



COMPLIANCE COMMITTEE

CC/ERT/ARR/2010/31

19 April 2010

**Report of the individual review of the annual submission of Denmark
submitted in 2009**

Note by the secretariat

The report of the individual review of the annual submission of Denmark submitted in 2009 was published on 15 April 2010. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2009/DNK, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.



**UNITED
NATIONS**



**Framework Convention
on Climate Change**

Distr.
GENERAL

FCCC/ARR/2009/DNK
15 April 2010

ENGLISH ONLY

**Report of the individual review of the annual submission of Denmark
submitted in 2009***

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Denmark, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 31 August to 5 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Newton Paciornik (Brazil) and Mr. Tinus Pulles (Netherlands); energy – Mr. Gebru J. Endalew (Ethiopia), Ms. Erasmia Kitou (European Union) and Mr. Hongwei Yang (China); industrial processes – Mr. Menouer Boughedaoui (Algeria) and Mr. Jos Olivier (Netherlands); agriculture – Mr. Paul Duffy (Ireland) and Mr. Jacques Kouazounde (Benin); land use, land-use change and forestry (LULUCF) – Mr. Sandro Federici (Italy) and Mr. Motoshi Hiratsuka (Japan); and waste – Ms. Kyoko Miwa (Japan) and Ms. Melissa Weitz (United States of America). Mr. Yang and Mr. Duffy were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira (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 Denmark, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in Denmark was carbon dioxide (CO₂), accounting for 80.0 per cent of total GHG emissions¹ expressed in CO₂ eq, followed by nitrous oxide (N₂O) (10.1 per cent) and methane (CH₄) (8.6 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 78.1 per cent of the total GHG emissions, followed by agriculture (15.0 per cent), industrial processes (3.8 per cent), waste (2.0 per cent), other (1.0 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions² amounted to 67,320.43 Gg CO₂ eq and decreased by 3.8 per cent between the base year³ and 2007.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector and the sector other (sector 7).

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

² Emissions from the sector other (sector 7), which refer to emissions of Greenland, are included in this total.

³ “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1990–2007^a

Greenhouse gas	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^b	1990	1995	2000	2005	2006	2007	
CO ₂	52 793.32	52 793.32	60 574.22	52 918.47	50 228.66	58 068.68	53 227.80	0.8
CH ₄	5 695.50	5 695.50	5 988.57	5 889.87	5 678.45	5 625.14	5 748.09	0.9
N ₂ O	10 526.65	10 526.65	9 357.87	8 288.08	6 739.27	6 482.26	6 779.78	–35.6
HFCs	217.73	NA, NE, NO	217.73	604.64	795.00	814.90	840.00	285.8
PFCs	0.50	NA, NE, NO	0.50	17.89	13.90	15.68	15.36	2 958.7
SF ₆	107.34	44.45	107.34	59.23	21.75	35.99	30.35	–71.7

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

^a “Total greenhouse gas emissions” includes emissions from Annex A sources only and excludes emissions/removals from the land use, land-use change and forestry sector and the sector other.

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

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^a	1990	1995	2000	2005	2006	2007	
Energy	52 083.08	52 083.08	59 911.52	52 185.53	49 610.69	57 431.46	52 546.08	0.9
Industrial processes	2 520.63	2 239.52	2 724.21	3 386.52	2 435.00	2 515.81	2 532.74	0.5
Solvent and other product use	179.38	179.38	140.96	126.61	113.39	129.94	124.00	–30.9
Agriculture	13 009.54	13 009.54	11 906.20	10 581.54	9 929.16	9 585.98	10 072.34	–22.6
LULUCF	NA	551.16	–1 669.73	1 630.22	160.72	–875.29	–1 127.55	NA
Waste	1 548.40	1 548.40	1 563.34	1 497.97	1 388.81	1 379.47	1 366.23	–11.8
Other	651.41	651.41	558.84	691.11	663.04	686.49	679.31	4.3
Total (with LULUCF)	NA	70 262.49	75 135.35	70 099.50	64 300.82	70 853.86	66 193.14	NA
Total (without LULUCF, without the sector other^b)	NA	69 059.92	76 246.23	67 778.17	63 477.05	71 042.66	66 641.38	NA
Total (without LULUCF, with the sector other^b)	69 992.39	69 711.21	76 804.95	68 469.13	64 139.83	71 728.88	67 320.43	–3.8

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

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and

1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only, but include emissions reported under the sector other.

^b Emissions from the sector other excluding LULUCF, which refer to emissions of Greenland, are included in the total.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007. The national inventory report (NIR) was submitted on 15 April and resubmitted on 29 May. Denmark also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on accounting of Kyoto Protocol units and changes in the national registry. The standard electronic format (SEF) tables were submitted on 15 April and resubmitted on 20 April. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. In addition to its CRF tables for Denmark and Greenland, which is Denmark's submission under the Kyoto Protocol, Denmark has submitted sets of CRF tables for: Denmark, and Greenland and Faroe Islands, which are reported under the Convention, and Denmark only, which are reported for the submission of the European Community under the burden-sharing agreement of the European Union for meeting commitments under the Kyoto Protocol. The Party has also included independent sets of CRF table summary 2 for: Denmark and Greenland, Greenland, and Faroe Islands.

7. In addition, the expert review team (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.⁴

8. During the review, Denmark provided the ERT with additional information. The full list of materials used during the review is provided in annex I to this report.

Completeness of the inventory

9. The inventory is complete in terms of years and geographical coverage and covers almost all source and sink categories. Denmark is not estimating emissions from several pools and categories in the LULUCF sector. The list of categories and carbon pools that Denmark is reporting as not estimated ("NE") is discussed in the LULUCF chapter (see para. 78).

10. Information on not estimated categories is provided in detail in the CRF tables and the NIR (annex 5 provides a detailed justification for the categories "NE"), and the ERT commends the Party for this transparent reporting procedure.

11. The ERT noted that Denmark reported as "NE" a few categories and subcategories, for which there are no methodologies to estimate emissions in 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 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), including: CO₂ from food and drink (other production); CO₂ emissions from iron production (for this category the NIR refers that the Party is not providing estimates, while CRF table 2(I) reports not occurring ("NO")); N₂O emissions from fire extinguishers, aerosol cans, and other uses; CH₄ from enteric fermentation (poultry and fur animals); CH₄ direct and indirect emissions from agricultural soils;

⁴ The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paragraphs 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. The SIAR is not publicly available.

and CO₂ from solid waste disposal on land. During the centralized review, the Party informed the ERT that it is making efforts to collect data to be able to prepare emission estimates for some of these categories.

12. The ERT commends the Party for its plans to improve the completeness of the inventory, and generally encourages Denmark to explore approaches available in the scientific literature to estimate emissions for categories that do not have methodologies prescribed in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, with a view to enhancing further, to the extent possible, the completeness and accuracy of its inventory. The ERT also recommends that the Party, when reporting emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series and that the choice of methods and emission factors (EFs) is clearly explained in the NIR.

D. Main findings

13. The inventory is generally in line with the Revised 1996 IPCC Guidelines, 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), but the ERT identified the need for further methodological improvements in the following areas: incorporate estimates of emissions and removals of Greenland in the key category and uncertainty analyses, and ensure consistency in the time series when using the European Union emissions trading scheme (EU ETS) data for more recent years.

14. The 2009 annual inventory submission is of good quality and generally complete. Denmark is only not estimating emissions from several pools and categories in the LULUCF sector, and for some categories of other sectors, but for which there are no methodologies to estimate emissions in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

15. The ERT found that the inventory submitted by Denmark was not reported in full accordance with the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” (hereinafter referred to as the UNFCCC reporting guidelines), as it was not fully complete and transparent. Denmark reports aggregated estimates of emissions and removals for each gas from Greenland in the sector other (sector 7) instead of including these emissions and removals in the relevant sectors. Considering that, according to Article 3, paragraph 1, of the Kyoto Protocol only activities included in Annex A to the same Protocol (energy, industrial processes, solvent and other product use, agriculture and waste) should be considered as aggregate emissions, the Party has provided explanations that the part of emissions reported in the sector other and corresponding to activities under Annex A should be included in the aggregate total in accordance with Article 3, paragraph 1, of the Kyoto Protocol. For this purpose, Denmark included as an annex to the 2009 submission additional CRF tables summary 2 where emissions from Greenland are allocated to each sector and total emissions from Denmark and Greenland are combined.

16. However, the ERT noted this does not result in transparent and complete reporting under the Kyoto Protocol. In particular, the CRF sectoral background tables for each sector do not refer to activity data (AD), EFs and emissions for the totality of the territory to be covered by the submission under the Kyoto Protocol (Denmark and Greenland), which would support the information reported in this separate CRF Summary 2 table and would allow for the review of this information. At the end of the week of the centralized review, the ERT identified the problem of lack of transparency and completeness in the CRF tables as a problem in accordance with paragraph 73 of the annex to the “Guidelines for review under Article 8 of the Kyoto Protocol”, and requested that the Party provide a complete set of CRF tables for all years from 1990 to 2007, containing the data for Denmark and Greenland combined. Denmark

acknowledged the problem identified by the ERT and informed the ERT that it intends to resolve this issue by providing additional resources and to submit a fully integrated CRF tables for Denmark and Greenland in the 2010 annual submission. However, Denmark was not able to submit revised GHG inventory estimates and provide the requested single and complete set of CRF tables for the 2009 submission for all years from 1990 to 2007 due to problems in provision of resources. The ERT reiterates the recommendation from previous reviews that Denmark integrate emissions in Greenland into the relevant specific categories in both the CRF tables and the NIR for the reporting of annual submissions under the Kyoto Protocol for the next annual submission and subsequent submissions.

