Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2014/28**
25 June 2014

Report of the individual review of the annual submission of Denmark submitted in 2013

Note by the secretariat

The report of the individual review of the annual submission of Denmark submitted in 2013 was published on 23 June 2014. 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 decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2013/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 individual review of the annual submission of Denmark submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Denmark, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 16 to 21 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Leif Hockstad (United States of America) and Mr. Marius Taranu (Republic of Moldova); energy – Ms. Rayna Angelova (Bulgaria), Ms. Duduzile Nhlengethwa-Masina (Swaziland), Mr. Norbert Nziramasanga (Zimbabwe) and Ms. Songli Zhu (China); industrial processes and solvent and other product use – Mr. Joseph Baffoe (Ghana), Ms. Valentina Idrissova (Kazakhstan) and Mr. Takuji Terakawa (Japan); agriculture – Ms. Olga Gavrilova (Estonia) and Ms. Janka Szemesova (Slovakia); land use, land-use change and forestry (LULUCF) – Mr. Emil Cienciala (Czech Republic) and Mr. Mark McGovern (Canada); and waste – Ms. Detelina Petrova (Bulgaria) and Ms. Irina Yesserkepova (Kazakhstan). Mr. Hockstad and Mr. Taranu were the lead reviewers. The review was coordinated by Mr. Stylianos Pesmajoglou (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), 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. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Denmark was published after the submission of the 2014 annual submission.

3. In 2011, the main greenhouse gas (GHG) in Denmark was carbon dioxide (CO_2), accounting for 78.3 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (10.6 per cent) and methane (CH_4) (9.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 77.7 per cent of total GHG emissions, followed by the agriculture sector (17.0 per cent), the industrial processes sector (3.3 per cent), the waste sector (1.8 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 57,011.07 Gg CO_2 eq and decreased by 18.2 per cent between the base year[2] and 2011. The ERT concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from sources including in Annex A to the Kyoto Protocol only.

5. Additional background data on recalculations by Denmark in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

Table 1
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	53 478.11	53 478.11	61 466.71	54 406.24	51 554.86	49 051.09	49 488.61	44 614.53	–16.6
		CH_4	6 050.06	6 050.06	6 143.68	5 894.08	5 632.39	5 539.77	5 601.08	5 505.70	–9.0
		N_2O	9 806.86	9 806.86	8 773.09	7 953.48	6 395.20	6 023.31	5 981.35	6 040.82	–38.4
		HFCs	217.75	NA, NE, NO	217.75	608.61	859.25	805.41	810.95	765.78	251.7
		PFCs	0.50	NA, NO	0.50	17.89	12.79	14.18	13.27	11.06	2 101.4
		SF_6	107.37	44.45	107.37	59.23	31.60	36.69	38.29	73.19	–31.8
KP-LULUCF	Article 3.3[b]	CO_2					430.49	–133.56	–241.82	9.58	
		CH_4					NO	NO	NO	NO	
		N_2O					0.15	0.15	0.15	0.15	
	Article 3.4[c]	CO_2	5 238.00				–1 770.2	3 011.95	–275.42	–2 722.16	NA
		CH_4	0.00				0.01	0.01	0.01	0.01	–98.2
		N_2O	0.00				12.46	12.27	12.26	12.25	–24.7

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

			Gg CO_2 eq								*Change (%)*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A		Energy	52 737.00	52 737.00	60 699.83	53 543.84	50 971.86	48 838.00	49 394.45	44 278.66	–16.0
		Industrial processes	2 520.69	2 239.52	2 725.81	3 385.56	2 260.52	1 770.56	1 691.37	1 860.82	–26.2
		Solvent and other product use	116.38	116.38	137.34	153.79	157.38	170.18	187.68	167.18	43.7
		Agriculture	12 553.53	12 553.53	11 600.47	10 480.11	9 953.60	9 607.29	9 623.21	9 680.55	–22.9
		Waste	1 733.05	1 733.05	1 545.65	1 376.23	1 142.73	1 084.42	1 036.84	1 023.85	–40.9
		LULUCF	NA	5 473.22	3 649.64	3 218.29	–1 298.23	2 932.05	–472.88	–2 663.97	NA
		Total (with LULUCF)	**NA**	**74 852.70**	**80 358.74**	**72 157.80**	**63 187.86**	**64 402.49**	**61 460.67**	**54 347.10**	**NA**
		Total (without LULUCF)	**69 660.66**	**69 379.48**	**76 709.10**	**68 939.52**	**64 486.09**	**61 470.44**	**61 933.55**	**57 011.07**	**–18.2**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation					351.79	–211.96	–321.82	–73.10	
		Deforestation					78.85	78.55	80.15	82.83	
		Total (3.3)					**430.65**	**–133.41**	**–241.67**	**9.74**	
	Article 3.4[d]	Forest management					–5 923.58	–24.51	–4 028.32	–6 313.62	NA
		Cropland management	5 053.87				3 939.59	2 835.12	3 560.15	3 367.89	–33.4
		Grazing land management	184.14				226.28	213.62	205.02	235.84	28.1
		Revegetation	NA				NA	NA	NA	NA	NA
		Total (3.4)	**5 238.00**				**–1 757.72**	**3 024.23**	**–263.15**	**–2 709.90**	**NA**

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

[a] "Base year" for sources included in Annex A to the Kyoto Protocol refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6.The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was originally submitted on 15 April 2013 and, following revisions, was resubmitted on 8 May 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and an NIR. Denmark also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

8. Table 3 contains the ERT's overall assessment of the annual submission of Denmark. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for: potential emissions from the export in products of HFC-32, HFC-125, HFC-143a; N_2O emissions from aerosol cans and from other uses of N_2O; CH_4 emissions from direct soil emissions and indirect emissions under agricultural soils; and CO_2 emissions from managed waste disposal on land
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for: N_2O emissions from flooded lands; and CH_4 emissions from forest land from drainage of soils and wetlands in Greenland
KP-LULUCF	Complete	Mandatory: none

