COMPLIANCE COMMITTEE **CC/ERT/IRR/2007/13**
2 November 2007

Report of the review of the initial report of Denmark

Note by the secretariat

The report of the review of the initial report of Denmark was published on 2 November 2007. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2), the report is considered received by the secretariat on the same date. This report, FCCC/IRR/2007/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.

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Report of the review of the initial report of Denmark

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the 'initial report') to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Denmark conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Denmark, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 16 to 21 April 2007 in Copenhagen, Denmark, and was conducted by the following team of nominated experts from the roster of experts: generalist – Ms. Mirja Kosonen (Finland); energy – Mr. Michael Strogies (Germany); industrial processes – Mr. Masato Yano (Japan); agriculture – Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Mr. Nijavalli Ravindranath (India); waste – Mr. Philip Acquah (Ghana). Ms. Hongmin Dong and Mr. Michael Strogies were the lead reviewers. In addition the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve, and took note of the LULUCF parameters and the elected Article 3, paragraph 4, activities. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

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

3. Most comments indicating that the Party will address the remarks made by the ERT in its future submissions are not specifically recorded in this report. In many comments, the Party provides explanations of issues and plans for future short-term improvements for issues raised by the ERT in the draft review report. In such cases, the ERT has left the relevant paragraphs unchanged since the ERT's recommendation to include such explanations in the national inventory report remains valid, and in many cases the Party has indicated its intention to do so in the next submission. In addition, the ERT noted that a few recommendations provided in this report have already been partly addressed by Denmark in its 2007 submission.

B. Summary

4. The GHG inventory of the Kingdom of Denmark under the Kyoto Protocol covers Denmark and Greenland. Denmark is part of the European Community while Greenland is not.

1. Timeliness

5. Decision 13/CMP.1 requests Parties to submit their initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report was submitted on 20 December 2006, which is in compliance with decision 13/CMP.1. In its initial report Denmark refers to its 2006 greenhouse gas (GHG) inventory submission of 12 April 2006. The review team used the CRF tables resubmitted on 26 January 2007, the NIR submitted on 12 April 2006 and resubmitted on 22 August 2006 and NIR annexes 6.1 and 6.2 on Greenland's emissions resubmitted on 28 March 2007.

2. Completeness

6. Table 1 below provides information on the mandatory elements have been included in the initial report. The assigned amount (276,838,955 tonnes CO_2 equivalent) and the commitment period reserve (249,155,060 tonnes CO_2 equivalent) are calculated based on the base year emissions (69,978,070 tonnes CO_2 equivalent. Denmark's and Greenland's base year emissions (excluding LULUCF) are estimated at

69,323.34 Gg CO_2 equivalent and 654.73 Gg CO_2 equivalent, respectively, as reported by Denmark in its initial report.

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year 1990 to the most recent year available 2004	Yes	1990–2004
Base year for HFCs, PFCs and SF_6	Yes	1995
Agreement under Article 4	Yes	Denmark states in its initial report that the it has accepted a legal commitment, under EU decision 2002/358/EC, to reduce the emissions of greenhouse gases by 21% in 2008–2012 compared with the base year. Greenland is not included in the EU burden-sharing agreement; it has to reduce its GHG emissions by 8%.
LULUCF parameters	Yes	Minimum tree crown cover: 10% Minimum land area: 0.5 ha Minimum tree height: 5 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	Denmark elected forest management, cropland management and grazing land management under Article 3, paragraph 4, of the Kyoto Protocol. Denmark has decided to account for each activity under Article 3, paragraphs 3 and 4, annually.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	276 838 955 tonnes CO_2 eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised value		Not applicable
Calculation of the commitment period reserve	Yes	249 155 060 tonnes CO_2 eq.
Calculation of the commitment period reserve, revised value		Not applicable
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	Yes	
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the CMP	Yes	

7. The information in the initial report covers all elements as required by decision 13/CMP.1, section I of the decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the Meeting of the Parties (CMP).

3. Transparency

8. The initial report is generally transparent. The ERT noted a need for more transparency in the NIR. Detailed recommendations for improvement are included in the sectoral sections of this report. The ERT recommends the use of concise illustrations as background data at category level in the NIR, for example, graphs describing the energy sector subcategories, which would improve transparency and would not unnecessarily expand the NIR. With regard to the national registry, some of the information was not included in the report (e.g. a list of the information publicly accessible using the interface to the national registry). This information was provided during the review, however, and the ERT recommends that Denmark provide such information in its next inventory submission under the Kyoto Protocol.

9. The GHG inventory includes emissions from Denmark and Greenland. The emissions from Greenland were included under other (sector 7), instead of the relevant sectors in the original submission. However, during the course of the review Denmark resubmitted table Summary 2 where the emissions from Greenland were included in the relevant sectors instead of in sector 7. The contribution of Greenland to GHG emissions is only about 1 per cent of total national GHG emissions. A more detailed trend discussion of Greenland's emissions should be included in the NIR. The ERT welcomes this development and recommends that Denmark continue to include the emissions for Greenland in the relevant sectors.

4. Emission profile in the base year, trends and emission reduction target

10. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6), the most important GHG in Denmark was carbon dioxide (CO_2), contributing 76.2 per cent to total[1] national GHG emissions expressed as CO_2 equivalent, followed by nitrous oxide (N_2O), 15.2 per cent, and methane (CH_4), 8.2 per cent (see figure 1). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 0.5 per cent of the overall GHG emissions in the base year. The energy sector accounted for 75.4 per cent of the total GHG emissions in the base year, followed by agriculture, (18.7 per cent), industrial processes (3.5 per cent), waste (2.2 per cent) and solvents and other product use (0.2 per cent) (see figure 2). Total GHG emissions (excluding LULUCF) amounted to 69,978.07 Gg CO_2 equivalent and decreased by 1.7 per cent from the base year to 2004. This overall trend is caused partly by large emission reductions in the agriculture sector, by 23.3 per cent, in solvent and other product use, by 17.1 per cent, and in waste, by 10.0 per cent. On the other hand, GHG emissions increased in the main contributing sectors – in energy by 2.7 per cent and in industrial processes by 24.1 per cent.