17. Denmark has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The Party did not submit on a voluntary basis information on activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol, information on changes to the national system, or information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

18. Denmark reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1.

19. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified that the procedures for inventory preparation with respect to the inclusion of Greenland data and emission estimates in the annual submission under the Kyoto Protocol are not fully operational, and the resultant submission is not in accordance with the transparency principle as defined in the UNFCCC reporting guidelines. Furthermore, the ERT noted that the national system was unable to react to the request for information during this centralized review in accordance with paragraphs 73 and 74 of the annex to the “Guidelines for review under Article 8 of the Kyoto Protocol” (see paras. 27–29 below).

20. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. However, the ERT identified, from the SIAR, that the information provided in the submission by Denmark in response to recommendations from previous reviews is not sufficient to assess whether they were fully resolved. Therefore, the SIAR strongly recommends that Denmark provide, in its next annual submission, more detailed information on: steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction, including information on whether there are automated processes in place to terminate discrepant transactions.

21. The ERT encourages Denmark to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.⁵

22. In the course of the review, the ERT formulated a number of recommendations relating to: the institutional arrangements to ensure full operation of the national system in Greenland; integration of the inventory of Greenland into the relevant specific categories in both the CRF tables and the NIR; and ensuring time-series consistency when using the EU ETS data for the most recent years.

⁵ <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

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

1. Overview

23. The ERT concluded that the national system continued to perform its required functions. However, the ERT noted the need for strengthening the national system, ensuring that the institutional arrangements with the Government of Greenland are in place and that all necessary data from Greenland are available to the national system in order to be able to integrate the emissions occurring in Greenland into the appropriate categories and reported for the full territory included for Denmark in the Kyoto Protocol.

2. Inventory planning

24. The NIR describes the national system for the preparation of the inventory. The National Environmental Research Institute (NERI) is responsible for reporting the national inventory of Denmark to the UNFCCC, including the preparation of the annual submission and its submission to the UNFCCC secretariat. NERI is also the single national entity designated with overall responsibility for the national inventory under the Kyoto Protocol for Greenland and Denmark. Other ministries, research institutes, institutional organizations and private companies in Denmark are involved with the preparation of the inventory, mostly as data providers, including: Danish Energy Authority; Danish Environmental Protection Agency; Statistics Denmark; Faculty of Agricultural Sciences; the Road Directorate; Danish Centre for Forest, Landscape and Planning; Civil Aviation Agency of Denmark; Danish Railways; and the Ministry of Transport and Energy. The inventory also uses data from audited accounting reports under the EU ETS and information received directly from companies.

25. The Government of Greenland is responsible for finalizing the inventory for Greenland and to transfer it to NERI so it is included in the submission under the Kyoto Protocol. The Environmental Agency of the Faroe Islands is responsible for finalizing the inventory on behalf of the Ministry of Interior of the Faroe Islands and transferring it to NERI, where data are used to prepare the inventory under the Convention.

26. The NIR also describes in detail the institutional arrangements for the preparation of the inventory in Greenland in its annex 6.2.1. According to the NIR, the Climate and Infrastructure Agency is responsible for the preparation of the annual inventory of Greenland and its submission to the UNFCCC secretariat (CRF tables and an NIR). The ERT found this statement not in agreement with the indication of the roles of NERI. In response to the draft review report, Denmark acknowledged to the ERT that the text in the NIR is inaccurate and provided further clarification that the Climate and Infrastructure Agency is responsible for the preparation of complete reporting of emissions and removals using the CRF tables and the documentation for the GHG emission inventory of Greenland, excluding reporting of information on activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol, which is the responsibility of the Danish authorities. The Party also clarified that the Climate and Infrastructure Agency will provide the data to NERI and that NERI is responsible for aggregating the CRF tables of Denmark and Greenland and reporting the resultant aggregated CRF tables to the secretariat. Denmark further informed that the NIR text will be updated in the next annual submission accordingly. The ERT recommends Denmark to do so.

27. The ERT noted that the national system was unable to collect the necessary data from Greenland to prepare a complete set of CRF tables for the whole territory of Denmark and Greenland. Estimates of emissions and removals from Greenland are not reported in the appropriate categories and sectors, but rather, the aggregated values for each gas are reported in the sector other (sector 7). Accordingly, the CRF sectoral background tables for each sector do not refer to AD, EFs and emissions for the total

territory under the Kyoto Protocol, Denmark and Greenland, but only to Denmark. The ERT also noted that this situation was detected in previous reviews, and the Party has not been able to solve this issue.

28. Responding to the ERT during the centralized review, Denmark has informed that NERI, the single national entity responsible for the GHG inventory, has prepared an agreement with Greenland on the matter and provided the ERT with a copy of the document in Danish (see the list of additional information provided by the Party in annex I to this report). However, the ERT was not provided with further information that the agreement was effective and under implementation. After the centralized review, in accordance with paragraph 73 of the annex to decision 22/CMP.1, the ERT requested Denmark to submit a complete set of CRF tables for all years from 1990 to 2007, containing the data of Denmark and Greenland combined and allocated to categories included in Annex A to the Kyoto Protocol and the LULUCF sector.

29. Responding to the ERT, Denmark confirmed that it intends to solve this issue by providing additional resources and to submit a fully integrated CRF for Denmark and Greenland in the 2010 annual submission. However, Denmark was not able to submit revised GHG inventory estimates and provide the requested single and complete set of CRF tables for the 2009 submission for all years from 1990 to 2007 due to problems in provision of resources. In response to the draft review report, Denmark informed the ERT that an agreement between NERI and the Government of Greenland was indeed made to ensure future cooperation in reporting emission estimates for Greenland and Denmark in a combined CRF. The Party also informed the ERT that a project was undertaken to improve the emission inventory of Greenland and that this project was successful and, as a result, a full CRF for Denmark and Greenland will be submitted on time for the next annual submission. Further, the Party provided the ERT with a full set of CRF tables for all years from 1990 to 2008 for Denmark and Greenland in draft form. The ERT strongly recommends that Denmark make the agreement effective and implement the necessary improvements to the national system, ensuring that the emissions of Greenland are fully integrated into the CRF tables and the NIR of the next and subsequent submissions.

3. Inventory preparation

Key categories

30. Denmark has reported a key category tier 1 analysis, both level (base year and 2007) and trend assessment, as part of its 2009 submission. Denmark has included the LULUCF sector in its key category analysis. However, the ERT noted that the Party did not report the results of the key category analysis excluding LULUCF in its NIR, which should also be provided to show that it was done in accordance with the IPCC good practice guidance for LULUCF. The ERT recommends that Denmark also report on the results of the analysis excluding LULUCF in the NIR of its next annual submission. The ERT also reiterates the recommendations in the previous review report⁶ that Denmark reports a tier 2 analysis in its next annual submission.

31. The key category analysis performed by Denmark and that performed by the secretariat⁷ produced similar results. The few differences are explained by the different level of disaggregation of the analysis and by the fact that Denmark did not include the data for Greenland in its key category analysis while the secretariat included it as sector 7 (other). In the secretariat's analysis, sector 7 (other)

⁶ FCCC/ARR/2008/DNK, paragraph 7.

⁷ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. 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.

is identified as a key category, stressing the importance of moving the emissions reported under this sector to the appropriate sectors included in Annex A to the Kyoto Protocol. The key category analysis is used by Denmark to prioritize the development and improvement of the inventory. The ERT recommends that Denmark, in its next annual submission, include the emissions for Greenland in the appropriate categories before preparing the key category analysis.

Uncertainties

32. Denmark has provided a tier 1 level and trend uncertainty analysis in line with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, covering all sources and removals except N₂O from other product use and CO₂ from use of lubricants (reported under the category other (industrial processes (2.G))). The uncertainty analysis also does not cover emissions in Greenland. The ERT noted that the uncertainty estimates are largely based on default IPCC uncertainty levels for activity rates and EFs. Denmark informed the ERT that it is planning to incorporate more country-specific uncertainty estimates in future submissions. The ERT encourages Denmark to incorporate more country-specific uncertainty estimates in its next annual submission. The ERT also encourages Denmark to prepare a tier 2 analysis that could better represent the uncertainty for categories with high uncertainty values, such as N₂O emissions from the agriculture sector. The ERT encourages the Party to include the categories of Greenland in the uncertainty analysis for the next annual submission.

Recalculations and time-series consistency

33. Denmark has reported recalculations for all years, from 1990 to 2006, and for all sectors and gases. The recalculations resulted from: availability of new AD (energy, industrial processes, agriculture and waste sectors); new EFs (solvent and other product use and agriculture sectors); and inclusion of new categories (LULUCF sector).