		General findings and recommendations
		Non-mandatory: none
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	Paragraphs 31, 33, 60
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	The ERT recommends that Denmark increase its QA/QC efforts when harmonizing the data reported in the NIR and the CRF tables, notably where complex methods are used and when finalizing the CRF tables and the NIR Category-specific recommendations can be found in paragraphs 29, 39, 41, 50 and 56 below
The ERT's findings on the transparency of the 2013 annual submission	Generally sufficient	The ERT recommends that Denmark increase transparency in both the NIR and the CRF tables by expanding the discussions of the country-specific methods used, and by clarifying the reporting of the notation keys, the key category analysis and the uncertainty analysis, especially when reporting combined emission estimates for Denmark and Greenland Category-specific recommendations can be found in paragraphs 19, 32, 33, 36, 44, 47, 60 and 62 below

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

9. The NIR described the national system for the preparation of the inventory. The Danish Centre for Energy and Environment (DCE), on behalf of the Ministry of the Environment and the Ministry of Climate, Energy and Building, has overall responsibility for the preparation and publication of the national inventory. Approval of the national inventory is the responsibility of the Danish Energy Agency. The Government of Greenland is responsible for finalizing and transferring the inventory for Greenland to DCE. The Faroe Islands Environmental Agency is responsible for finalizing and transferring the inventory for the Faroe Islands to DCE. There are data and delivery schedule agreements in place with both Greenland and the Faroe Islands ensuring the data delivery.

10. Multiple Danish ministries, research institutions and organizations are also involved in the preparation of the inventory. This includes the provision of statistics and activity data (AD) by the Danish Environmental Protection Agency, the Ministry of the Environment, the Danish Nature Agency, Statistics Denmark, the Ministry of Economic Affairs and the Interior, the Danish Centre for Food and Agriculture, Aarhus University, the Road Directorate, the Civil Aviation Agency of Denmark, the Ministry of Transport and Danish Railways. The Danish Centre for Forest, Landscape and Planning is responsible for preparing the estimates of emissions and removals for the reporting of the KP-LULUCF activities.

Inventory preparation

11. Table 4 contains the ERT's assessment of Denmark's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Denmark

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Yes	The level and trend key category analysis was performed, including and excluding LULUCF The key category analysis was presented separately for Greenland
Approach followed?	Both tier 1 and tier 2	A tier 2 key category analysis including and excluding LULUCF, both level and trend assessment, has been provided for mainland Denmark only, while a tier 1 key category analysis including and excluding LULUCF, both level and trend assessment, has been provided for Greenland The ERT encourages the Party to make efforts to conduct a tier 2 key category analysis for the aggregated inventory of Denmark and Greenland for future annual submissions
Were additional key categories identified using a qualitative approach?	No	
Has Denmark identified key categories for activities under Article 3, paragraphs 3 and	Yes	The key categories for activities under Article 3, paragraph 3,

		General findings and recommendations
4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?		include CO_2 emissions from afforestation and reforestation. The key categories for activities under Article 3, paragraph 4, include forest management, cropland management and grazing land management
Does Denmark use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	No	Minor changes have been made to the key category analysis so that the categorization follows the categorization used for the uncertainty analyses
Assessment of uncertainty analysis		
Approach followed?	Both tier 1 and tier 2	A tier 2 uncertainty analysis was performed for Denmark, a tier 1 uncertainty analysis was conducted for Greenland, and a tier 1 combined uncertainty analysis was performed for Denmark and Greenland
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	The NIR contains quantitative uncertainty values including LULUCF. The ERT recommends that the Party provide the results of the uncertainty analysis excluding LULUCF in the NIR
Quantitative uncertainty (including LULUCF)	Level = 6.8% Trend = –27.7%	
Quantitative uncertainty (excluding LULUCF)	Level = 5.1% Trend = –18.2%	

Abbreviations: ERT = expert review team, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

12. Denmark has a centralized archiving system, which includes the archiving of disaggregated emission factors (EFs) and AD, and 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 quality assurance/quality control (QA/QC) procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The archive is maintained by the Department of Environmental Science at Aarhus University. During the review, the ERT was provided with the requested additional archived information.

4. Follow-up to previous reviews

13. The NIR includes information on the responses to the recommendations made in the 2008, 2009, 2010 and 2011 annual review reports in the recalculations chapter of the NIR, as well as the sector chapters. In the NIR, Denmark highlighted that some recommendations made in the 2012 annual review report were not implemented because of the delay in the availability of the draft 2012 report. In response to questions raised by the ERT during the review, Denmark explained that some recommendations made in the 2012 annual review report were addressed based on the discussions with the previous ERT during the 2012 review.

14. In response to questions raised by the ERT during the review, the Party stated that work has started on a number of recommendations made in previous review reports related to the LULUCF and waste sectors, but these have not been fully addressed in the 2013 annual submission and the work is ongoing. Denmark further stated that previous recommendations that have not yet been implemented will be addressed in the 2014 annual submission.

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

15. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 9 below.

B. Energy

1. Sector overview

16. The energy sector is the main sector in the GHG inventory of Denmark. In 2011, emissions from the energy sector amounted to 44,278.66 Gg CO_2 eq, or 77.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 16.0 per cent. The key drivers for the decrease in emissions are the reductions in fuel consumption in energy industries (–23.3 per cent) and in manufacturing industries and construction (–18.6 per cent). Within the sector, 45.8 per cent of the emissions were from energy industries, followed by 29.3 per cent from transport, 13.5 per cent from other sectors and 10.1 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 0.8 per cent and other (energy) accounted for 0.5 per cent. Fugitive emissions from solid fuels are reported as not applicable ("NA") or not occurring ("NO").

17. The ERT commends Denmark for its efforts to achieve detailed and accurate emission estimates for the energy sector through the update of its QA/QC procedures and the implementation of planned improvements. The ERT encourages Denmark to continue updating its QA/QC procedures so as to achieve the planned improvements for the energy sector.