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

Figure 1. Shares of gases in total GHG emissions, base year

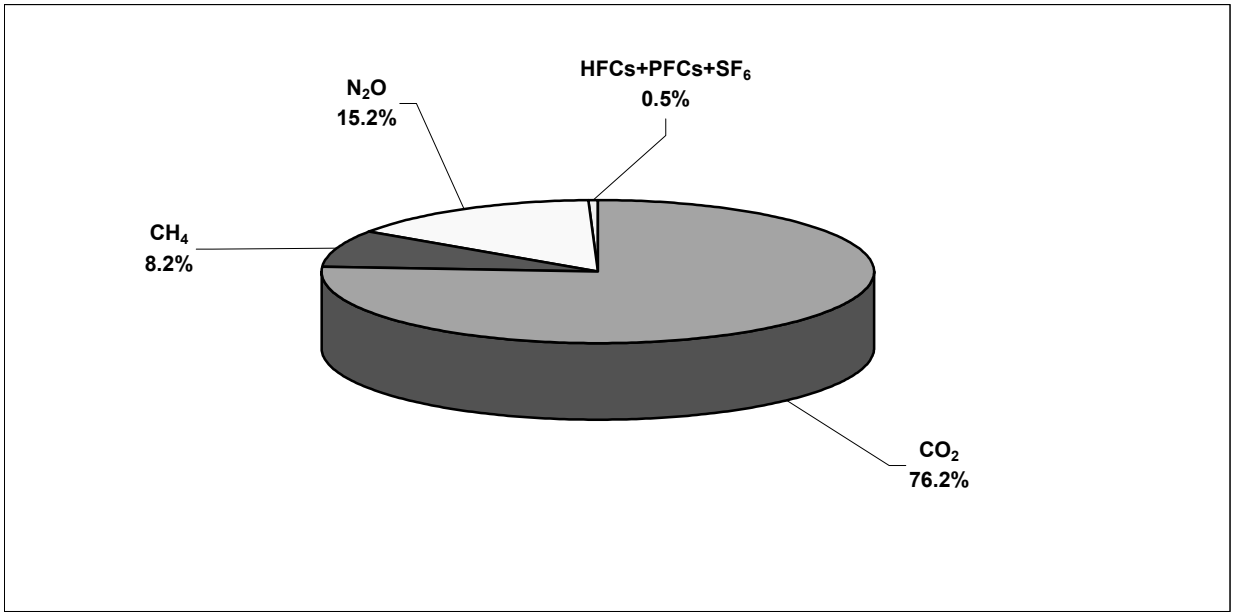
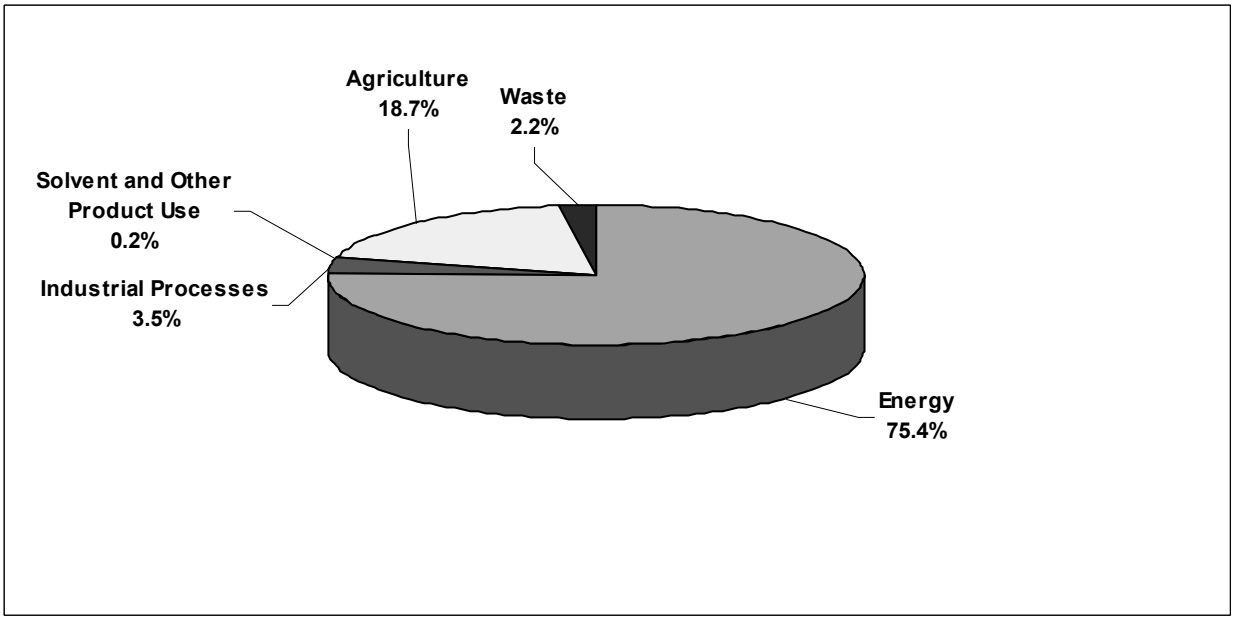


Figure 2. Shares of sectors in total GHG emissions, base year



11. Tables 2 and 3 show the greenhouse gas emissions by gas and by sector, respectively.

12. As Denmark is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, Denmark's quantified emission limitation is 79 per cent. The quantified emission limitation for Greenland is 92 per cent because Greenland is not part of the European Community. Denmark's assigned amount is calculated based on its Article 4 commitment. Greenland's assigned amount is based on 92 per cent.

Table 2. Greenhouse gas emissions by gas, 1990–2004

GHG emissions (without LULUCF)	Gg CO_2 equivalent								Change
	Base year	1990	1995	2000	2001	2002	2003	2004	BY–2004 (%)
CO_2	53 342.45	53 342.45	60 989.60	53 742.05	55 291.43	54 845.76	60 096.08	54 610.13	2.4
CH_4	5 708.15	5 708.15	6 041.42	5 894.54	6 040.62	5 998.34	5 980.19	5 779.40	1.2
N_2O	10 601.83	10 601.83	9 521.95	8 553.79	8 305.45	7 951.98	7 906.02	7 597.46	–28.3
HFCs	217.75	0.00	217.75	606.49	650.25	675.91	700.17	754.30	246.4
PFCs	0.50	0.00	0.50	17.89	22.13	22.17	19.34	15.90	3,066.1
SF_6	107.37	44.45	107.37	59.23	30.40	25.01	31.38	33.15	–69.1

Note: BY = Base year; LULUCF = Land use, land-use change and forestry.

Table 3. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 equivalent								Change
	Base year	1990	1995	2000	2001	2002	2003	2004	BY–2004 (%)
Energy	52 753.78	52 753.78	60 525.33	53 276.01	54 855.88	54 439.07	59 842.06	54 197.71	2.7
Industrial processes	2 469.99	2 188.81	2 675.77	3 368.85	3 296.00	3 193.87	3 217.51	3 065.30	24.1
Solvent and other product use	136.90	136.90	123.29	119.58	112.57	106.33	107.24	113.48	–17.1
Agriculture	13 058.56	13 058.56	11 994.02	10 621.86	10 587.36	10 268.45	10 041.39	10 011.15	–23.3
LULUCF	NA	551.74	–1 664.28	1 642.08	–756.80	–1 965.04	–1 940.36	–2 279.57	NA
Waste	1 558.85	1 558.85	1 560.20	1 487.69	1 488.47	1 511.46	1 524.98	1 402.71	–10.0
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	70 248.64	75 214.32	70 516.07	69 583.48	67 554.14	72 792.82	66 510.78	NA
Total (without LULUCF)	69 978.07	69 696.90	76 878.60	68 873.98	70 340.28	69 519.17	74 733.18	68 790.35	–1.7

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

13. Denmark's national system is in general set up in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1) apart from some deficiencies in non-mandatory elements. On 1 January 2007 the Danish National Environmental Research Institute (NERI), which is the single national entity responsible for the GHG inventory, was separated from the Ministry of Environment and became a research Institute under the University of Aarhus. The Party has informed the ERT of the situation and of the transitional arrangements in the national system for year 2007. The contract between the Ministry of Environment and Aarhus University for 2008–2011 will be negotiated later in 2007. The ERT made a detailed investigation of the arrangements, with the benefit of information on current agreements between the Ministry of Environment, NERI and Aarhus University. The ERT has evaluated the national system partly on the basis of this additional information and partly relying on the information submitted in the NIR and the initial report.