34. The rationale for the recalculations is provided in the NIR in a transparent manner, with descriptions for the overall inventory (chapter 10 of the NIR) and detailed explanations at category level whenever relevant. Explanations are also provided in CRF table 8(b). However, the information reported in CRF table 8(a) does not show the difference between the previous submission and the current submission. During the centralized review, the Party explained to the ERT that this is due to the fact that every year Denmark submits to the secretariat three different submissions and the CRF Reporter software provided by the UNFCCC secretariat only compares the current submission with the last submission where the last submission from the previous year does not have the same scope of the first submission made in the subsequent year. To overcome this problem, the Party provided the comparative analysis for total emissions in the NIR, including tables showing the absolute magnitude of recalculations for CO₂, CH₄ and N₂O (tables 10.1–10.4 in the NIR), in relation to Denmark only. The magnitude of the impact (table 10.1 in the NIR) includes a decrease in total GHG emissions in the base year (1990, 0.1 per cent) and an increase in 2006 (0.8 per cent). The ERT recommends that the Party solve this reporting problem together with the secretariat, in order to provide a correct CRF table 8(a) in the next annual submission. The ERT also recommends that the Party include quantitative information in the NIR in relation to recalculations referring to the submission under the Kyoto Protocol (Denmark and Greenland). In response to the draft review report, Denmark informed that, starting with the 2011 submission, it plans to submit five different complete sets of CRF tables: Denmark; Greenland; Faroe Islands; Denmark and Greenland; and Denmark, Greenland and Faroe Islands. The Party also informed the ERT that the CRF table 8(a) in each of the submissions, beginning with the 2011 submission, will contain the appropriate correct values of recalculations.

35. The ERT identified instances where the use of the EU ETS data to estimate emissions for more recent years may be causing inconsistency in the time series. The NIR presents specific information on the use of EU ETS data (annex 3.A to the NIR, section 5.6.1), following a recommendation in the

previous review report. The NIR indicates for which categories EU ETS data are used to establish the CO₂ implied emission factor (IEF), and that quality assurance/quality control (QA/QC) procedures are applied to data. The Party also clarified that EU ETS emissions are only used in the inventory when higher-tier methodologies (defined in accordance with EU ETS reporting guidelines) are used. EU ETS data are used for more recent years, in particular to estimate CO₂ emissions for stationary combustion in the energy sector (use of solid, liquid and other fuels) and for cement production (use of petroleum coke), CO₂ emissions from cement production, and CO₂ from limestone and dolomite use (sugar processing) and other mineral products (yellow bricks production and expanded clay production). The ERT recommends that the Party provide information showing that the methodologies used to establish the emission estimates under the EU ETS are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for each category where they are used.

36. The ERT noted that it is not clear if the Party has ensured consistency in the time series in accordance with the IPCC good practice guidance when using data from EU ETS for the most recent years in the time series (e.g. see paras. 49 and 60 below). The ERT recommends that Denmark ensure time-series consistency in accordance with the IPCC good practice guidance when using the EU ETS data and provide the necessary explanations in the next annual submission.

Verification and quality assurance/quality control approaches

37. Denmark has developed a QA/QC plan and provides a comprehensive description of its major elements in the NIR of the 2009 submission, including general concepts and a detailed list of QC actions (general and specific for each category). For individual sectors and categories, the Party includes a detailed discussion of the implementation of the overall plan, the QA/QC applied to individual categories and the identification of additional improvements that are necessary to include in the plan. The ERT commends the Party for the transparent reporting on its QC plan, which is in accordance with the IPCC good practice guidance.

38. The NIR does not include information on the QA/QC procedures applied to the inventory of Greenland. Responding to the previous review,⁸ the Party explained that the QA/QC procedures for Greenland, together with detailed explanations of the plan, will be included in the 2010 submission. The ERT reiterates the recommendations from the previous review that the Party implement the plan for the next annual submission. It also recommends that the Party include a description of the full QA/QC system in the NIR for the next annual submission.

Transparency

39. The ERT considers that the NIR of Denmark is generally prepared in a transparent manner and the Party has made significant improvements since last year's submission. In particular, the ERT welcomes the inclusion of methodological information for Greenland in the NIR, as recommended in previous reviews. However, the ERT noted that this information is still included as an annex (annex 6.2) and not in the sectoral discussion in the main body of the NIR. Therefore, the ERT recommends that the Party extend and incorporate this information in the main chapters of the NIR.

40. Denmark reports the emissions of Greenland as the total of emissions in the sector other rather than reported in the appropriate categories and sectors. Accordingly, the CRF sectoral background tables for each sector do not refer to AD, IEFs and emissions for the total territory (Denmark and Greenland) under the Kyoto Protocol. The ERT considers that this way of reporting reduces the transparency and impairs comparability with the other Parties. The ERT strongly recommends that Denmark report on emissions in Greenland by integrating the activities in Greenland into the categories included in Annex A to the Kyoto Protocol for the next annual submission. In response to the draft review report, Denmark

⁸ FCCC/ARR/2008/DNK.

stated that it intends to submit a complete CRF submission in 2010 for Denmark and Greenland combined and has provided a set of CRF tables to the ERT in a draft form.

4. Inventory management

41. The background data, AD and EFs for the inventory of Denmark are collected and stored in central databases located at NERI. The databases are in Access format and handled with software developed by the European Environment Agency and NERI. For each submission, databases and additional tools and sub-models are frozen and saved together with the CRF tables in central institutional servers, which are subject to routine backup services. Backups are archived safely. Additionally, all correspondence is registered, including the registration of submissions and communication on inventories with the UNFCCC secretariat, the European Commission and review teams.

42. For the inventory of Greenland, background data (AD and EFs) are collected and stored in central databases at Statistics Greenland. The databases were developed in SAS software and were designed by Statistics Greenland. The material is placed on servers at Statistics Greenland. The servers are subject to routine backup services and archived in a safe place. The ERT considers that Denmark has in place an appropriate system for the management of the inventory and its archiving. The ERT encourages the Party to collect and archive all the information from both Denmark and Greenland in a single location.

F. Follow-up to previous reviews

43. Denmark includes in its NIR detailed information for the energy sector on the improvements made in response to the comments and recommendations from earlier reviews. The ERT commends the Party for this transparent way of presenting its follow-up to earlier reviews, and recommends that Denmark extend this procedure for all sectors. In the 2009 submission, the reported improvements include:

- (a) Improved documentation for the use of town gas and non-energy use of fuels;
- (b) Documentation for the use of EU ETS data has been incorporated into the NIR (annex 3.A);
- (c) Improved documentation for QA/QC procedures applied to plant-specific EFs;
- (d) Documentation of the inventory of Greenland. The Party provided in annex 6.2.1 to the NIR a description of the institutional arrangements for the preparation of the inventory and the national system, general descriptions of methodologies used, and trends and explanations of trends (Greenland, and Greenland and Denmark).

44. The ERT noted that Denmark did not follow the strong recommendation of the previous review reports to incorporate the emissions of Greenland into the respective sectors of Denmark, both in the CRF tables and the NIR. The Party has not yet reported fully on QA/QC actions for Greenland.

G. Areas for further improvement

1. Identified by the Party

45. The 2009 NIR identifies several areas for improvement:

- (a) Improve documentation for EFs, including further QA/QC checks on plant-specific EFs;
- (b) Develop country-specific uncertainty values, to replace the current analysis based on default values;

- (c) Increase the use of data from EU ETS;
- (d) Include emission estimates from storage of fuels and town gas;
- (e) Update EFs to estimate emissions for combined heat and power (CHP) plants.

2. Identified by the expert review team

46. The ERT identifies the following cross-cutting issues for improvement:
- (a) Implement the institutional arrangements with the Government of Greenland to ensure full operation of the national system in that part of the territory to be included in the submission under the Kyoto Protocol;
 - (b) Integrate the emission estimates for Greenland into the relevant specific categories, in both the CRF tables and the NIR, for the reporting of annual submissions under the Kyoto Protocol;
 - (c) Integrate information concerning the institutional arrangements for inventory preparation and QA/QC procedures for Greenland in the main part of the NIR together with the information for Denmark;
 - (d) Integrate information related to Greenland in relation to methodologies, AD, EFs, emission trends and uncertainty analysis in the sectoral chapters in the NIR, together with the information for Denmark;
 - (e) Include Greenland's emissions and removals in the appropriate categories when performing the key category analysis and uncertainty analysis;
 - (f) Resolve the problems detected in calculating and reporting recalculations in CRF table 8(a) when using CRF Reporter, and due to the fact that the Party submits three different sets of CRF tables in each year;
 - (g) Ensure time-series consistency in accordance with the IPCC good practice guidance when using the EU ETS data for the most recent years, and provide the necessary explanations in the NIR on how the consistency in the time series was obtained. Also, provide information showing that the methodologies used to establish the emission estimates under the EU ETS are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for each category where they are used.
47. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

48. The energy sector is the main sector in the GHG inventory of Denmark. In 2007, emissions from the energy sector amounted to 52,546.08 Gg CO₂ eq, or 78.1 per cent of total GHG emissions, excluding emissions from fuel combustion in Greenland, which are reported under the sector other instead of the energy sector. Since 1990, emissions have increased by 0.9 per cent. The key driver for the rise in emissions was the increase of emissions in the category transport, which was largely compensated by the decrease in emissions from other sectors and from energy industries. Within the energy sector, 48.5 per cent of the emissions were from energy industries, followed by 26.9 per cent from transport, 12.3 per cent from other sectors and 11.0 per cent from manufacturing industries and construction.