2. Reference and sectoral approaches

18. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 19–21 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach	Energy consumption: –3.31 PJ, –0.57% CO_2 emissions: –214.73 Gg CO_2 eq, –0.50%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	19
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	20
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	21

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

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

19. The ERT noted that there are differences between the data reported in the CRF tables and the fuel consumption data published by the International Energy Agency (IEA). In response to questions raised by the ERT during the review, Denmark explained that the data submitted to IEA cover only part of its territory, excluding Greenland and the Faroe Islands. The ERT encourages Denmark to present a transparent discussion of the differences between the two data sets to allow for a comparison with the IEA data and to further increase transparency.

International bunker fuels

20. The ERT commends Denmark for continuing to improve the data collection for international aviation and navigation. The ERT noted that the previous review report contained a recommendation regarding the inclusion of emissions from lubricants used in international marine bunkers, which has not yet been implemented. In response to a question raised by the ERT during the review, the Party explained that these emissions will be included in the next annual submission. The ERT appreciates this clarification and reiterates the recommendation made in the previous review report that Denmark include emissions from the use of lubricants in international marine bunkers in CRF table 1.C.

Feedstocks and non-energy use of fuels

21. In response to a recommendation made in the previous review report, Denmark explained that it used a carbon storage factor for lubricants of 1.00 because they are not

used for energy purposes but rather are used under the category other in the industrial processes sector. According to the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), about 50 per cent of lubricants are lost as CO_2 during their life cycle. Denmark accounts for CO_2 emissions from lubricants in the industrial processes sector, but there is no explicit justification for the use of a 100 per cent carbon storage factor in the energy sector The ERT recommends that Denmark include a more detailed explanation of the use of lubricants in the energy and industrial processes sectors, and the selected methods, in the NIR, in order to demonstrate that there is no underestimation of emissions.

3. Key categories

Stationary combustion: solid, liquid and gaseous fuels – CO_2

22. The ERT noted that, in response to a recommendation made in the previous review report, Denmark has documented its research to determine if a correlation exists between the carbon content and the net calorific value of coal reported by selected facilities that use tier 3 methods under the European Union Emissions Trading System (EU ETS). The Party has included explanations and tables showing the results of the analysis carried out for coal, gas oil and natural gas. According to the information in the NIR, no significant correlation has been found. The ERT commends Denmark for undertaking such research, with a view to providing insights into the development of country-specific EFs, and encourages the Party to include any additional details of this analysis that may be available.

23. In response to recommendations made in the previous review report, Denmark has explained the fluctuations in the CO_2 emissions from electricity production in a clearer way. The Party explained that its electricity grid is connected to those of other Scandinavian countries (Sweden and Norway). Electricity imports and exports introduce variations into the annual electricity trend, especially in the years when there is a shortage of hydropower in the regional interconnected system. In those years, the hydropower shortage is compensated by higher amounts of electricity from coal plants. The ERT noted that coal consumption has been falling since 1990, while consumption of gas and biomass fuels has been increasing. Denmark also reported that cogeneration has been decreasing since 2004, owing to the liberalization of the energy market. The ERT appreciates this clarification from Denmark.

4. Non-key categories

Manufacture of solid fuels and other energy industries: gaseous fuels – N_2O

24. In response to a recommendation made in the previous review report, Denmark provided explanations in its NIR regarding the N_2O EF for offshore gas turbines, which was assumed to be equal to that for onshore gas turbines. The ERT commends the Party for this improvement. The ERT noted that the implied emission factor (IEF) for N_2O has dropped from 2.2 kg/TJ in 1990 to 1.0 kg/TJ in 2011. In response to a question raised by the ERT, the Party explained that this was due to a transcript error in the time series of the N_2O EF for natural gas combustion, which will be corrected in the 2014 submission. The ERT recommended that the Party make this correction.

Aviation: liquid fuels – CO_2, CH_4 and N_2O

25. In response to a recommendation made in the previous review report, Denmark provided information on the number of domestic landings and take-offs (LTOs) per representative aircraft type for each of the Danish airports, including flights between

Denmark and Greenland/the Faroe Islands. The Party also provided information on the average LTO fuel consumption and EFs per representative aircraft type, together with a table showing the correspondence between actual aircraft and representative aircraft The ERT commends Denmark for its efforts to improve transparency.

C. Industrial processes and solvent and other product use

1. Sector overview

26. In 2011, emissions from the industrial processes sector amounted to 1,860.82 Gg CO_2 eq, or 3.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 167.18 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 26.2 per cent in the industrial processes sector, and increased by 43.7 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the reduction in emissions from chemical industry due to the closure of a nitric acid production plant in Denmark in 2004. At the peak of its production in 1990, the emissions from nitric acid production contributed 46.6 per cent of total emissions from the industrial processes sector. Also, CO_2 emissions from iron and steel production decreased from 28.45 Gg CO_2 eq in 1990 to 15.58 Gg CO_2 eq in 2005, when the only steel production plant in Denmark closed. This decline in emissions was countered by increasing emissions from consumption of halocarbons and SF_6, which increased from 325.63 Gg CO_2 eq in 1995 to 850.03 Gg CO_2 eq in 2011. Within the industrial processes sector, 52.3 per cent of the emissions were from mineral products, followed by 45.7 per cent from consumption of halocarbons and SF_6, 1.8 per cent from other (industrial processes) and 0.1 per cent from chemical industry. The remaining 0.1 per cent were from other production (sugar production). Denmark reported emissions from metal production and production of halocarbons and SF_6 as "NO".

2. Key categories

Cement production – CO_2

27. In 2011, CO_2 emissions from cement production were the largest category of emissions in the industrial processes sector, accounting for 46.3 per cent of sectoral emissions. The emissions were calculated for the single cement-producing plant in the country using three different methods: a tier 1 method for the period 1990–1997; a tier 2 method for the period 1998–2005; and a tier 3 method (using EU ETS data) for the period 2006–2011. In the previous review report, the ERT recommended that Denmark provide information on imports and exports of cement for the years 1990–1997 in order to ensure that the tier 1 method is being implemented in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). However, no such information has been provided in the 2013 annual submission. In response to a question raised by the ERT during the review, Denmark explained that it is still working on collecting the additional information, as it has proven to be more difficult than expected to acquire the requested import/export data. The ERT recommends that the Party intensify its efforts to collect information on imports and exports of cement for the years 1990–1997 and report this information in the NIR.