14. Table 4 shows which of the specific functions of the national system are included and described in the initial report.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factor collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	No	See section II.A.2
Basic review by experts not involved in inventory	Yes	See section II.A.2
Extensive review for key categories	Yes	See section II.A.2
Periodic internal review of inventory preparation	No	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	Yes	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

15. During the in-country visit, Denmark explained the institutional arrangements, as part of the national system, for preparation of the inventory. NERI is the designated single national entity.

Regarding other inventory partners, the Danish Energy Agency, the Danish Institute of Agricultural Sciences, the Road Directorate, the Danish Centre for Forest, the Civil Aviation Agency of Denmark and Danish Railways are contracted to prepare parts of the inventory, along with the Danish Environmental Protection Agency, Statistics Denmark, the Greenland Home Rule and Statistics Greenland as partners in the administration, as well as companies in Denmark and Greenland which have permanent responsibilities for the inventory development process, as described in the initial report (page 13). The Ministry of Environment and Aarhus University have a contract, including for GHG inventory reporting, for the year 2007, and negotiations are ongoing over a contract for the following four years. The Ministry of Environment indicated during the review that it aims to continue with the current structure of the national system with NERI remaining the designated single national entity responsible for the inventory. The ERT recommends that arrangements be made to ensure the continuity of the national system and that negotiations be concluded as soon as possible. The ERT also recommends that the Party give a full description of the national system and of changes to the system in the next inventory submission under the Kyoto Protocol.

16. Denmark has a formal process for the official consideration and approval of the inventory prior to its submission. Both the Royal Resolution of 27 November 2001, on the responsibility of the Minister for Environment for the Kyoto Protocol, and the contract with NERI for the years 2004–2007, for the delegation of inventory submission and the establishment of a national system, give NERI an independent status with regard to the compilation of the inventory and its submission to the UNFCCC secretariat. During the review the Ministry of Environment, represented by the Environmental Protection Agency, responded to the ERT's requests in cooperation with NERI. The Party is encouraged, in the context of the ongoing negotiations over the national system, to establish a process for official consideration and approval of the inventory. During the review Denmark indicated its intention to do this.

2. Quality assurance/quality control

17. Denmark is in the process of developing a quality assurance/quality control (QA/QC) plan, which currently is mainly limited to NERI activities. NERI is preparing a quality management manual according to International Organization for Standardization (ISO) standard 9000. QC in NERI is supported by information technology (IT) procedures and includes general QC procedures (tier 1 and tier 2), but has not yet been implemented for all categories. Some inventory partners, most notably the Danish Energy Authority, have their own QA/QC systems which improve the quality of the input data.

18. As part of the QA procedures, national experts within NERI but not directly involved in the preparation of the inventory have reviewed parts of the inventory on a continuous basis. NERI, as the responsible organization, is independent both for inventory compilation and for its submission to the UNFCCC secretariat (see paragraph 16). NERI has developed quality management (QM) activities using its own practices as a research institute as a starting point. NERI alone is responsible for the preparation of the NIR. The ERT encourages NERI to develop practices that will enable the inventory partners to participate in the preparation of the NIR in order to benefit fully from the expertise of such partners.

3. Inventory management

19. Denmark has a centralized archiving system, maintained by NERI, which includes the archiving of disaggregated emission factors (EFs) and activity data (AD), as well as documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on existing QA/QC procedures, external and internal reviews (e.g. comparisons between the CO_2 emission estimated by NERI and those estimated by the Danish Energy Agency), and documentation on annual key categories and key category identification as well as planned inventory improvements. Annual submissions are compiled and archived in electronic format, using the CollectER and ReportER databases as well as NERI's own databases. Background

documentation from NERI and the contributing institutions is currently archived mainly as paper documents, but there are plans to convert to electronic filing.

B. Greenhouse gas inventory

20. In its initial report submission, Denmark refers to its submission of a complete set of CRF tables for the years 1990–2004 and an NIR from 12 April 2006. On 26 January 2007, prior to the in-country visit, Denmark submitted revised CRF tables for the years 1990–2004, which were used as the basis for the review by the ERT. In addition, on 28 March 2007 Denmark submitted revised annexes 6.1 and 6.2 to the NIR. Where needed the ERT also used the previous years' submissions, including the CRF tables for the years 1990–2003.

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

1. Key categories

22. In 2006 Denmark reports a tier 1 key category analysis for the year 2004, both level and trend assessment, as part of its annual inventory submission. During the review a key category analysis for the base year was provided.

23. The secretariat's analysis for the base year identified 15 key categories compared to 19 key categories identified by the Party.[2] Denmark has not included the LULUCF sector in its key category analysis and Greenland is also excluded from the Party's analysis, while the secretariat has included both Greenland and the Faroe Islands in one aggregate category: other (CO_2). These differences in scope, as well as the use of a higher level of disaggregation in the data on the energy sector in the Party's key category analysis, are the main reasons for the differences in the results. The Party's analysis for the year 2004 identifies 21 key categories, on both level and trend assessment. The main categories coincide with the secretariat's analysis for the year 2004, which also identified 21 key categories by level and 18 categories by trend assessment. The key category assessment is used to prioritize measures to improve the inventory. The Party is encouraged to provide the key categories analysis according to 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), including LULUCF categories. In addition the ERT encourages Denmark to apply a tier 2 analysis using the available data on uncertainties. In response to the draft review report, Denmark stated that it has initiated efforts to include the LULUCF sector in its key category analysis and will include it in the 2008 submission. The inclusion of the LULUCF sector in key category analysis is a prioritized activity for the Party. In addition Denmark stated that it will consider the possibility of applying a tier 2 key category analysis.

2. Cross-cutting topics

24. The inventory is in line with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines); the IPCC *Good Practice Guidance and Uncertainty Management in National*

[2] The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. 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.

Greenhouse Gas Inventories (hereinafter referred to as the IPCC good practice guidance); and the IPCC good practice guidance for LULUCF.

25. The inventory is generally compiled in accordance with Article 7, paragraph 1, and decision 15/CMP.1.

Completeness

26. The inventory is complete for Denmark and Greenland. Three different sets of CRF tables are submitted: the Kingdom of Denmark (Denmark, Greenland and the Faroe Islands) under the Convention, Denmark and Greenland under the Kyoto Protocol, and Denmark only. Some LULUCF categories are not estimated in the inventory.

Transparency

27. The ERT noted a need for more transparency in the NIR. Detailed recommendations for improvement are included in the sectoral sections of this report. The ERT recommends the use of concise illustrations on background data at category level in the NIR, for example, graphs describing the energy sector subcategories, which would improve transparency and would not unnecessarily expand the NIR. The description of the institutional arrangements for inventory preparation should also be elaborated so that it covers the legal basis for the national system and a clear statement on the status of agreements between NERI and the inventory partners, and between the Ministry of Environment and NERI.

Consistency

28. The inventory is generally consistent, apart from some inconsistencies in the LULUCF time series and for fluorinated gases (F-gases). Some inconsistencies were identified between the NIR and CRF table summary 3 on methodologies. The ERT recommends Denmark to improve the consistency in the time series and between the NIR and the CRF tables.

Comparability

29. The inventory is comparable with those of other Annex I Parties in terms of methodologies and formats, as defined in the UNFCCC reporting guidelines.

Accuracy

30. The inventory is considered accurate as defined in the UNFCCC reporting guidelines. The ERT noted that the NIR also provides estimates of uncertainties. The NIR states that uncertainty estimates, covering 99.9 per cent of total GHG emissions, are ±5.2 per cent for the level and from –1.5 per cent to ±2.1 per cent for the trend. This estimate replaces the incorrect estimates presented in the initial report.