Fugitive emissions from solid fuels and oil and natural accounted together for 0.9 per cent. The remaining 0.3 per cent of emissions resulted from other fuel combustion.

49. Denmark uses EU ETS data for the update of the time series of CO₂ emissions only for more recent years coal and residual oil fired power plants. In responding to the ERT during the centralized review, Denmark stated that EU ETS data are only available for 2006 and 2007 and that the EF for 1990–2005 would not be improved by extrapolating from 2006 and 2007 data. Reiterating the recommendations in the previous review report,⁹ the ERT recommends that Denmark recalculate the whole time series by applying the EFs from the EU ETS data, which are more representative and more accurate for the coal and residual oil fired power plants in Denmark, and ensuring that the use of EU ETS data ensure that the use of EU ETS data is followed by appropriate actions in accordance with the IPCC good practice guidance in order to maintain the consistency of the time series for which these data are used. The ERT also recommends that the Party provide more background information to explain the reasons for the variability of the IEF for the most recent years. Further, the ERT recommends that Denmark provide information showing that the methodologies used to establish the emission estimates under the EU ETS are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for each category where they are used.

B. Reference and sectoral approaches

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

50. CO₂ emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2007, CO₂ emissions estimated by the sectoral approach (51,127.06 Gg) are only slightly larger (0.004 per cent) than emissions estimated by the reference approach (51,125.03 Gg). Denmark provided appropriate explanations in the documentation box of CRF table 1.A(c) and in the NIR for the differences between the reference approach and the sectoral approach. According to the NIR, the reference approach prepared by Denmark is based on data for import, export and stock change of energy products prepared by the Danish Energy Authority. The ERT noted that in order to achieve a better agreement with the sectoral approach the Party adds CO₂ emissions from incineration of the plastic component of municipal waste to the reference approach and also assumes in the reference approach that 50 per cent of the consumption of lubricants and all bitumen and white spirit are stored and not emitted. In the sectoral approach, emissions of CO₂ from incineration of the plastic fraction of municipal waste are reported under the categories energy industries, manufacturing industries and construction, and other sectors. The ERT commends the Party for its efforts to use the reference approach as verification of the results of the inventory for the energy sector.

51. Data on apparent energy consumption reported in the inventory are in very close agreement with the energy consumption reported to the International Energy Agency by Denmark. Annual discrepancies between the two data sets are not significant, smaller than 0.3 per cent for all years in the period 1990–2007.

2. International bunker fuels

52. To separate emissions from civil aviation from international aviation bunkers, Denmark considered as domestic (reported under the category civil aviation) the estimates of fuel used in all flights with departure and arrival points in Denmark, and also included the jet fuel sold in Greenland and the Faroe Islands, assuming that almost all fuel sales in Greenland and the Faroe Islands are used to flights to Denmark.

⁹ FCCC/ARR/2008/DNK.

53. The split between domestic navigation and international marine bunkers is done in the following manner: total fuel sales to Danish ferries and other ships navigating between ports in Denmark are included under domestic navigation; total fuel sold in Denmark to international ferries, international warships, any other ships with foreign destinations, transport to Greenland and the Faroe Islands, tank vessels and foreign fishing boats is considered under international maritime bunkers; in Greenland all fuel sales are considered as domestic; and in the Faroe Islands only fuel sales to local ships and fishing vessels are considered domestic. The ERT noted that the allocation procedures used by Denmark to identify fuel sales to domestic navigation and international maritime bunkers, and the inclusion of fuel sales to the fishing industry, is not in agreement with the IPCC good practice guidance, and recommends that the Party revise the methodology it uses to prepare such allocations for the next annual submission.

3. Feedstocks and non-energy use of fuels

54. In the NIR and in CRF table 1.A(d) Denmark refers that 50 per cent of lubricants are stored in feedstocks or non-energy products. However, in CRF table 1.A(d) the Party does not report if the remaining 50 per cent is oxidized resulting in CO₂ emissions and, if yes, in which categories emissions are reported. According to page 458 of the NIR, emissions from use of white spirit are reported in the sector solvent and other products, emissions from bitumen use are reported in the category mineral products and emissions from the oxidation of lubricants under other industrial processes (2.G). The ERT noted that the NIR does not contain a dedicated section concerning feedstocks and non-energy use of fuels, referring to this subject under the section dedicated to the reference approach, and encourages the Party to provide more explanations in the next annual submission, following the UNFCCC reporting guidelines. The ERT also recommends that Denmark complete CRF table 1.A(d) for the next annual submission. In response to the draft review report, the Party stated that information will be included in CRF table 1.A(d) in the next annual submission.

C. Key categories

1. Stationary combustion: solid fuels and biomass – CO₂

55. CO₂ emissions from waste incineration are reported in the energy sector under the categories: public electricity and heat production; other (manufacturing industries and construction); and other sectors. This allocation is in accordance with the IPCC good practice guidance, given that Denmark reports that all incinerated waste is used for energy production. However, the Party reported the energy consumption from incineration of municipal waste under fuel type biomass, but the associated CO₂ emissions were split into two parts: CO₂ emissions from the plastic component of the waste were reported under other fuels; and CO₂ emissions from the biomass part were reported under biomass. The ERT considers that although total CO₂ emissions are correctly estimated and allocated in accordance with the IPCC good practice guidance, the IEFs reported in the CRF tables for biomass and other fuels are not correct and transparently reported, and they are not comparable to the IEFs reported by other Parties. Therefore, the ERT recommends that Denmark split the AD for waste incineration into biomass and plastic fractions, and allocate the energy values to biomass and other fuels, respectively, to improve transparency for the next annual submission.

56. The CO₂ IEFs for biomass for pulp, paper and print industry and for food processing, beverages and tobacco range generally between 93.89 t/TJ and 101.99 t/TJ for all years reported in the period 1990–2007. However, the ERT noted that Denmark reports unusually low values from 2000 to 2003 (between 13.18 t/TJ and 21.57 t/TJ). Responding to a question raised by the ERT during the centralized review, Denmark explained that this results from an error in the disaggregation of emissions from manufacturing industries and construction by relevant subcategories (1.A.2.a–1.A.2.f.). The ERT recommends that Denmark corrects this mistake and enhances the QA/QC procedures it applies to check IEFs and their trends for the next annual submission.

2. Road transportation: liquid fuels – CO₂, CH₄ and N₂O¹⁰

57. The CO₂ IEF for use of gasoline in road transportation is constant over the period 1990–2005 and equal to the IPCC default value (73.00 t/TJ). However, the IEF decreased in 2006 (72.86 t/TJ) and 2007 (72.76 t/TJ). Responding to a question raised by the ERT, Denmark explained during the centralized review that the decrease in the IEF in 2006–2007 results from the fact that ethanol was started to be used in the country mixed with gasoline since 2006. Besides, the Party explained that CO₂ emissions from the ethanol fraction are reported under biomass, while AD are reported under gasoline (and reported as included elsewhere (“IE”) under biomass). The ERT also noted that CH₄ and N₂O emissions are also reported as “IE” under biomass. The ERT considers that the reporting of emissions from biomass use in road transportation is not transparent, and the IEFs are not correctly calculated and reported in the CRF tables. Therefore the ERT recommends that the Party separate the energy component associated with ethanol, which should be reported under biomass, from gasoline for the next annual submission. The ERT also recommends that the Party make efforts to report the part of CH₄ and N₂O emissions from the use of ethanol under biomass.

III. Industrial processes and solvent and other product use

A. Sector overview

58. In 2007, emissions from the industrial process sector amounted to 2,532.74 Gg CO₂ eq, or 3.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 124.00 Gg CO₂ eq, or 0.2 per cent of total GHG emissions (it should be noted that this excludes HFC and SF₆ emissions from consumption of halocarbons and SF₆ in Greenland, which Denmark reports under the sector other in the CRF tables instead of the industrial processes sector). Since the base year (1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆), emissions have increased by 0.5 per cent in the industrial processes sector and decreased by 30.9 per cent in the solvent and other product use sector. The key drivers for the rise in emissions in the period 1990–2007 in the industrial processes sector were the consumption of HFCs, in particular for refrigeration, which has increased by 628.26 Gg CO₂ eq (290 per cent), and CO₂ emissions from cement production, which have increased by 524.69 Gg CO₂ (59.5 per cent). However these increases were largely compensated for by a 100 per cent decrease of N₂O emissions from nitric acid production (emissions were reduced from 1042.84 Gg CO₂ eq in 1990 to not occurring in 2007). Within the industrial processes sector, 63.4 per cent of the emissions were from mineral products, followed by 35.0 per cent from consumption of halocarbons and SF₆, and by 1.5 per cent from the category other (industrial processes (2.G)). The remaining 0.1 per cent was from the chemical industry. The most relevant categories of the industrial sector in 2007 were CO₂ from cement production (55.4 per cent), HFC consumption for refrigeration and air-conditioning equipment (28.5 per cent), HFC consumption for foam blowing (4.1 per cent) and CO₂ from lime production (2.6 per cent).