28. In the previous review report, the ERT recommended that Denmark provide relevant information to clarify whether cement kiln dust (CKD) is included in the emission estimates for the years prior to 1998. The ERT noted that no such information has been provided in the 2013 annual submission. In response to a question raised by the ERT during the review, Denmark explained that it did not have sufficient time to collect the requested

information because of the delay in receiving the draft 2012 annual review report. The Party stated that it is currently working on collecting the additional information. The ERT reiterates the recommendation made in the previous review report that Denmark clarify whether CKD is included in the emission estimates for the years prior to 1998.

Consumption of halocarbons and SF_6 – HFCs and PFCs

29. Denmark has reported the AD for the amounts of HFC-125, HFC-134a, HFC-143a and HFC-32 remaining in products at decommissioning for commercial refrigeration, the AD for HFC-134a for domestic refrigeration and the AD for HFC-125, HFC-134a and HFC-143a for transport refrigeration as "NO", "NE" (not estimated). Similarly, the AD for the amount of HFC-134a remaining in products at decommissioning for aerosols (other) and the AD for the amount of SF_6 remaining in products at decommissioning for electrical equipment have been reported as "NE". In response to a question raised by the ERT during the review, the Party explained that the notation keys used are incorrect and should be changed to "NO" because, according to Danish law, the refrigerators, air-conditioning equipment and aerosols should be emptied before decommissioning. The ERT accepts this response and recommends that Denmark report the emissions from these activities as "NO". The ERT also recommends that the Party perform more careful QC checks of the values used in the CRF tables to avoid the incorrect use of the notation keys.

30. The ERT noted that Denmark continues not to estimate HFCs remaining in products (e.g. insulation for heating pipes). During the previous review, the Party had stated that an applicable methodology could be derived from the ongoing European Union projects regarding hard foam and, if possible, the methodology would be applied in the 2013 annual submission. However, a new methodology has not been applied in the 2013 annual submission. In response to a question raised by the ERT during the review, Denmark explained that the projects are ongoing and any new methodology will be applied once the projects have been finalized and if it is found that the results are appropriate for the Danish conditions and in line with the IPCC good practice guidance.

3. Non-key categories

Other (mineral products) – CO_2

31. Denmark has used two different EFs for yellow brick production: for the period 1990–2005 the EF is based on the average content of calcium carbonate ($CaCO_3$) in clay (assumed to be 18 per cent) and the default EF for lime production (0.44 kg CO_2/kg $CaCO_3$); and for the period 2006–2011 the EF is derived from the CO_2 emissions reported to the EU ETS. In response to a question raised by the ERT during the review regarding the time-series consistency of the EFs, Denmark explained that the process of brick production varies from year to year based on the plant-specific data for the period 2006–2011. Therefore, it is not possible to make any assumptions related to the period 1990–2005 based on the data for the years 2006–2011. The ERT accepts this explanation and recommends that Denmark include in the NIR this additional information on the time-series consistency of the emissions from this category.

32. The ERT noted that information on emissions of CO_2 from mineral wool has been obtained from confidential company reports to the EU ETS for the period 2006–2011 and extrapolations for previous years of the time series. However, it is not clear in the NIR what methods and data were used to extrapolate the emissions prior to 2006. In response to a question raised by the ERT during the review, Denmark explained that during planning/implementation of the EU ETS, the relevant companies reported confidential production statistics and process CO_2 emissions for the years 1998–2002 to the Danish Energy Agency and this information was made available to the inventory team. The Party

suggested including a description of the method used in its NIR, taking into account the confidentiality of the company-specific information. The ERT welcomed Denmark's suggestion and recommends that the Party implement it in order to improve transparency.

Other production – CO_2

33. The ERT noted that Denmark estimated CO_2 emissions from refining of sugar for the years 1990–2005 using production statistics and assumptions based on environmental reports for the year 2002. It also noted that for the years 2006–2011 the CO_2 emissions were based on data reported to the EU ETS. In response to a question raised by the ERT during the review regarding the time-series consistency of the emissions, the Party explained that a comparison between the two methodologies will be presented in the NIR of the next annual submission. The ERT welcomes Denmark's suggestion and encourages the Party to provide this additional information to improve transparency.

Solvent and other product use – N_2O

34. Denmark reported N_2O emissions from aerosol cans as "NE". In the previous review report, the ERT encouraged the Party to continue its efforts to collect data and report the emissions in its next annual submission. In response to a question raised by the ERT during the review, Denmark explained that efforts are ongoing to collect data on used amounts of canned whipped cream and the content of N_2O, but it is not clear when all the data will be available for the purposes of the GHG inventory. The ERT welcomed the Party's efforts to improve completeness, taking into account the fact that this category is not mandatory and is reported by very few reporting Parties. The ERT encourages Denmark to continue its efforts to collect data to enable it to improve the completeness of reporting of N_2O emissions from solvent and other product use.

D. Agriculture

1. Sector overview

35. In 2011, emissions from the agriculture sector amounted to 9,680.55 Gg CO_2 eq, or 17.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 22.9 per cent. The key drivers for the fall in emissions are the reduction in cattle (dairy and non-dairy) from more than 2.2 million head in 1990 to almost 1.6 million head in 2011, and the decrease in N_2O emissions from agricultural soils as a result of the reduction (by more than 50 per cent) in the use of synthetic fertilizers. Several measures that have been implemented at the national and regional levels have led to improvements in the utilization of nitrogen (N) in manure and reduced emissions per produced kg of meat or per ha. Within the sector, 52.9 per cent of the emissions were from agricultural soils, followed by 29.4 per cent from enteric fermentation, 17.7 per cent from manure management and less than 0.01 per cent from field burning of agricultural residues. Prescribed burning of savannas and rice cultivation do not occur in Denmark (emissions from prescribed burning of savannas are reported as "NA" while the emissions from rice cultivation are reported as "NO").