Recalculations

31. The current national system, with NERI as the responsible body, ensures that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance. NERI's documentation database stores all outside inventory inputs in an electronic format and allows the retrieval of original inputs. The ERT noted that recalculations reported by the Party for the years 1990–2003 had been undertaken to take into account new AD and changes in modelling, especially in the energy and industrial processes sectors. Emission estimates for soda ash use as well as for limestone and dolomite use have been added as new categories. The major changes include decreases in CO_2 emissions in the transport category and decreases in N_2O emissions in the energy industries category. The effect on total GHG emissions as reported in the NIR is a decrease by 0.41 per cent for the year 1990 excluding LULUCF, and an increase by 0.08 per cent for

2003. The rationale for these recalculations is provided in the NIR. Recalculations have improved the inventory, for example, through the inclusion of more accurate AD.

Uncertainties

32. The Party has provided an uncertainty analysis for each source category and for the inventory in total, following the IPCC good practice guidance.

33. A tier 1 uncertainty analysis is presented, excluding the LULUCF categories. The Party has used some very high values, notably in N_2O emission factor estimates in the energy sector, as was the case in the 2005 submission. The ERT recommends Denmark to include the LULUCF categories in its future uncertainty analysis. It also encourages Denmark to proceed to tier 2 uncertainty estimates, in order to gain information for further improvements of the inventory.

3. Areas for further improvement identified by the Party

34. The NIR identifies as areas for improvement: in industrial processes, the preparation of better uncertainty estimates and more detailed information on EFs, and continued work on collecting AD; in the agriculture sector, improved transparency through improved use of national data and national methodologies; and in the solvents and other product use and LULUCF sectors, improvement of data availability, which was raised in the 2005 review report. During the review, inventory partners indicated their plans to further develop data supply, models and estimates. These plans are linked to the partners' other activities but through cooperation between NERI and the partners most of the activities will be beneficial for the development and the quality of the inventory. One example is a European Community harmonization study, which aims for consistent reporting on energy consumption.

4. Areas for further improvement identified by the ERT

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

(a) Include information on the national system, institutional arrangements for inventory preparation, and the legal basis for the institutional arrangements as well as a clear statement on the status of agreements between NERI and the inventory partners, and between the Ministry of Environment and NERI in the next inventory submission under the Kyoto Protocol;

(b) Compile an annual QA/QC plan and enhance integration with the QM systems of inventory partners;

(c) Enhance the cooperation between NERI and other inventory partners on the compilation of the NIR in order to benefit fully from outside expertise and for verification of the NIR;

(d) Increase the amount of concise background information in the NIR without unnecessarily expanding the volume of the report, notably in the energy sector;

(e) Provide tier 2 uncertainty estimates in order to effectively focus the inventory improvement;

(f) Undertake a tier 2 key category analysis;

(g) Continue reporting of emission estimates for Greenland in the relevant categories instead of reporting under sector other, as well as update the estimates on an annual basis;

36. In addition, the ERT noted that the emission estimates are oriented to the technical structures and definitions of the CORINAIR nomenclature. Transparency in the inventory would be improved by

structuring the NIR using the IPCC category structure instead of the SNAP structure. This also applies to the description of emission trends, and background AD and EF data. This is particularly relevant for the energy sector.

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

5. Energy

Sector overview

38. In all years, the energy sector in Denmark is the largest contributor to total national emissions. In the base year these emissions accounted for 75.4 per cent of total national GHG emissions. CO_2 comprised 98.8 per cent of emissions from the sector, while CH_4 and N_2O contributed 0.4 per cent and 0.8 per cent, respectively. Fuel combustion accounted for 99.4 per cent of the sectoral emissions, and fugitive emissions for the remaining 0.6 per cent. Energy industries were clearly the largest contributor to the sectoral total (50.2 per cent), followed by transport (20.1 per cent), other sectors (18.3 per cent) and manufacturing industries and construction (10.5 per cent).

39. The Party's reporting includes all the information necessary to assess the quality of the inventory for the energy sector. However, the ERT recommends a more detailed discussion at the level of subcategories in future NIRs, for example, energy industries, manufacturing industries and construction, and so on, instead of, as currently happens, grouping these together under stationary combustion. It would be possible to provide a short description of the categories included; a graphic presentation of the emission trends; and a detailed discussion of the emissions trends, main drivers and underlying assumptions. The NIR includes only an aggregated description of stationary combustion in total with cross references to the CORINAIR-oriented SNAP categories. This is not really transparent. During the review the Danish experts provided and discussed with the ERT their first proposals for improving transparency through more category-oriented discussions and descriptions and a future restructuring of the energy chapter. In response to the draft review report, Denmark announced its intention to implement these proposals as first approach in its 2008 reporting.

40. The ERT observed that a border trade adjustment for the consumption of liquid fuels is included in the official Danish energy balance. During the review the ERT checked that, as requested in the Revised 1996 IPCC Guidelines, total fuel sales are applied in the inventories.

41. The Danish emission inventory for the energy sector has been improved in recent years. The ERT noted that recommendations made in previous reviews have been considered and included in the estimation process (e.g. reallocation of fuels in the reference approach, harmonization of energy data for national and international transport, exclusion of fugitive emissions from storage). The ERT also noted that the GHG inventory for the energy-related emissions is of good quality.

Reference and sectoral approaches

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

42. The CO_2 emissions are estimated using both approaches (sectoral and reference) for the entire time series. The difference in 1990 is –0.78 per cent. The differences compared to the sectoral approach are always below the 2 per cent limit and vary over time between –1.61 per cent (1999) and 0.65 per cent (1998). Only in 1998 did the reference approach result in higher emissions than the sectoral approach. The ERT suggests that a detailed description should be included in future NIRs, if possible, of the underlying reasons for this happening in this specific year. In principle the deviations between the reference and the sectoral approach are within the given and accepted ranges of the Revised 1996 IPCC Guidelines.

43. Like previous review teams the ERT noted the use of an estimation approach underlying the full oxidation of the carbon content in the fuels. An oxidation factor of 1.0 has been applied for both estimation approaches (sectoral and reference) and for the entire time series. This may result in a slight overestimation of the CO_2 emissions. The Danish experts expressed an intention to analyse the verified data provided by the operators under the European Union (EU) emissions trading scheme (ETS) for detailed information on the oxidation of the carbon content. The ERT recommends that Denmark continue to use the full oxidation approach, because this is in line with the latest scientific literature available.

International bunker fuels

44. Aviation and marine emissions are allocated to the domestic or international category on the basis of statistics on the start- and end-point of journeys. Greenland is counted as a domestic destination which is in line with the revised 1996 IPCC Guidelines. The ERT noted that, as was recommended in previous reviews, the use of AD for international and domestic consumption has been harmonized between the reference and the sectoral approaches.

Feedstocks and non-energy use of fuels

45. The problems of feedstocks and non-energy use of fuels were discussed during the review. The ERT noted that the CO_2 emissions from the non-energy use of fuels are based on data provided by the Danish Energy Authority. Industrial processes which use fuels as feedstocks do not occur in Denmark (those are mainly part of the chemical industry). The ERT recommends that a more detailed description of this aspect be included in the next NIR.