59. Generally the information in the NIR is not transparently presented. As an example, the ERT noted that documentation of recalculations for the category cement production is not complete and the following elements are missing: explanation of how the Party ensured the consistency in the time series in accordance with the IPCC good practice guidance, in particular given that EFs from the EU ETS are used for the most recent years; and justifications that the selection of country-specific EFs comply with the IPCC good practice guidance and that these result in an improvement of accuracy or completeness. Moreover, in some sections the structure of the NIR is not fully transparent and it is difficult for the ERT to assess specific issues for some subcategories (e.g. subcategories within the category mineral products).

¹⁰ CH₄ and N₂O emissions are not identified as key categories. However, since the issues related to gasoline and ethanol use are discussed as a whole, the individual gases are not assessed in separate sections.

The ERT encourages Denmark to further improve the transparency of the NIR for the industrial processes sector.

60. As already noted in the energy sector, also in the industrial processes sector, Denmark is not assessing and showing that it is maintaining the consistency in the time series when it is using emission estimates and EFs from the EU ETS, notably for the categories: cement production; limestone use in sugar refining; and other mineral products (yellow bricks production and expanded clay production). The ERT recommends that Denmark ensure that the use of EU ETS data is followed by appropriate actions in accordance with the IPCC good practice guidance in order to maintain the consistency of the time series and the completeness of emission estimates for the categories for which these data are used. The ERT also recommends that the Party provide in the NIR more background information to explain the reasons for the recent variability of the IEFs (e.g. by comparing the estimates using both the previous methodology and the revised methodology using EU ETS data, including assessments explaining the nature of the differences as either accidental or systematic, and explaining the rationale for selection of the new EF). Further, the ERT recommends that Denmark provide information showing that the methodologies used to establish the emission estimates under the EU ETS are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for each category where they are used. Finally, the ERT recommends that Denmark provide information for this year's recalculation in cement production in future annual submissions.

B. Key categories

Cement production – CO₂

61. The CO₂ IEF shows an overall decrease by 12.3 per cent from 1990 (0.54 t/t) to 2007 (0.48 t/t), which is the largest variation among reporting Parties for the same period. The IEF has also decreased from 2005 to 2006 (2.5 per cent decrease) and from 2006 to 2007 (2.7 per cent decrease). From the information provided in the NIR and from further information provided during the centralized review, the ERT concluded that the Party uses three different data sources to establish EFs, and for the following periods: 1990–1997; 1998–2004; and 2005–2007 from EU ETS. The ERT noted that the change of reference source for the EF in 1998 coincides with a significant inter-annual change: 1997–1998 (4.8 per cent decrease) and 1998–1999 (4.9 per cent increase). The NIR states that all IEFs are based on measurements using the 'loss of ignition' method, which estimates CO₂ emissions by calculating the weight loss during the reactions to form clinker and cement and which result from loss of CO₂ from carbonates. During the centralized review, the Party provided sufficient explanation for the 1990–1997 period that the recent decreases in the IEF may be the result of changes in stock of clinker or changes in the product mix and raw materials consumption, but no quantitative supporting information was provided. The ERT noted that the information provided by Denmark is not sufficient to explain the changes in the EFs since 1998 and that the emission estimates for 2005–2007 are not underestimated, and recommends that Denmark provide more detailed information in the NIR, in the next annual submission, about the different sources of EFs, methodologies used for each period, more detailed information used to calculate the EFs by the 'loss of ignition' method (e.g. the quantity of raw materials used and their carbonate content) and on how the consistency was ensured and compliance with the IPCC good practice guidance is achieved. During the review, Denmark informed the ERT that more information on consistency in the time series will be included in the NIR of its next annual submission.

C. Non-key categories

1. Limestone and dolomite use – CO₂

62. The IEF for limestone and dolomite use shows a sudden decrease by 15.7 per cent between 2004 (0.142 t/t) and 2005 (0.120 t/t), and the ERT noted that 2005 is the first year in the time series when data

from the EU ETS are used to estimate emissions from some industry activities covered under this subcategory. In addition, the inter-annual changes in the CO₂ IEF for the category limestone and dolomite use in 2005–2006 (5.0 per cent) and 2006–2007 (3.0 per cent) are also significant. The ERT noted that estimates for more recent years could be underestimated in comparison to previous years in the time series, and the full time series may not be consistent. Besides, the ERT also found some potential inconsistencies in the time series of AD: an increase of 28.1 per cent in 2005–2006 and a 28.8 per cent decrease in 2006–2007. The Party did not provide information in the NIR explaining what verification procedures and methodologies it used to ensure that the full time series is consistent in accordance with the IPCC good practice guidance. The ERT recommends that Denmark provide in the NIR of its next annual submission information on the specific procedures and verifications the Party used. Denmark informed the ERT during the centralized review that it intends to do so in its next annual submission.

2. Other (mineral products) – CO₂

63. During the review week, and responding to a request made by the ERT to provide more information on the recalculation made for CO₂ from yellow bricks production, Denmark informed the ERT that the CO₂ EF used from 1990 to 2005 (0.079 t/t bricks) is based on an average content of calcium carbonate in the clay used as raw material for yellow bricks. Denmark also referred that, although this EF has been verified against measurements of carbonate contents of the raw materials (comparison presented in Figure 4.3 in the NIR for the period 1998–2002) for the years 2006 and 2007, the EFs calculated from EU ETS data were different 0.075 t/t and 0.109 t/t, respectively. Despite these differences the Party has decided to use the emissions reported to the EU ETS in the inventory for the last two years, but did not provide reasons for the different EF for the last two years and did not assess or explain how it has ensured consistency with the previous years in the time series in accordance with the IPCC good practice guidance. The ERT recommends that Denmark provide in the next NIR sufficient information to assess that consistency in the time series was maintained, or revise the time series to ensure consistency.

3. Solvent and other product use – N₂O

64. The ERT noted that emissions from N₂O use are reported as “NE” for the categories N₂O use in fire extinguishers, aerosol cans and other uses, while emission estimates are reported for N₂O use as anaesthesia from 2005 to 2007. During the centralized review, Denmark informed the ERT that currently no AD are available to estimate N₂O emissions from use in fire extinguishers and aerosol spray cans, but that it will investigate further if estimates could be provided for future submissions. The ERT encourages Denmark in its efforts to increase the completeness of the inventory. The ERT encourages the Party to provide estimates of emissions of N₂O from use as anaesthesia for the period 1990–2004 in order to complete the time series.

IV. Agriculture

A. Sector overview

65. In 2007, emissions from the agriculture sector amounted to 10,072.34 Gg CO₂ eq, or 15.0 per cent of total GHG emissions. (It should be noted that this excludes CH₄ and N₂O emissions from enteric fermentation and manure management from sheep in Greenland, which are reported in the CRF tables under the sector other instead of the agriculture sector.) Since 1990, emissions have decreased by 22.6 per cent. The key drivers for the fall in emissions are the large reductions in dairy and non-dairy cattle livestock numbers, with the subsequent reduction of emissions from enteric fermentation, animal manure applied to soils, reduction in the use of synthetic nitrogenous fertilizer and decline in nitrogen leaching and run-off. Within the agriculture sector, 56.1 per cent of the emissions

were from agricultural soils, 27.7 per cent from enteric fermentation and the remaining 16.2 per cent from manure management.

66. The inventory is complete, as Denmark only does not estimate CH₄ emissions from enteric fermentation for poultry and fur animals, and CH₄ emissions from agricultural soils are also reported as “NE”. The ERT noted that there is no methodology provided in the Revised 1996 IPCC Guidelines or IPCC good practice guidance for these categories. Rice cultivation, prescribed burning of savannahs and field burning of agricultural residues do not occur in Denmark, and are reported with the notation keys “NO” and not applicable (“NA”). The ERT encourages Denmark to complete the inventory, by providing estimates for the missing categories, or revise the notation keys used and provide explanations in the NIR for the next annual submission.

67. Denmark estimates emissions from agriculture using a complex model: the Inventory Agriculture Data built as a database based on the model DIEMA. The ERT commends Denmark for implementing this improvement recommended in the previous annual review. However, during the week of the review, the ERT found some erroneous data reported in Denmark’s agricultural CRF tables for 2007, in particular, nitrogen amounts for poultry in CRF table 4.B(b) and nitrogen inputs to the category animal manure applied to soils in CRF table 4.D. In response to questions raised during the review, Denmark stated that the new model still requires some improvement in relation to QA/QC and the quality of the submission will be improved for the next annual submission. The ERT recommends that Denmark implement the additional quality checking of all outputs from this database in its next annual submission, and document these quality checks in its NIR and ensure the CRF tables are completed without errors for the next annual submission.

B. Key categories

1. Enteric fermentation – CH₄

68. All livestock CH₄ EFs are based on tier 2 approaches and estimates of energy intake are based on data from Danish feeding plans using country-specific models. The previous annual reviews recommended that Denmark perform a QC check on this approach by comparing the estimates of energy intake with the tier 2 method described in the IPCC good practice guidance. During the course of this review, Denmark informed the ERT that this analysis will be available as planned for the 2010 annual submission. The ERT noted Denmark’s continuing efforts to improve the transparency of this key category and urges Denmark to complete the verification procedures in response to previous annual reviews.