36. Since the previous annual submission, Denmark has improved the transparency and completeness of its reporting and included new information in the NIR (e.g. the comparison of the feed intake, milk yield and IEF for dairy cattle, and statistics on the crop area). However, some recommendations from the previous review report with regard to increasing transparency have not been implemented (e.g. describing the use of biogas and associated energy output; providing disaggregated data on the amount of crop residue used for each purpose (i.e. feeding, bedding and energy production); and providing a time series for crop yields). Therefore, the ERT reiterates the recommendation made in the previous review report that Denmark provide this information in the NIR.

37. Denmark has used a comprehensive agricultural model called IDA (Integrated Database model for Agricultural emissions) with a number of country-specific parameters and EFs. The ERT welcomes Denmark's efforts to increase the transparency and completeness of the NIR by providing information on the model and encourages the Party to continue these efforts.

38. Denmark has calculated the uncertainties for the agriculture sector using a tier 1 and tier 2 approach with the same uncertainty values for the AD and EFs used in both approaches. The calculation shows almost the same level of uncertainty in the tier 1 and tier 2 approaches. The highest uncertainties can be observed in the N_2O emissions from pasture, range and paddock and direct and indirect soil emissions. The ERT encourages the Party to use the uncertainty analyses for the prioritization of planned inventory improvements. The ERT recommends that Denmark include information on the prioritization of planned inventory improvements for the agriculture sector.

39. Although Denmark has implemented a comprehensive QA/QC system with the identification of "critical control points and points of measures", the ERT nevertheless identified inconsistencies, typographical errors and incorrect references in the 2013 annual submission. The ERT recommends that Denmark implement the activities in "stage V" of the QA/QC plan as described in section 6.11 of the NIR, specifically to compare the calculations from the IDA model with estimates from other institutions as far as available data allow. The ERT also recommends that the Party include more detailed descriptions on the geographic coverage of information provided in the NIR.

2. Key categories

Enteric fermentation – CH_4

40. The ERT noted that the number of sheep, goats and horses for all years of the time series is not consistent with the reported animal statistics in the database of the Food and Agriculture Organization of the United Nations (FAO). The NIR explained that the difference is due to the addition of data from small farms to the statistics used for the national GHG inventory that are not included in the FAO statistics. However, for almost all years (except for 2009) the number of sheep is higher in the FAO database (for 2011 the difference is 21 per cent). In response to a question raised by the ERT during the review, the Party explained that the data used cover the basic data regarding the N excretion, feed intake and manure excretion, and are based only on the number of breeding ewes, including lambs. Denmark further explained that the number of breeding ewes in the national official statistics is lower than the actual figures because the national statistics does not include the number of sheep that are raised in small farms (below 5 ha). Therefore, the Party decided, for the purposes of the GHG inventory, to use the number of breeding ewes registered in the Central Husbandry Register (CHR), which is the central register of farms and animals administered by the Ministry of Food, Agriculture and Fisheries. The number of breeding ewes in the CHR is considered reliable because all sheep in Denmark have to be registered. The ERT welcomes this explanation and recommends that Denmark include it in the NIR.

41. The ERT noted that, for 2011, the CH_4 conversion rate for dairy cattle reported in the NIR does not match the information reported in the CRF tables. There are also small inconsistencies between the values in NIR table 6.8 and the CRF tables for other years of the time series. In response to a question raised by the ERT during the review, Denmark confirmed that there is an inconsistency between the methane conversion rate (Ym) values in the CRF tables and in NIR table 6.8. The lower Ym is the result of changes in feed composition where feeding with sugar beets is replaced by feeding with maize (the higher content of easily converted sugar in sugar beets results in a higher CH_4 production compared with maize and grass). The ERT recommends that the Party correct the

inconsistencies between the NIR and the CRF tables and introduce appropriate QC procedures.

42. The ERT noted an increase in the average gross energy intake for non-dairy cattle between 2005 and 2007 by 20 per cent (the average gross energy intake is relatively constant before 2005 and after 2007). In response to a question raised by the ERT during the review, Denmark explained that this increase was due to the use of new data for feed intake for heifers for 2007. The estimate of the feed intake for 2007 was based on the interpolation of data, which is in line with the IPCC good practice guidance. The ERT recommends that Denmark include a description of the interpolation method and the parameters used in the NIR.

43. The ERT identified several inter-annual changes in the number of goats and swine. Specifically, the number of goats decreased by 21.5 per cent between 2010 and 2011 (from 15,989 heads to 12,557 heads) and the number of swine decreased by 1.8 per cent between 2010 and 2011 (from 13,173.01 to 12,931.68 thousand heads) after having increased by 6.5 per cent between 2009 and 2010 (12,369.15 thousand heads in 2009). In response to a question raised by the ERT during the review, Denmark explained that goats are mainly raised by part-time farmers and, in general, the goat population varies depending on the economic conditions as well as associated administrative burdens. According to the chairman of the Danish Goat Union, the most important reason for the decrease between 2010 and 2011 was the outbreak of bluetongue disease, which resulted in the slaughter of animals and, in some cases, a complete cessation of production. In relation to the number of swine, the Party explained that nearly 90 per cent of the meat is exported and thus production is closely related to the conditions in major export markets such as the United Kingdom of Great Britain and Northern Ireland, Germany, Japan and Poland. The economic instability in Europe has contributed to an overall decline in demand and to difficulties with regard to opportunities to finance the expansion of production, as well as an increase in environmental requirements. The ERT welcomes this explanation and recommends that Denmark include it in the NIR.