Key categories

Stationary combustion: all fuels – CO_2

46. The estimations for CO_2 for stationary combustion are partly based on EFs provided and/or approved by the relevant companies and based on plant-specific measurements and/or fuel analysis, for example, for petroleum coke and incinerated waste. To improve transparency and according to QA/QC procedures these factors should be documented and compared to default values provided by the Revised 1996 IPCC Guidelines. Any differences should be explained.

47. In line with previous reviews, the ERT recommends that priority be given to work on an improved documentation of the CO_2 EFs. These have been applied as constant values for the entire time series for most of the fuels (except natural gas and waste). The influence of different fuel characteristics and the origins of the fuels used should be elaborated and documented in the NIR or an explanation for the use of a constant EF should be provided. In response to the draft review report, Denmark announced its intention to include in the inventory new information on CO_2 EFs based on the monitoring of the EU ETS.

48. The NIR states that data for the use of town gas are included as natural gas in the estimation process. During the review the Danish experts indicated their intention to provide further explanations for this (including fuel characteristics). The ERT commends this work towards improved documentation and transparency in the inventory and recommends that Denmark report progress with it in future NIRs.

Road transportation: liquid fuels – CO_2

49. The estimated figures on fuel consumption are based on a detailed COPERT III model approach. In accordance with the Revised 1996 IPCC Guidelines, a comparison of the fuel use between the model approach and the energy balance is implemented for all years to ensure that the emissions are based on the amount of fuel sold. The results of the comparison match well for gasoline use but differ significantly (by 70 per cent) for the use of diesel in 1990. A correction factor for this "fuel use gap" is

applied to include all emissions based on fuel sold within Denmark in the inventory. The ERT recommends more analysis of the explanations for the large differences in the underlying diesel use parameters in the model compared to the data provided by the Danish Energy Authority. In response to the draft review report, Denmark informed the ERT that it has included the required information in its 2007 submission.

Non-key categories

Other sectors: liquid fuels – CO_2, CH_4 and N_2O

50. The ERT noted the efforts made by the Danish experts to improve the detailed model approach used for the estimation of emissions released from off-road machinery for agriculture, forestry and fisheries. The ERT encourages the Danish experts to realize the announced improvements, in particular the verification of the underlying fuel consumption data.

6. Industrial processes and solvent and other product use

Sector overview

51. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6), emissions from the industrial processes sector in Denmark and Greenland amounted to 2,469.99 Gg CO_2 equivalent, or 3.5 per cent of total national GHG emissions under the Kyoto Protocol. The largest key categories in the sector in the base year were nitric acid production (42.2 per cent of sectoral emissions), cement production (35.7 per cent) and consumption of halocarbons and SF_6 (11.7 per cent).

52. In the base year, emissions from the solvent and other product use sector in Denmark and Greenland amounted to 136.90 Gg CO_2 equivalent, or 0.2 per cent of national total GHG emissions under the Kyoto Protocol.

53. Emissions from the industrial processes sector were revised to include some new categories such as limestone and dolomite use, asphalt roofing and road paving with asphalt. In addition, more accurate information such as company-specific data for catalysts/fertilizers production were taken into account in the chemical industry.

54. In estimating emissions, many country-specific data and methodologies were used. However, some relevant information was not provided (e.g. data used in estimating EFs for cement production and consumption of halocarbons and SF_6). The ERT noted that detailed information, such as underlying data, equations, assumptions and references, could be better described in the NIR, and encourages Denmark to do so in its next submission.

Key categories

Cement production – CO_2

55. Denmark applies a method based on the production of cement and explains that it is the best estimate based on the available data. During the in-country visit, Denmark provided additional data and the equations used to estimate AD and EFs for the base year. The ERT concludes that the estimates are adequate. To improve transparency, the ERT recommends that Denmark provide additional information on how the emissions are derived, including background data and assumptions, in the NIR.

Nitric acid production – N_2O

56. In response to the 2005 review report, Denmark provided the value of the emission factor used in the NIR (7.5 kg/t). The ERT acknowledged that this emission factor value is within the range of the IPCC default (2–19 kg/t) and considered it to be adequate.

Consumption of halocarbons – HFCs, PFCs and SF_6

57. Detailed information on EFs is not provided in the NIR. The ERT recommends that Denmark provide more information on the choice of EFs and the specific model approaches.

58. Denmark reports some subcategories as not applicable ("NA"). For example, HFC-32 emissions from foam blowing in the base year (1995) are reported as "NA" because emissions were not occurring even though foam blowing was conducted. However, the ERT was informed that consumption of HFC-32 was not used in foam blowing. The ERT recommends that Denmark provide a description of the actual status of the usage of HFCs in the NIR and amend the notation key to "not occurring" ("NO").

Non-key categories

Lime production – CO_2

59. The CO_2 implied emission factor (IEF) (0.20 t/t) is the lowest of reporting Parties and lower than the IPCC default range (0.59–0.86 t/t). Denmark explains that this category includes CO_2 emissions from the production of lime and of yellow bricks. The ERT was provided with additional information including CO_2 emissions which split the emissions into lime and yellow bricks, and acknowledged that the methodologies used are adequate. The ERT recommends that Denmark report only CO_2 emissions from lime production in this category. The ERT also recommends that Denmark report emissions from yellow bricks in category other (mineral products (2.A.7)) and provide relevant information in the CRF and NIR.

7. Agriculture

Sector overview

60. For the base year, the agriculture sector contributed 13,058.56 Gg CO_2 equivalent or 18.7 per cent of Denmark's total national emissions. The sector was the second-largest emission source in Denmark. Agricultural soils contributed 64.0 per cent to sectoral emissions, followed by enteric fermentation and manure management (25.0 and 11.0 per cent, respectively).

61. Denmark submitted a complete agriculture inventory covering all gases, all categories and all years. The additional information tables in CRF tables 4.A and 4.B(a) was provided to the ERT during the review. The ERT recommends that Denmark include these tables in future submissions. There is no rice cultivation or field burning of agricultural residues in Denmark, so the corresponding categories are reported as "NO". According to the NIR, prescribed burning of savannas does not occur in Denmark. However, GHG emissions from prescribed burning of savannas are reported as "NA" in the CRF. The ERT recommends that Denmark check the use of the notation keys and to report emissions from prescribed burning of savannas as "NO".

62. CH_4 emissions from enteric fermentation have been recalculated to reflect a change of fodder practice from the use of sugar beet to use of maize for cattle. Due to changes in the methodology used for calculating emissions from organic soils in the LULUCF sector, N_2O emissions from histosols in the agricultural sector have been recalculated. The recalculations increased GHG emission from the agricultural sector by 1.6 per cent for 1990.

63. Enhanced animal characteristics and country-specific parameters and EFs have been applied in the related categories (enteric fermentation, manure management and agricultural soils).
Sixty subcategories of cattle and 17 of swine were classified according to animal type, age, weight and type of stabling. This is consistent with the IPCC good practice guidance. The NIR provides useful information on the methods, basic parameters and IEFs used in the emission estimations. During the review, the ERT noted that extensive tabular data on livestock characteristics and stabling systems are available. This information was useful for the review of the Danish inventory. The ERT recommends

that Denmark further improve transparency by including in the NIR more tables on the key parameters (such as animal population, gross energy intake (GE), CH_4 conversion rate (Y_m), volatile solid excretion (VS), digestible energy (DE) and nitrogen (N) excretion) and EFs for subcategories.