69. Denmark uses country-specific methods to estimate the methane conversion ratio (Y_m) from dairy and other cattle, and IPCC default methods for other livestock categories. The Y_m values for dairy cattle and heifers are based on a country-specific model and using specific feeding regime. In response to recommendations from the previous annual review, the ERT noted that Denmark has provided additional information on the Y_m factor in section 6.2.2 of the NIR and has also provided data in appendix 3D concerning the grown area of sugar beets, using data from Statistics Denmark. During the centralized review, Denmark stated that it intends to provide additional data on the area of maize in the NIR of the next annual submission. The ERT commends Denmark on its efforts to improve the transparency of this country-specific methodology.

70. The gross energy (GE) intake of non-dairy cattle increased by 12.1 per cent between 2006 and 2007, from 105.4 to 130.4 MJ/head/day. No such inter-annual increase can be seen for the other years from 1990 to 2005. Denmark responded to this issue during the centralized review by stating that the Faculty of Agricultural Science (FAS) provided new data for feed intake for heifers, but does not do this on an annual basis, and recognizes that this increase has not developed in one year. Denmark stated that

it is planning to interpolate the GE intake from 2000–2007 in its next annual submission. The ERT recommends that Denmark revise GE values and improve time-series consistency in accordance with the IPCC good practice guidance in its next annual submission.

71. Similarly, the ERT noted that GE intake for swine decreased by 10.1 per cent between 1993 and 1994, from 43.3 to 38.9 MJ/head/day. Denmark responded to this issue during the review by stating that FAS only updated GE intake on a four- or five-year interval during the period 1990–2001 but thereafter it has updated data annually. Denmark clarified that the change between 1993 and 1994 reflects a development in fodder efficiency, that it happened for more than a single year, and therefore Denmark intends to interpolate this data for 1990–2000 in its next annual submission. The ERT recommends that Denmark perform this interpolation to improve time-series consistency in its next annual submission, in accordance with the IPCC good practice guidance.

2. Manure management – CH₄

72. Denmark uses the IPCC tier 2 methods, and uses country-specific volatile solid (VS) excretion rates, and IPCC default CH₄-producing capacity. Denmark uses a methane conversion factor (MCF) for liquid/slurry of 10 per cent, which is from the Revised 1996 IPCC Guidelines, instead of a MCF value of 39 per cent in accordance with the revised default values in the IPCC good practice guidance (table 4.10). In the NIR, Denmark supported the use of keeping with the Revised 1996 IPCC Guidelines default MCF by stating that similar countries in the cool climate region use this value. However, the ERT noted that in the previous review report,¹¹ Denmark agreed to investigate the appropriateness of this MCF for liquid systems in time for its 2010 submission, and the ERT reiterates the recommendation that Denmark review this factor and justify its appropriateness in its next annual submission as planned. In response to the draft review, Denmark provided additional documentation. The ERT recommends that Denmark include this information in its NIR in the 2010 submission.

73. The ERT noted that the allocations of swine manure to each animal manure management system (AWMS) in CRF table 4.B(b) do not match the allocation percentages in CRF table 4.B(a). During the review, Denmark clarified that the allocations to each AWMS given to CRF table 4.B(a) were incorrect and will be revised in its next annual submission. The ERT recommends that Denmark fix these errors in its next annual submission and ensure adequate QC checking takes place on the completed CRF tables before submission.

74. Denmark treats some of its animal slurries in biogas plants, capturing the CH₄ generated and using it for electricity and CHP production. In response to a question from the ERT, Denmark stated that some of the information in table 6.12 of the NIR might be misleading with regard to the energy production values expressed in TJ, as they are not directly related to the estimation of CH₄ captured, but rather were obtained independently from the Danish Energy Agency. The ERT recommends that the Party report estimates of energy production and CH₄ recovery in a consistent way, and correct table 6.12 in the next annual submission. Responding to the ERT during the centralized review, the Party also clarified that the reduced CH₄ emissions are estimated based on the content of VS in the slurry and considering a CH₄ reduction potential of 30 per cent for cattle slurry and 50 per cent for swine. The ERT recommends that Denmark, for the sake of improving transparency, provide plant-specific data regarding energy output and quantities of slurry treated from one or more of the larger biogas plants. The ERT also recommends that Denmark use the energy output from plants to assess the validity of the CH₄ reduction potentials for cattle and swine slurry as an additional QC check.

¹¹ FCCC/ARR/2008/DNK, paragraph 60.

3. Manure management – N₂O

75. Denmark uses the IPCC method and default EFs to estimate emissions from this category. The ERT found that the N₂O IEF for liquid systems declines over time as a result of reductions in emissions due to the treatment of slurries for biogas production: the IEF decreased by 15.7 per cent from 1990 (0.00099 kg N₂O-N/kg N) to 2007 (0.00084 kg N₂O-N/kg N). According to the NIR, the Party assumes reduction potential factors of 36 per cent for cattle slurry and 40 per cent for swine slurry. The ERT noted that the subtraction of emissions is based on country-specific studies, and that neither the Revised 1996 IPCC Guidelines nor the IPCC good practice guidance provide any guidance on reduction of N₂O emissions by energy use of biogas. The ERT reiterates the recommendation of the previous review that Denmark include additional information in the NIR of the next annual submission with supporting studies that the reduction of emissions does indeed occur, by providing detailed information about the country-specific method it has used, and better documenting the stated reduction potential factors for cattle and swine slurry, to enhance transparency and understanding of the methods used.

4. Direct soil emissions – N₂O

76. The ERT noted that, in accordance with data provided in table 6.24 of the NIR, there was a significant increase in the quantity of nitrogen excretion (6.9 per cent) and nitrogen volatilized as ammonia (36.1 per cent) from 2006 to 2007. In response to a question raised during the review, Denmark stated that the nitrogen lost as ammonia is largely overestimated for 2007 due to errors in the Danish agricultural database. The ERT recommends that Denmark implement additional quality checking and trend analysis of all outputs from this database in its next annual submission, and ensure the CRF tables are completed without errors.

V. Land use, land-use change and forestry

A. Sector overview

77. In 2007, net removals from the LULUCF sector amounted to 1,127.55 Gg CO₂ eq. Since 1990, when net emissions were 555.16 Gg CO₂ eq, net removals have increased (in absolute terms) by 304.8 per cent. (It should be noted that this excludes CO₂ net emissions/removals from forest land, cropland and grassland in Greenland, which are reported in the CRF tables under the sector other instead of the LULUCF sector.) The key driver for the trend in the fall in emissions is the net emissions from carbon stock change (CSC) in mineral soils in cropland remaining cropland: net emissions decreased by 61.3 per cent from 1990 (1,643.67 Gg CO₂) to 2007 (661.16 Gg CO₂). Within the sector, 61.3 per cent of the emissions/removals¹² were from forest land, followed by 36.7 per cent from cropland and 1.7 per cent from grassland. The remaining 0.3 per cent of emissions was from wetlands. Denmark is reporting emissions from settlements and other land as “NE” or “NA”.

78. Denmark is not estimating (reporting as “NE”) emissions from several pools and categories: net CSC from dead organic matter (DOM), soil organic carbon (SOC) in mineral soils and organic soils from forest land remaining forest land; SOC in mineral soils and organic soils from grassland, wetlands, settlements and other land converted to forest land (although AD are reported as “NO”); SOC in mineral soils from croplands converted to forest lands; net CSC in DOM in wetlands remaining wetlands (peat extraction); AD and net CSC in DOM and SOC in mineral soils and organic soils in wetlands remaining wetlands; AD and CSC in all pools from settlements remaining settlements, land converted to settlements and land converted to other land. The ERT encourages the Party to improve the completeness of the

¹² The per cent of each category was calculated by comparing the net emissions/removals expressed as an absolute value; to the sum of absolute values of the categories forest land, cropland, grassland, wetlands, settlements, other land, and other.

inventory for those categories that are known to occur within the Party and for which methodologies to estimate emissions are available in the IPCC good practice guidance for LULUCF.

79. Denmark has not developed a complete and consistent land representation system for all land-use categories, and the ERT noted that without a consistent land representation, double counting or omission of an area might occur, leading to incorrect estimates of a source or a sink. Indeed, the ERT found that the total reported area was 3,205,860 ha in 1990, changes every year of the time series, and it was 3,217,585 ha in 2007. Meanwhile, according to information of the Danish Statistical Office,¹³ the total area of Denmark should be equal to 4,309.83 kha, plus the area of the Faroe Islands that is 139.57 kha, for the whole time series. Therefore, the ERT recommends that Denmark report a consistent time series of AD for each land use and land-use change established in accordance with the IPCC good practice guidance for LULUCF, and encourages the Party to include a complete set of annual land use and land-use change matrices since 1971, in the next annual submission, covering Greenland. Responding to a question raised by the ERT during the review, the Party responded that a revised and consistent methodology for land representation is going to be applied for the next annual submission.