Manure management – CH_4 and N_2O

44. During the previous review, the ERT noted that the methodology used by Denmark to extrapolate the amount of slurry treated (used to estimate CH_4 and N_2O emissions from biogas-treated slurry) was not in line with the IPCC good practice guidance (section 7.3.2.2). The previous review report recommended that the Party improve the transparency of the AD used for biogas-treated slurry, by providing additional documentation on the reduction potential or on the associated energy output. The current ERT noted that there has been no further improvement regarding this issue and therefore reiterates the recommendation made in the previous review report.

Direct soil emissions – N_2O

45. The ERT welcomes the additional explanations provided in the NIR regarding the fraction of synthetic fertilizer N applied to soils that volatilizes as ammonia (NH_3) and nitrogen oxides (NO_X) ($Frac_{GASF}$) in response to a recommendation made in the previous review report. However, the ERT noted that the Party did not provide explanations of the measures implemented in this area, especially given that the reduction in synthetic fertilizer consumption is one of the main drivers of emission reductions in the agriculture sector. The ERT encourages Denmark to provide such information in the NIR.

46. The ERT noted that Denmark used a country-specific value for the fraction of total above-ground crop biomass that is removed from the field as a crop product ($Frac_R$) for feeding and bedding purposes ($Frac_R$ = 0.86 in 2011), which is higher than the IPCC default value (0.45). The ERT welcomes the improvement in transparency through the provision of

the background data used for the estimation of N_2O emissions from crop residues in the annex to the NIR. However, the ERT noted that the Party does not provide information on the amount of crop residue used for each purpose (i.e. feeding, bedding and energy production) and recommends that the Party include this information in its NIR.

47. The ERT noted that although N fixed by N-fixing crops increased by 8.7 per cent between 2010 (0.77 Gg) and 2011 (0.83 Gg), the total area of N-fixing crops decreased from 724,132 ha in 2010 to 709,871 ha in 2011. The ERT also noted that, according to the NIR, the N_2O emissions from N-fixing crops were estimated based on the crop yield taking also into account emissions from clover. The ERT welcomes this approach, which increases completeness. However, the NIR does not provide information on the crop yield for the complete time series, which is required for transparency and comparability. The ERT considers that this leads to a lack of transparency, and therefore strongly recommends that Denmark include the time series of the crop yield in the NIR.

E. Land use, land-use change and forestry

1. Sector overview

48. In 2011, net removals from the LULUCF sector amounted to 2,663.97 Gg CO_2 eq. Since 1990, net removals have increased by 148.7 per cent, which represents a substantial change given that the sector was a net source of emissions amounting to 5,473.22 Gg CO_2 eq. The key drivers for the rise in removals are the increase in removals from forest land (by 6,522.28 Gg CO_2 eq between 1990 and 2011), and the decrease in emissions from cropland (by 1,709.48 Gg CO_2 eq between 1990 and 2011) and wetlands (by 10.85 Gg CO_2 eq between 1990 and 2011). Emissions increased for grassland (by 65.61 Gg CO_2 eq between 1990 and 2011) and settlements (by 39.81 Gg CO_2 eq between 1990 and 2011). In 2011, within the sector, net removals of 6,386.72 Gg CO_2 eq were from forest land, followed by net emissions of 3,337.07 Gg CO_2 eq from cropland, 249.25 Gg CO_2 eq from grassland, 80.49 Gg CO_2 eq from wetlands and 55.94 Gg CO_2 eq from settlements. Emissions and removals from other land were reported as "NA" and "NO".

49. The ERT reiterates the encouragement from the previous review report that Denmark expand the tier 2 uncertainty analysis to cover the LULUCF sector (particularly for the key categories agricultural lime application, forest land remaining forest land and cropland remaining cropland). The ERT appreciates the efforts made by Denmark to update the land-use mapping products that are being used to develop a new land-use change matrix based on revised vector mapping. The ERT encourages the Party to review and update the current uncertainty estimates for this sector.

2. Key categories

Forest land remaining forest land – CO_2

50. In response to a recommendation from the previous review report, recalculations of the carbon pool estimates for forest land remaining forest land were performed due to errors in the reporting of these estimates in the 2012 submission. The ERT noted that the time series of net CO_2 emissions/removals from 2006 and onwards are now stable. The Party provided additional data for 1990–2005 in the NIR and the ERT noted that interpolations have been applied to obtain data for missing years. The ERT notes the QA/QC improvements made by the Party and encourages Denmark to continue these efforts in future annual submissions.

51. The ERT noted the improvements made in the NIR through the provision of additional information, in response to the recommendation in the previous review report,

on: tree species composition and age structure. The ERT commends the Party for these improvements. The ERT also noted the intention of the Party to provide additional information on the area and volume of clear cutting and the area subject to destructive disturbance in its next submission subject to the availability of the data. The ERT recommends that the Party implement this improvement.

Cropland remaining cropland – CO_2

52. As also noted in the previous review report, the trend in net CO_2 emissions/removals exhibits large inter-annual changes across the entire time series. In response to the recommendation in the previous review report, Denmark provided the input data used together with a description of the link between temperature and yield. The ERT commends the Party for this improvement.

53. The ERT noted that the Party reports a large variation in the areas of set-aside (e.g. 3,861 ha in 1990, 200,751 ha in 2005 and 48,273 ha in 2011) without any explanation of the reasons for these large changes. The ERT recommends that Denmark provide additional information on these large changes in its NIR to help explain the estimates associated with cropland management practices.

3. Non-key categories

Direct N_2O emissions from nitrogen fertilization of forest land – N_2O

54. The ERT noted that Denmark reported direct N_2O emissions from N fertilization of forest land as "IE" (included elsewhere) and has explained in the NIR that these emissions are estimated together with the emissions from N fertilization of agricultural land, which are reported under the agriculture sector. The reason for this is that the national statistics for N fertilization do not distinguish between agriculture and forestry activities. The ERT encourages the Party to undertake efforts to distinguish between agriculture and forestry activities, taking into account any financial implications and the availability of resources.