Key categories

Enteric fermentation – CH_4

64. Tier 2 methods and country-specific gross energy intake have been applied to estimate CH_4 emissions from enteric fermentation for dairy cattle and heifers. The IPCC default methane conversion rate (Y_m) has been applied for all other livestock categories except dairy cattle and heifers. This is in line with the IPCC good practice guidance.

65. Little information on the country-specific Y_m is provided in the NIR. During the review, Denmark provided Excel tables with information on the development of the country-specific Y_m over time. The ERT recommends Denmark to include a table with information on the development of country-specific Y_m in the NIR to facilitate comparison between the Danish Y_m and the IPCC Y_m. In response to the draft review report, Denmark indicated that a table showing the trend for gross energy intake (GE), for the methane conversion rate (Y_m), for volatile solid excretion (VS – kg dm/head/day) and for digestible energy (DE) for the years 1990–2005 are included in the 2007 NIR.

Manure management – CH_4

66. CH_4 emissions from manure management were estimated based on tier 2 methodology, country-specific VS, IPCC default values for methane-producing capacity (Bo) and a methane correction factor. The ERT was provided with detailed descriptions of livestock allocation to stable type and this was helpful for the ERT and the review. The ERT encourages Denmark to include this information in the NIR in future submissions. In response to the draft review report, Denmark indicated that a table showing the country specific methane conversion rate (Y_m) is given in the 2007 NIR.

67. The ERT noted that annual VS values instead of daily values have been used to fill in the cells in CRF table 4.B(a). This resulted in daily VS values in CRF table 4.B(a) and VS values in the NIR that were more than 300 times higher than the IPCC default. During the review, Denmark provided data which supported the fact that the EF calculation was based on correct data. The ERT recommends Denmark to correct this in the next submission.

Manure management – N_2O

68. Animal N excretion in kg/head/year for non-dairy cattle and swine is approximately 50 per cent of the IPCC defaults (35.67 kg/head/year versus 70 kg/head/year for non-dairy cattle and 11.62 kg/head/year versus 20 kg/head/year for swine). The NIR explains that the values are weighted for different subcategories of cattle and pigs with lower weight, low feed intake, high utilization of N and lower part of suckling cattle. The published report and tables provided during the review showed that N excretion in kg/head/year for slaughter pigs decreased from 18.0 in 1990 to 14.0 in 2004. The ERT recommends that Denmark provide tables on N excretion and EFs for swine and non-dairy cattle in future submissions. In response to the draft review report, Denmark indicated its intention to include improved documentation in the 2008 submission.

Direct emissions from agricultural soils – N_2O

69. The IPCC tier 1a methodology has been used to calculate direct N_2O emissions from agricultural soils. The IPCC default EFs were applied to all categories except cultivation of histosols. N_2O emissions from histosols were based on the area of organic soil, multiplied by the emission factor for C, the C:N relationship for the organic matter in the histosols and an emission factor of 1.25 per cent of the total amount of released N. The recalculated N_2O emissions from histosols increased by 0.5 per cent

compared to the previous submission because of changes to the EFs. Denmark provided explanations for the change during the review. The ERT recommends Denmark to include these explanations in its next NIR.

Indirect emissions from agricultural soils – N_2O

70. The $Frac_{LEACH}$ value, from the model in the base year, of 0.38 kg N/kg of fertilizer or manure applied is higher than the IPCC default value of 0.3 kg N/kg of fertilizer or manure applied. During the review, Denmark provided literature to support the country-specific $Frac_{LEACH}$ value.

8. Land use, land-use change and forestry

Sector overview

71. The LULUCF sector was a net source in the base year. The net CO_2 equivalent emissions for the sector were 551.74 Gg CO_2, accounting for 0.8 per cent of base year emissions. The sector was a source in 1990 but, except for the year 2000, it was a net sink from 1991 to 2004. In 2004 it was a net sink of 2,279.57 Gg CO_2. All the CRF tables for the LULUCF sector have been completed. However, the inventory is incomplete: first, in terms of categories, for example, settlements and other land are not included; second, because not all the carbon pools are included for the different categories; and, third, because the geographic coverage is not clear from the NIR. CO_2 emissions and removals are reported for forest land, cropland, grassland and wetlands. Settlements and other land categories are reported as not estimated. During the base year, CO_2 emissions and removals are reported as not occurring, not applicable and not estimated for land converted to forest land, as not estimated for land converted to cropland and land converted to grassland, and as not occurring and not applicable for wetlands and settlements. Furthermore, no forest land-use conversion or change is reported for the base year. A combination of tier 1 and tier 2 methods was used.

72. QA and QC procedures have not been fully implemented for the 2006 inventory for the LULUCF sector. Denmark should be complimented for initiating a plan for developing QA/QC for the LULUCF sector, which, according to the NIR, will be implemented for future inventories.

73. Denmark has not included the LULUCF sector in its key category analysis so the rest of this section is based on the secretariat's key category analysis. The ERT recommends Denmark to include the LULUCF sector in its key category analysis in future inventories. In response to the draft review report, Denmark stated that it has initiated efforts to include the LULUCF sector in its key category analysis and will include it in the 2008 submission. The inclusion of the LULUCF sector in the key category analysis is a prioritized activity for the Party.

Key categories

Forest land remaining forest land – CO_2

74. Net CO_2 removals are reported for broadleaf and conifer forest types. Only carbon stock change in living biomass is reported. Carbon stock changes in dead organic matter and soils are reported as not estimated. The EFs used are within the range for the forest types. The ERT recommends that Denmark report all the carbon pools, even if they are insignificant. In response to the draft review report, Denmark stated that monitoring of carbon stocks for woody biomass and dead wood is currently being carried out in a continuous sampling programme with a five-year rotation in the NFI. For litter and soil C pools it is well recognized that changes occur slowly and measurements with a frequency of less than 10 years are not likely to show any patterns due to large site- and sampling-related variability.

Cropland remaining cropland – CO_2

75. Cropland is the dominant land category, accounting for 2.57 million hectares. CO_2 uptake of living biomass is reported for hedgerows and horticulture areas. Dead organic matter and soil carbon are reported as not applicable for these land-use categories. For mineral and organic soils only carbon stock change in soils is reported. The ratio of mineral soils to organic soils is assumed to be constant in 1990–2004. This must be clarified, since the areas under different agricultural systems have changed. The Party has provided adequate clarification to show that the changes in the ratio between mineral and organic soils is marginal.

76. All CO_2 emissions relevant to carbon emissions from agricultural applications in the country are reported under cropland. The ERT recommends that Demark report the emissions for cropland and grassland separately.

Non-key categories

Land converted to forest land – CO_2

77. The cropland area converted to forest land for the year 1990 is estimated to be 730 ha. CO_2 emissions and removals are not reported for any pools for this particularly year but reported as "NA" and "NE". The Party explained that the growth of biomass in the first year after planting is almost nil as no felling takes place. The growth model used includes changes in the C stock in living biomass for year 2 after planting and onwards. The ERT recommends that for the sake of completeness Denmark report CO_2 emissions and removals even if the land area involved is small.

78. Conversion of grassland, wetlands, settlements and other as well as CO_2 emissions and removals are reported as not occurring.

Grassland – CO_2

79. Only carbon stock change in organic soils is reported for grassland remaining grassland. Carbon stock change in living biomass and dead organic matter are reported as not applicable. Soil C stock change for mineral soils, which account for 196,970 ha, is reported under cropland remaining cropland. It is recommended to report soil C stock change for all grassland under grassland for consistency.