80. The source of AD and IEFs changes over the time series: the 1990 and 2000 census for the years 1990–2006 and the national forest inventory for the year 2007. Considering that Denmark did not apply sufficient efforts or methodologies to obtain consistency among the different sources of data, the ERT is of the view that the time series of emission and removal estimates could be inconsistent. The ERT recommends that Denmark apply methods in accordance with the IPCC good practice guidance for LULUCF to produce a consistent time series of estimates, and also that information explaining how it was achieved be included in the next annual submission.

B. Key categories

1. Forest land remaining forest land – CO₂

81. For forest land remaining forest land, net CSC of DOM and soil organic matter pools is reported as “NE”. Considering that this is a key category, the ERT recommends that Denmark provide estimates in the next annual submission. The Party answered during the centralized review that a new methodology will be applied and results will be available for the next annual submission.

2. Cropland remaining cropland – CO₂

82. Estimates of net CSC in mineral soils under grassland use are reported under cropland remaining cropland. The ERT recommends that Denmark revise the allocation of these emissions in the next annual submission, and follow the rules of allocation of emissions and removals established in the IPCC good practice guidance for LULUCF and the UNFCCC reporting guidelines.

83. To estimate carbon stock changes in mineral soils, Denmark is using a model (C-TOOL). However, the Party did not report sufficient and clear information in the NIR on the model, and the ERT had difficulties in understanding how the model works and its principles; what assumptions are behind the model; what are its most important variables (sensitivity analysis); what are the validation procedures; and how well it performs in estimating emissions from mineral soils (QA). The ERT recommends that Denmark include the above-mentioned information in the next annual submission.

84. Denmark reported emissions from mineral soils using a five-year average (e.g. for 2007 the average value in the period 2005–2009). The ERT noted that this reporting practice is not in accordance with the IPCC good practice guidance for LULUCF and also is not justified by the model that Denmark

¹³ See the Statistical Yearbook of 2009 at http://www.dst.dk/asp2xml/puk/udgivelser/get_file.asp?id=14468&sid=sy2009.

is using: according to the NIR, the model does not use averaged input data. Therefore, the ERT recommends that Denmark report, in its next annual submission, estimates from the model on a yearly basis and without averaging.

C. Non-key categories

1. Land converted to forest land – CO₂

85. The ERT noted that net CSC in soil organic matter have been reported as “NO”, although the information supporting that assumption is not included the NIR. The ERT encourages Denmark to provide evidence that emissions do not occur in this pool or revise the assumption and provide estimates for the next annual submission.

2. Land converted to wetlands – CO₂

86. Denmark has included for the first time CH₄ emissions/removals from the drainage of wetlands under peat extraction. Emissions are estimated for all years, from 1990 to 2007, using a default factor of 20 kg CH₄/ha, but the Party reports a negative value that results from comparison of emissions in a given year to a reference level of emissions, and considering that a change from not cultivated peatland to cultivated peatland leads to a decrease in the IEF. According to the IPCC good practice guidance for LULUCF, annual estimates reported in GHG inventories should refer to fluxes of gases and changes in carbon stock that occur in each year and not in comparison to a reference level. Therefore, the ERT noted that the reporting of Denmark is not in accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF, and the ERT recommends that the Party revise its reporting of this CH₄ sink for the next annual submission.

VI. Waste

A. Sector overview

87. In 2007, emissions from the waste sector amounted to 1,366.23 Gg CO₂ eq, or 2.0 per cent of total GHG emissions. (It should be noted that this excludes emissions from solid waste disposal on land, waste incineration and other, which are reported in the CRF tables under the sector other instead of the waste sector.) Since 1990, emissions have decreased by 11.8 per cent. One of the key drivers for the fall in emissions is the decreasing amount of organic waste disposed of on land and the increasing amount of recovery of landfill gas. In a different direction, CH₄ emissions from wastewater handling have increased by 203.6 per cent during the same period. Within the sector, 77.8 per cent of the emissions were from solid waste disposal on land, followed by 22.2 per cent from CH₄ from wastewater handling. CO₂, CH₄, and N₂O emissions from waste incineration are reported under the energy sector.

88. Generally, the presentation of AD and methodologies in the NIR is of good quality, except for the lack of detailed explanations on CH₄ recovery. Denmark is also providing information on QA/QC. However, the ERT recommends that Denmark investigate further on waste practices in the country, in a way to reflect the changing characteristics of landfill sites and waste disposed, with a view to improving the accuracy of the emission estimates. The ERT found some errors in the naming of tables in the NIR, and this makes it difficult to assess the inventory. For example, the title of table 8.17 in the NIR indicates CH₄ could be recovered and flared in wastewater treatment plants despite the fact that no flaring is conducted in Danish wastewater treatment plants. Denmark is encouraged to improve QC procedures to improve the transparency of the NIR. The ERT also recommends that Denmark provide a table showing different waste types disposed of as municipal solid waste or incinerated, together with their main characteristics, to increase the transparency.

B. Key categories

1. Solid waste disposal on land – CH₄

89. Denmark has prepared recalculations for this category following the update in the energy statistics data on CH₄ recovery from the landfills with energy recovery. As a result of the update, the amount of CH₄ recovered in 2006 has decreased by 35.4 per cent, from 12.30 Gg CO₂ eq to 7.94 Gg CO₂ eq. After recalculation, the decreasing trend of emissions and biogas recovery is still visible due to the reduction of degradable waste brought to the landfill site.

90. Denmark uses an IPCC tier 2 country-specific first order decay method and country-specific data for the degradable organic carbon (DOC) fractions. Although the values of the parameters used in the calculations are only slightly different from the IPCC defaults, the NIR does not provide sufficient explanations of how the parameters were determined, and the ERT cannot assess whether they were selected in accordance with the IPCC good practice guidance. To improve transparency, the ERT recommends that Denmark improve explanations and documentation of the parameters in its next annual submission.

91. The carbon content of plastics has been taken into account as DOC, which the ERT considers not to be correct. During the centralized review and responding to the ERT, Denmark made preliminary estimates showing that emissions for the most recent years could be reduced by about 12–13 per cent if a correction was made. Denmark is planning to revise those parameters in the next annual submission and the ERT encourages the Party to do so.

92. Denmark uses a half-life time of 10 years (k equal to 0.0693) based on expert judgement as a bulk value for all waste types. However, the Party in the NIR also includes an independent estimate using different k values for different waste types, and the results of this analysis indicate that emission estimates could be significantly different. Considering that the composition of waste may change in the coming years, the ERT encourages Denmark to develop k values by waste type to improve the accuracy.

93. Denmark estimates the amount of CH₄ recovery from the Danish energy statistics on energy obtained and considers the net calorific value to estimate biogas volumes. The ERT recommends that Denmark improve the explanation of the methodology and assumptions it uses to estimate CH₄ recovery, together with the volumes of biogas recovered and used in energy production for the next annual submission.

2. Wastewater handling – CH₄

94. Emissions from domestic wastewater and industrial wastewater are aggregated together. Denmark uses a country-specific total organic waste (TOW) that does not differentiate between industrial and municipal sewage sludge. The NIR explains that from the fact that a significant fraction of the industrial wastewater is treated at centralized municipal wastewater treatment plants and the data available for TOW do not differentiate between industrial and municipal sewage sludge. Recognizing that the increase of total industrial biochemical oxygen demand is a key driver of the trend of emissions from this category (before the recovered CH₄ is subtracted), and following the recommendation by the previous review, the Party is planning to collect plant-specific monitoring data to develop average maximum methane production capacity and to use it to prepare the next annual submission. The ERT encourages Denmark to implement its plans and to report on them in the next annual submission.

C. Non-key categories

Waste incineration – CO₂, CH₄ and N₂O

95. Emissions from waste incineration are reported under the energy sector. AD are presented in CRF table 6.C with a reference to the category public electricity and heat production in the energy sector in the documentation box. However, the ERT found in the NIR reference to the fact that also the categories manufacturing industries and construction and other sectors in the energy sector include emissions from municipal solid waste. Denmark is encouraged to clarify this in the next annual submission to improve transparency.

VII. Other sectors

96. In the 2009 submission, Denmark reported total estimated emissions from Greenland in sector 7 other in the CRF tables. In 2007, Greenland accounted for 679.05 Gg CO₂ eq (excluding LULUCF), or 1.0 per cent of total GHG emissions from Denmark and Greenland. Total emissions from Greenland alone increased by 4.3 per cent between the base year and 2007.

97. In the 2009 submission, Denmark provides the methodologies used to estimate emissions from Greenland in annex 6.2.1 to the NIR. The inventory for Greenland covers the following sectors and categories: energy (all fuel combustion categories), industrial processes (consumption of halocarbons and SF₆), agriculture (enteric fermentation and manure management from sheep and reindeer), LULUCF (forestland, cropland and grassland) and waste (solid waste disposal on land and waste incineration). The ERT welcomes the inclusion of emission estimates for LULUCF from Greenland for the first time in its 2009 submission.

98. Denmark continues to provide, as additional information, a separate set of CRF table summary 2 for Greenland for all years from 1990–2007. The ERT is of the view that, since Denmark already estimates Greenland's emissions at sectoral level, the ERT reiterates the recommendations from previous reviews that Denmark provide a complete set of CRF tables for Denmark and Greenland combined in its next annual submission. Denmark acknowledged this finding at the time of the centralized review, but it was unable to submit revised estimates as requested by the ERT in accordance with paragraphs 73 and 74 of the annex to decision 22/CMP.1.