F. Waste

1. Sector overview

55. In 2011, emissions from the waste sector amounted to 1,023.85 Gg CO_2 eq, or 1.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 40.9 per cent. The key driver for the decrease in emissions is the reduction in CH_4 emissions from solid waste disposal sites by 52.6 per cent between 1990 and 2011, resulting from the decrease in the amount of solid waste deposited in municipal solid waste disposal sites due to the increased use of waste for power and heat production. Within the sector, 68.6 per cent of the emissions were from solid waste disposal on land, followed by 16.4 per cent from wastewater handling and 14.4 per cent from other (waste). The remaining 0.6 per cent were from waste incineration.

56. The sector-specific QA/QC procedures are well documented, but the ERT encourages the Party to expand on them by including more specific results of the verification activities undertaken. The ERT noted that improvements are planned for the category solid waste disposal on land, where a new reporting system has been implemented by the Danish Environmental Protection Agency based on an in-depth mass balance of the identified waste types, and for the category wastewater handling, for which the data on the collective sewerage system will be improved. The ERT welcomes these planned improvements and encourages the Party to implement them as soon as possible.

2. Key categories

Solid waste disposal on land – CH_4

57. The ERT noted that the first order decay (FOD) model was applied to estimate CH_4 emissions, which is in line with the IPCC good practice guidance. Denmark used country-specific AD and a combination of country-specific and IPCC default values for the degradable organic carbon (DOC) and methane generation rate constant (k). The ERT reiterates the encouragement made in the previous review report that Denmark consider the possibility of deriving more country-specific parameters for use in the FOD model, in order to improve the accuracy of the associated CH_4 emission estimates.

58. The ERT noted that the AD for solid waste disposal on land were taken from the Danish Environmental Protection Agency database of all registered Danish waste sites (ISAG)[3] for the years 1994–2009 and were divided into eight waste categories: domestic waste; bulky waste; garden waste; commercial waste; industrial waste; building waste; sludge; and ash and slag. Denmark also assessed the data on waste from the ISAG database for 2004 and subsequently divided the waste into eight different waste types: food waste; cardboard and paper; wet cardboard and paper; plastics; other combustibles; glass; metal; and other non-combustibles. The waste deposited at landfills has been reported for two waste types since 1994 ("other combustibles" and "other non-combustibles"). Owing to the lack of information, the DOC values for "other combustibles" were derived from the Danish waste characterization survey undertaken by the Danish Environmental Protection Agency in 1993. The ERT reiterates the strong recommendation made in the previous review report that Denmark analyse and report updated information on the composition of the waste category "other combustibles", divided into the different waste types, in order to ensure that each waste type is assigned a DOC value.

59. According to the NIR, in December 2012, the Danish Environmental Protection Agency made available data from its new waste reporting system. A first validation of these data is expected to be published in the beginning of 2014. In response to a question raised by the ERT during the review regarding the implementation of this new system, Denmark explained that it will be based on the Danish National Waste Register and will deliver more detailed information concerning the reported waste data, especially regarding the origin of the waste, as the waste producers are obliged to indicate the waste type in the reporting system. The ERT encourages Denmark to provide the results from the implementation of the Danish National Waste Register in the NIR in a future annual submission.

3. Non-key categories

Wastewater handling – CH_4 and N_2O

60. Denmark reported a high fixed CH_4 recovery rate (about 99 per cent) across the entire time series for the wastewater treatment plants in the country. This is not in line with the IPCC good practice guidance since the Party does not use the default value of 0 per cent and the reported value is not based on actual measurements. In response to a question raised by the ERT during the review, the Party explained that all available information from the measurements of the wastewater treatment plants has been extracted from the Danish energy statistics and the National Waste Quality Parameter database and that data on biogas production will be reported in the next annual submission for the entire time series. The ERT commends Denmark for its efforts. The ERT also reiterates the recommendation made in the previous review report that the Party perform a review of this measurement-based

[3] Available at: <http://www2.mst.dk/databaser/isag/Default.asp?advanced=Yes>.

information for the entire time series, consistent with the requirements of the IPCC good practice guidance, and include a time-series trend for the amount of recovered CH_4 in the NIR, in order to improve transparency.

61. The ERT noted that Denmark used a fraction of the population not connected to the collective sewer system of 10 per cent. However, the Party did not provide the source of the information used to justify this value. In response to a question raised by the ERT during the review, Denmark explained that the percentage was provided by the Danish Environmental Protection Agency. In addition, the Party informed the ERT that the Danish Nature Agency is planning to provide updated estimates based on the municipal water and wastewater treatment plants data, which are being collected as part of a national information map project. The ERT encourages Denmark to use the updated values, when they become available, and document them in the NIR.

62. The ERT noted that Denmark performed a recalculation of N_2O emissions based on the elimination of a correction factor (1.2) that was applied for the fraction of the influent N in wastewater treatment plants. In response to a question raised by the ERT, the Party explained that the decision to eliminate the use of the 1.2 factor was based on recently available detailed measurement data for point sources in Denmark. The Party stated that a full description of the actual measurement data will be available for the next annual submission. The ERT commends Denmark for this improvement. The ERT encourages the Party to include this information in its NIR to improve the transparency of the inventory.

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

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

Overview

63. Table 6 provides an overview of the information reported and parameters selected by Denmark under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

	Findings and recommendations
Has Denmark reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Sufficient
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management, cropland management and grazing land management Years reported: 1990, 2008, 2009, 2010 and 2011
Identify the period of accounting	Annual accounting
Assessment of Denmark's ability to identify areas of land and areas of land-use change	Sufficient

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

Afforestation and reforestation – CO_2

64. The ERT noted that the carbon stock change in the period 1990–2011 was calculated based on the area of afforestation, the information on species composition from the Forest Census 2000 and from the National Forest Inventory (NFI), which covers the years 2006–2010. The estimates for the carbon pools reported under afforestation are similar to previous estimates, with a slight increase due to the new knowledge on species composition, average carbon stock in those areas based on the NFI data and new data on the carbon stock in soils. The ERT also noted that the NIR provides more information on the rationale for changing the method used to estimate the carbon pools. The ERT commended the Party for improving its NIR.