80. Land converted to grassland is reported as not occurring.

Wetlands – CO_2, N_2O

81. The area of wetland is limited at 1,070 hectares. CO_2 emissions resulting from peat extraction are reported for wetlands. N_2O emissions are also reported for wetlands.

82. Lands converted to wetlands are reported as not applicable and not occurring.

Biomass burning – CO_2, CH_4, N_2O

83. The area subjected to biomass burning during the base year is reported as not occurring. GHG emissions and removals are reported as not occurring and not applicable for biomass burning. Biomass burning was banned from 1 January 1990.

9. Waste

Sector overview

84. In the base year the waste sector contributed 2.2 per cent to national GHG emissions. The sectoral emissions are mainly from two categories: CH_4 emissions from solid waste disposal on land,

accounting for 23.5 per cent of the national CH_4 emissions; and N_2O emissions from wastewater handling which represented 0.8 per cent of the national N_2O emissions.

85. The need to prevent environmental pollution of the aquatic ecosystems by the activities in the sector in the 1980s and 1990s led the Government of Denmark to develop policy, legislation and enforcement activity, resulting in the establishment of institutional arrangements and databases for monitoring and control of the sector. The system has facilitated the collection of AD and national EFs and the development of country-specific methodologies for waste sector inventory. A comprehensive study in 2005 led to the estimation and reporting of emissions from the wastewater handling categories, thereby improving the completeness of the waste sector inventory in the 2006 submission.

86. Transparency also increased in the waste sector inventory through adequate summary of the methodologies, recalculations and uncertainty estimates for all the categories in the NIR, as well as improvements in the reporting and use of notation keys in the CRF table.

Key categories

Solid waste disposal on land – CH_4

87. Denmark uses a country-specific tier 2 approach based on the first order decay (FOD) methodology. Country-specific AD and EFs have been used. The consistency and transparency of the category were improved in the 2006 submission by detailed documentation of the model assumptions, the sensitivity analysis of various parameters that affect the emissions estimates, and the uncertainty analysis as well as adequate reporting in the NIR based on previous review comments.

88. Denmark has investigated the sensitivity of the FOD model to *k* values of respective waste types to determine the impact on the emissions from solid waste disposal on land. Initial analysis of the results showed that using the *k* values of individual waste types gives lower estimates compared to the reported emissions based on aggregate *k* values. The differences range from 8 per cent in 1990 to 20 per cent in 2004. Denmark plans to report the outcome of the investigation of the selection of *k* values in its 2008 submission. The ERT noted the increasing reduction in the fraction of biodegradable materials in the various waste types, and recommends that a waste inventory and characterization be undertaken as part of the investigation to determine the effect of changing DOC on the net emissions.

89. Denmark applies the oxidation factor to potential methane emissions before accounting for biogas recovery in the formulation of the FOD model methodology for the estimation of the methane emissions from solid waste disposal on land. The 2005 review comments recommended that Denmark should consider accounting for biogas recovery before applying the oxidation factor in the FOD model in accordance with the IPCC good practice guidance. This is because CH_4 oxidation is considered to happen only in the top layer of the landfill and not before recovery.

90. Denmark has subsequently investigated the impacts of the recommended methodology on methane emissions from the category in response to the review comments. The initial investigation shows that the methodological change resulted in systematically increased emissions, made little difference in 1990 (0.08 per cent) and produced relatively small increments over time, ranging from 0.08 per cent in 1990 to 2.38 per cent in 1998. For 2004 the increase was 2.03 per cent. This methodological change was carried out for the 2007 submission.

Non-key categories

Wastewater handling – CH_4 and N_2O

91. CH_4 and N_2O emissions from wastewater handling systems contributed only 0.3 per cent of national GHG emissions and 13.7 per cent of total sectoral emissions in 1990. Denmark's estimation methodology currently reports domestic and commercial, and industrial wastewater handling as one

category. This is because the country-specific AD for industrial wastewater sent to municipal wastewater treatment plants are not collected. The ERT noted that Denmark is preparing an improvement plan in response to the 2005 review comments to quantify the contributions of the two subcategories separately. The plan will involve further work on AD and the development of EF for the separate wastewater characteristics. The outcome of the implementation of the plan will be implemented in the NIR 2009.

92. Denmark improved the completeness of its wastewater inventory with a comprehensive study of wastewater handling in 2005 and the development of country-specific tier 2 methodologies, country-specific EFs, and AD for estimating and reporting emissions of CH_4 and N_2O from industrial, domestic and commercial wastewater handling in 2005, including extrapolation for the base year. Transparency was also increased by Denmark's response to previous review comments, providing adequate summaries of the methodologies, recalculations and uncertainty estimates in the NIR and improving its use of notation keys in the CRF.

Waste incineration – CO_2

93. Incineration plants in Denmark are all equipped with energy recovery facilities. Therefore, CO_2 emissions from waste incineration are accounted for under the energy sector in accordance with the Revised 1996 IPCC Guidelines.

10. Other sectors

94. Denmark reported, in its original submission, emissions from Greenland as aggregated estimates in sector 7 in the CRF tables. The way information for Greenland is presented is not transparent. The ERT recommends a more detailed overview of these emissions and that Denmark report them in the relevant sectors. Information on emissions from Greenland is included in annex 6.2 to the NIR. A more detailed presentation of the emissions, at least in a format similar to CRF table summary 2, would significantly increase transparency. A more detailed trend discussion of Greenland's emissions should be included in the NIR. During the course of the review, Denmark provided table summary 2 for all years where the emissions from Greenland were included in the relevant sectors instead of in sector 7. The ERT welcomes this development and recommends that Denmark continue including the emissions for Greenland in the relevant sectors.

C. Calculation of the assigned amount

95. The assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1.

96. Denmark and Greenland's base year is 1990 and the Party has chosen 1995 as base year for HFCs, PFCs and SF_6. Denmark and Greenland's quantified emission limitation is 92 per cent as stipulated in Annex B to the Kyoto Protocol. As Denmark is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, Denmark's quantified emission limitation is 79 per cent. Denmark's assigned amount is calculated based on the Party's Article 4 commitment (79 per cent), and Greenland's is calculated based on the Annex B target (92 per cent).

97. Land-use change and forestry constituted a net source of GHG emissions in 1990. However, there are no emissions from deforestation and therefore no emissions are accounted for under Article 3, paragraph 7, for the purpose of the calculation of the assigned amount.

98. Based on Denmark's and Greenland's base year emissions excluding LULUCF, estimated at 69,323.34 Gg CO_2 equivalent and 654.73 Gg CO_2 equivalent, respectively, and their corresponding commitments of 79 per cent (Denmark) and 92 per cent per cent (Greenland), the Party calculates its assigned amount to be 276,838,955 tonnes CO_2 equivalent, comprising 273,827,177 tonnes CO_2

equivalent for Denmark under the EU burden-sharing agreement (79 per cent) and 3,011,778 tonnes CO_2 equivalent for Greenland under Kyoto Protocol Annex B emissions target (92 per cent). The ERT agrees with the Party's estimate.

D. Calculation of the commitment period reserve

99. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

100. Based on its calculated assigned amount of 276,838,955 tonnes CO_2 equivalent, Denmark calculates the commitment period reserve to be 249,155,060 tonnes CO_2 equivalent. The ERT agrees with this figure.