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

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

99. Denmark 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 and recommendations included in the SIAR on the SEF tables and the SEF comparison report.¹⁴ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterates the main findings and recommendations contained in the SIAR.

100. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section 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 was consistent with that contained in the

¹⁴ The SEF tables 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.

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 paragraphs 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. No non-replacement has occurred.

2. National registry

101. 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.

102. The ERT took note of the recommendations in the SIAR that Denmark should enhance the user interface of its registry with regard to the public information on Article 6 projects referred to in paragraph 46 of the annex to decision 13/CMP.1. The SIAR also recommended that, if Denmark has not issued any emission reduction units, a clear statement to that effect be publicly available on its registry user interface.

103. The ERT also noted that the SIAR highlighted that the information provided in the submission by Denmark in response to recommendations from previous reviews is not sufficient to assess whether they were fully resolved. Therefore, the ERT reiterates the recommendation in the SIAR that Denmark provide, in its next annual submission, more detailed information on: steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction, including information on whether there are automated processes in place to terminate discrepant transactions.

104. Further, the ERT noted the list of recommendations in the SIAR, pertaining to technical standards, that Denmark should implement in its national registry to ensure minimal operator errors and reliable interoperability with other registry systems, including the ITL, in accordance with paragraph 115 of the annex to decision 22/CMP.1 and paragraph 25 of the annex to decision 24/CP.8. The SIAR, remembering that the ITL recommended implementing the following measures as soon as possible, recommended that Denmark report on progress made in implementing those measures in its next annual submission, including any relevant implementation plans, test plans and test reports following the changes applied to its registry. The ERT reiterates the recommendations in the SIAR that the Party implement:

- (a) Additional or improved operational procedures to prevent users from proposing transactions to the ITL if the registry is not fully operational;
- (b) Automated internal validations should be performed on account type codes before messages are submitted to the ITL;
- (c) Automated internal validations should be performed on the acquiring and transferring registries before transactions are proposed to the ITL.

105. Finally, the SIAR noted that the registry of Denmark fragments unit blocks at a rapid pace and that this could hamper the registry's ability to reconcile its holding position against the records of the ITL and its capacity to propose transactions successfully in the future. The ERT reiterates the

recommendations in the SIAR that Denmark should put in place measures to mitigate and reduce the internal fragmentation of unit blocks.

3. Calculation of the commitment period reserve

106. Denmark has not reported its commitment period reserve in its 2009 annual submission. In response to questions raised by the ERT during the review, the Party reported that its commitment period reserve has not changed since the initial report review (249,155,060 t CO₂ eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure. The ERT recommends that Denmark include information on its commitment period reserve in its next annual submission.

B. Changes to the national system

107. Denmark has not reported on changes in its national system since the previous annual submission. However, in response to questions raised by the ERT during the centralized review, the Party informed that in 2008 a contract on emission reporting was signed with Greenland. The Party also indicated that the NIR was expanded to include information on the institutional arrangements related to reporting the inventory from Greenland, but the ERT does not find that the information clarifies if the new information represents a change to the national system. The ERT recommends that the Party report on changes to the national system for the next annual submission, including changes to the institutional arrangements for the inventory of Greenland.

C. Changes to the national registry

108. Denmark has reported on a change in its national registry in annex 10 to the NIR: the Internet address of the registry has changed since the initial report to the Kyoto Protocol. Observations on the change in the national registry are contained in the SIAR. The ERT took note of the recommendations in the SIAR, in particular that in its next annual submission, Denmark should include additional information regarding the changes to the database structure and capacity of its registry, in accordance with paragraph 32 (c) of the annex to decision 15/CMP.1. The ERT concluded that, taking into account the confirmed change in the national registry, Denmark'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.

IX. Conclusions and recommendations

109. Denmark made its annual submission on 15 April 2009 (CRF tables and an NIR). The national inventory report was resubmitted on 29 May 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on Kyoto Protocol units and changes to the national registry). This is in line with decision 15/CMP.1.

110. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2007 and an NIR; these are complete in terms of geographical coverage, years and sectors, gases, and it is generally complete in terms of categories. Some of the categories, particularly in the LULUCF sector, were reported as “NE”. The ERT recommends that the Party provide estimates for these categories in its next annual submission, in order to improve completeness.

111. The ERT found that the inventory submitted by Denmark was not reported in full accordance with the UNFCCC reporting guidelines, as it was not fully complete and transparent: the CRF tables estimates of emissions and removals from Greenland are reported in the sector other (sector 7) in aggregated values. The ERT considers that this does not result in transparent and complete reporting

under the Kyoto Protocol, and in particular the CRF sectoral background tables for each sector do not refer to AD, EFs and emissions for the total territory to be covered by the submission under the Kyoto Protocol (Denmark and Greenland). To overcome this problem, the Party included as an annex to the 2009 submission additional CRF tables summary 2 where emissions from Greenland are allocated to each sector. However, the ERT noted that that way the ERT could not review a full and transparent set of CRF tables under the Kyoto Protocol.

112. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Denmark did not report on a voluntary basis information on activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol, information on changes in the national system and information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

113. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, but the ERT identified the need to improve the key category and uncertainty analyses, with the inclusion of emissions from Greenland, and to ensure consistency in the time series for more recent years when using EU ETS data.

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

115. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. However, the ERT identified that the procedures for inventory preparation with respect to the inclusion of Greenland data and emission estimates in the annual submission are not fully operational. Furthermore, the ERT noted that the national system was unable to react in a timely manner to the request of information during this centralized review in accordance with paragraphs 73 and 74 of the annex to decision 22/CMP.1.

116. 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. However, the ERT identified, from the SIAR, that the information provided in the submission by Denmark in response to recommendations from previous reviews is not sufficient to assess whether they were fully resolved.

117. In the course of the review, the ERT formulated a number of recommendations.¹⁵ The key recommendations are that Denmark:

- (a) Implement the institutional arrangements to ensure full operation of the national system in Greenland;
- (b) Integrate the emission estimates for Greenland into the relevant specific categories, in both the CRF and NIR, for the reporting of annual submissions under the Kyoto Protocol;
- (c) Integrate information concerning the institutional arrangements for inventory preparation, QA/QC procedures, methodologies, AD, EFs, emission trends and uncertainty analysis for Greenland in the main part of the NIR;

¹⁵ For a complete list of recommendations, the relevant chapters of this report should be consulted.

- (d) Include Greenland emissions and removals in the appropriate categories when performing the key category analysis and uncertainty analysis;
- (e) Resolve the problems detected in calculating and reporting recalculations in CRF table 8(a);
- (f) Ensure time-series consistency in accordance with the IPCC good practice guidance when using the EU ETS data for the most recent years, and provide information showing that the methodologies used to establish the emission estimates under the EU ETS are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

X. Questions of implementation

118. 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. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>>.

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/gp/landuse/gp/landuse.html>>.

“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 Denmark 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/dnk.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <<http://unfccc.int/resource/webdocs/sai/2009.pdf>>.

FCCC/ARR/2008/DNK. Report of the individual review of the greenhouse gas inventory of Denmark submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/dnk.pdf>>.

UNFCCC. Standard independent assessment report, parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Ole-Kenneth Nielsen (National Environmental Research Institute, Aarhus University Department of Policy Analysis), including additional material on the methodology and assumptions used.

DMU. 2009. *Aftale om levering af data og dokumentationsrapport fra Grønlands Klima- og Infrastrukturstyrelse til Danmarks Miljøundersøgelser* (contract on emission reporting, 2 February 2009).
Roskilde: Danmarks Miljøundersøgelser.

DMU. 2009. *Aft Grønland KIS_DMU_12Juni2009. Aftale om levering af data og dokumentationsrapport fra Grønlands Klima- og Infrastrukturstyrelse til Danmarks Miljøundersøgelser* (data agreement with Greenland, 12 January 2009).

Annex II**Acronyms and abbreviations**

AD	activity data	IPCC	Intergovernmental Panel on Climate Change
AWMS	animal manure management system	kg	kilogram (1 kg = 1 thousand grams)
CSC	carbon stock change	LULUCF	land use, land-use change and forestry
CH ₄	methane	MCF	methane conversion factor
CHP	combined heat and power	MJ	megajoule
CO ₂	carbon dioxide	NA	not applicable
CO ₂ eq	carbon dioxide equivalent	NE	not estimated
CRF	common reporting format	NO	not occurring
DOC	degradable organic carbon	N ₂ O	nitrous oxide
DOM	dead organic matter	NIR	national inventory report
EF	emission factor	PFCs	perfluorocarbons
ERT	expert review team	QA/QC	quality assurance/quality control
EU ETS	European Union emissions trading scheme	SEF	standard electronic format
GE	gross energy	SF ₆	sulphur hexafluoride
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF	SIAR	standard independent assessment report
HFCs	hydrofluorocarbons	SOC	soil organic carbon
IE	included elsewhere	t	tonne
IEF	implied emission factor	TJ	terajoule (1 TJ = 10 ¹² joule)
ITL	international transaction log	TOW	total organic waste
		UNFCCC	United Nations Framework Convention on Climate Change
		VS	volatile solid