E. National registry

101. Denmark has provided most of the information on the national registry system as required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1). The information provided is broadly transparent and in accordance with the requirements of the UNFCCC reporting guidelines. However, the ERT noted that some of the required information was not included in the initial report, such as the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions, and a list of the information publicly accessible by means of the user interface to the national registry. The ERT appreciates that the information was provided during in-country visit. The ERT recommends that Denmark provide this information in its next inventory submission under the Kyoto Protocol.

102. During the initial review, the ERT was provided with additional information on the national registry of Denmark regarding the developments that took place after the submission of the initial report. For example, the ERT was informed that Denmark will change the software used for the national registry and that the interface to the national registry is designed to be user-friendly and fully secure. The ERT recommends the Party to provide more information about this in its next inventory submission under the Kyoto Protocol.

103. Table 5 summarizes the information on the mandatory reporting elements of the national registry system, as stipulated by decisions 13/CMP.1 and 5/CMP.1.

Table 5. Summary of information on the national registry system

Reporting element	Provided in the initial report	Comments
Registry administrator		
Name and contact information	Yes	
Cooperation with other Parties in a consolidated system		
Names of other Parties with which Denmark cooperates, or clarification that no such cooperation exists	Yes	No such cooperation exists.
Database structure and capacity of the national registry		
Description of the database structure	Yes	Covered in the Independent Assessment Report (IAR)[a]
Description of the capacity of the national registry	Yes	
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	Yes	
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	No	Denmark provided this information during the initial review.
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	Covered in the IAR
An overview of how these measures are kept up to date	Yes	
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	No	Denmark provided this information during the initial review. Covered in the IAR
The Internet address of the interface to Denmark's national registry	Yes	http://dketreu.mst.dk/
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the IAR
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	Yes	Covered in the IAR

[a] Pursuant to decision 16/CP.10, once registry systems become operational, the administrator of the international transaction log (ITL) is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an independent assessment report (IAR). They will be also included in its annual report to the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

104. During the in-country visit, Denmark indicated that the initialization process had started in January. The national registry is expected to be fully operational by mid to late June. Information on the registry is publicly available through the Internet at URL <http://dketreu.mst.dk/>.

105. The ERT acknowledged the effort made by Denmark to put in place adequate procedures and security measures. For example, the ERT noted that Denmark defined procedures for changing software

versions, including testing procedures, before the new version goes online. The ERT gained the overall impression that Denmark attached adequate importance to, and allocated adequate resources, including human resources, to the development, operation and maintenance of the registry.

106. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report that was forwarded to the ERT by the administrator of the international transaction log , pursuant to decision 16/CP.10, on 17 October 2007.

107. The ERT reiterated the main findings of this report, including that the registry has fulfilled all of its obligations regarding conformity with the DES. These obligations include having adequate transaction procedures, adequate security measures to prevent and resolve unauthorized manipulations and adequate measures for data storage and registry recovery.

108. Based on the results of the in-country visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that Denmark's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

109. Table 6 shows Denmark's choice of parameters for forest definition as well as elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	10%	
Minimum land area	0.5 ha	
Minimum tree height	5 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3, activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Annual
Deforestation	Mandatory	Annual
Article 3, paragraph 4, activities		
Forest land management	Elected	Annual
Cropland management	Elected	Annual
Grazing land management	Elected	Annual
Revegetation	Not elected	Not applicable

110. Forest area includes temporarily unstocked areas and small open areas in the forest needed for management purposes such as fire breaks. Windbreaks and tree groves more than 0.5 ha in area with a minimum width of 20 m are included. Farmland, orchards and gardens are not included in the definition of forest. Denmark does not discuss in its initial report whether these values are consistent with the information provided to the Food and Agriculture Organization of the United Nations (FAO). However, the NIR states that the new national forest inventory will be consistent with the FAO forest definition.

III. Conclusions and recommendations

A. Conclusions

111. The ERT concluded that the information provided by Denmark is complete and submitted in accordance with the relevant provisions of paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1 and section I of the annex to decision 15/CMP.1, and relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the inventory estimates as submitted and reviewed; that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1, and that the LULUCF definitions are within the agreed range.

112. Denmark has described its national system in accordance with the annex to decision 19/CMP.1. The Danish national system is functioning well. NERI is the designated single national entity. The national system includes the relevant institutions which could improve the quality of the inventory data. The ERT considers that the national system can fulfil the requirements of the Kyoto Protocol.

113. The inventory for the base year is transparent and provides a well-documented estimate of the country's emissions in the base year. The inventory is complete and does not overestimate the base year emissions, so adjustments are not needed.

114. The calculation of the assigned amount (276,838,955 tonnes CO_2 equivalent) and the commitment period reserve (249,155,060 tonnes CO_2 equivalent) is based on the reported base year emissions (69,978.070 Gg CO_2 equivalent (Denmark's and Greenland's respective base year emissions excluding LULUCF estimated at 69,323.34 Gg CO_2 equivalent and 654.73 Gg CO_2 equivalent)). The calculations are in accordance with the annexes to decisions 11/CMP.1 and 13/CMP.1 and the results are provided in the initial report.

115. Denmark has clearly described its choices for the LULUCF parameters in the initial report in line with decision 16/CMP.1. A "forest" is defined as an area with a minimum size of 0.5 hectares, a minimum tree crown cover of 10 per cent and a minimum tree height of 5 metres. Denmark has elected forest land management, cropland management and grazing land management as activities under Article 3, paragraph 4, of the Kyoto Protocol. Accounting will be made annually for Article 3, paragraph 3, and elected Article 3, paragraph 4, activities.

116. Based on the results of the in-country review visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that Denmark's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

117. Denmark has submitted a complete set of CRF tables for the years 1990–2004 and an NIR which is complete in terms of geographical coverage, years and sectors, and fairly complete in terms of categories and gases. However, there is a need to further improve the quality of the inventory report. During the review the ERT formulated a number of recommendations relating to completeness, transparency and the institutional arrangements. The key recommendations[3] are that Denmark:

(a) Consider arrangements for ensuring the continuity of the national system. The ERT also recommends that the Party give a full description of the national system and of changes in the system in the next inventory submission under the Kyoto Protocol, including the legal basis of the institutional arrangements and a clear statement on the standing of

[3] For a complete list of recommendations, the relevant sections of this report should be consulted.

agreements between NERI and the inventory partners, as well as between the Ministry of Environment and NERI;

(b) Compile an annual QA/QC plan and enhance integration with the QM systems of inventory partners;

(c) Enhance the cooperation between NERI and other inventory partners with the compilation of the NIR in order to fully benefit from the outside expertise and for verification of the NIR;

(d) Increase the amount of concise background information in the NIR without unnecessarily expanding the volume of the report, notably in energy sector;

(e) Provide tier 2 uncertainty estimates in order to effectively focus the improvement of the inventory;

(f) Undertake a tier 2 key category analysis;

(g) Continue reporting of emission estimates for Greenland in the relevant categories instead of reporting under the sector other;

(h) Improve transparency of the inventory by structuring the NIR according to the IPCC category structure instead of the SNAP structure. This applies to both the description of emission trends and the background data (AD and EF data). This is particularly relevant for the energy sector.

C. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CMP	Conference of the Parties serving as the Meeting of the Parties
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU	European Union
F-gas	fluorinated gas
FOD	first order decay
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joule)
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
Mt	million tonnes
N_2O	nitrous oxide
NA	not applicable
NERI	National Environmental Research Institute
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
SO_2	sulphur dioxide
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solid excretion
Y_m	CH_4 conversion rate

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