65. The ERT noted that the recommendation in the previous review report on harvested areas and the associated estimation of emissions and removals has not been implemented. The ERT noted that although the Party (in the context of the previous review) had explained that it would be possible to provide estimates based on the NFI in its 2013 annual submission, including some indications of the frequency of harvesting/thinning occurring in afforested areas, no such information has been reported in the current NIR. Therefore, the ERT reiterates the recommendation in the previous review report that Denmark provide any available data on harvested areas and report the associated estimations of emissions and removals in its NIR.

Deforestation – CO_2

66. No major issues identified.

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

Forest management – CO_2

67. Denmark has made minor recalculations due to corrections of the reporting years to which the data refer. In response to a recommendation in the previous review report, the Party provided additional information in the NIR to explain the rationale and revised approach, which resulted in the recalculations.

Grazing land management – CO_2

68. The ERT noted that Denmark uses the same country-specific methods to estimate emissions and removals from grazing land management as those used to estimate emissions and removals from grassland remaining grassland under the LULUCF sector. In addition, the areas under grazing land management include all areas of grassland and match the area defined as grassland remaining grassland under the LULUCF sector. The ERT concludes that the emission estimates reported for grassland remaining grassland and grazing land management are consistent.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

69. 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 standard independent assessment

report (SIAR) on the SEF tables and the SEF comparison report.[4] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR. In response to questions raised by the ERT during the review, Denmark provided additional information on its response to the recommendations included in the SIAR. The ERT considered that the responses received by Denmark addressed the findings of the SIAR.

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

71. Information reported by Denmark on records of any discrepancies and on any records of non-replacement was found to be consistent with information provided to the secretariat by the ITL. The SIAR identified that corrective action was taken by Denmark, and the ERT concluded that the Party's records on its accounting of Kyoto Protocol units contained in its national registry are consistent with the corresponding records of the ITL.

72. Denmark provided access to information from its national registry that clarified the information reported in its annual submission.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

73. Denmark has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

74. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2013 submission[a]			*2010, 2011 and 2012 submissions*[b]	*Net accounting quantity*[c]
	As reported	*Revised estimates*	*Final*	*Final*	
Afforestation and reforestation					
Non-harvested land	–255 085		–255 085	–855 262	600 177
Harvested land					
Deforestation	320 390		320 390	119 982	200 408
Forest management	–916 667		–916 667	–916 667	0

[4] The SEF comparison report is prepared by the international transaction log (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.

	2013 submission[a]			2010, 2011 and 2012 submissions[b]	Net accounting quantity[c]
	As reported	*Revised estimates*	*Final*	*Final*	
Article 3.3 offset[d]					
Forest management cap[e]	–916 667		–916 667	–916 667	0
Cropland management	–6 512 723		–6 512 723	–4 600 337	–1 912 386
Grazing land management	144 217		144 217	–93 146	237 363
Revegetation					

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

[a] The values included under the 2013 submission are the cumulative accounting values for 2008, 2009, 2010 and 2011, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2011.

[b] The values included under the 2010, 2011 and 2012 submissions are the final accounting values as a result of the 2012 review and are included in table 6 of the 2012 annual review report (FCCC/ARR/2012/DNK, p. 29) in the column "2012 annual submission", "Final".

[c] The "net accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2013 submission and where the quantities issued or cancelled based on the 2012 annual review report have been subtracted ("net accounting quantity" = final 2013 – final 2012 annual review report).

[d] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[e] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

75. Based on the information provided in table 7 for the activity afforestation/reforestation, Denmark shall cancel 600,177 assigned amount units (AAUs), emission reduction units (ERUs), certified emission reduction units (CERs) and/or removal units (RMUs) in its national registry.

76. Based on the information provided in table 7 for the activity deforestation, Denmark shall cancel 200,408 AAUs, ERUs, CERs and/or RMUs in its national registry.

77. Based on the information provided in table 7 for the activity forest management, Denmark shall not issue or cancel any units in its national registry.

78. Based on the information provided in table 7 for the activity cropland management, Denmark shall issue 1,912,386 RMUs in its national registry.

79. Based on the information provided in table 7 for the activity grassland management, Denmark shall cancel 237,363 AAUs, ERUs, CERs and/or RMUs in its national registry.

Calculation of the commitment period reserve

80. Denmark has reported its commitment period reserve in its 2013 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (249,155,060 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

81. Denmark reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

82. Denmark reported that there are changes in its national registry since the previous annual submission. The Party described the changes, specifically due to the centralization of the EU ETS operations into a single European Union (EU) registry operated by the European Commission called the Consolidated System of European Union Registries (CSEUR), in its NIR (see p. 607). CSEUR is a consolidated platform, which implements the national registries in a consolidated manner and was developed together with the new EU registry.

83. The ERT noted that there were recommendations in the SIAR that had not been addressed related to the CSEUR, in particular recommendations related to reporting a description of the changes in database structure and reporting of test results. In response to questions raised by the ERT during the review, Denmark provided further information on the changes to the national registry, including on changes in database structure and test results.

84. The ERT concluded that, taking into account the changes in the national registry, including additional information provided to the ERT during the review, 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 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). With respect to the provision of information related to database structure specifically, the ERT recommends that the Party report in its next annual submission any change(s) in its national registry in accordance with decision 15/CMP.1, annex, chapter I.G.

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

85. Denmark reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission. Denmark provided the following information in a previous annual submission:

(a) Regarding the allocation of specific climate funds through the Climate Pool: in 2008, Denmark allocated 100 million Danish kroner (DKK), of which DKK 88 million were allocated to specific climate change projects covering issues such as adaptation, mitigation, the participation of developing countries in UNFCCC negotiations, civil society capacity-building, participation and dialogues, and climate diplomacy;

(b) As part of the financial pledges that were made by the EU to developing countries at the fifteenth session of the Conference of the Parties (COP), held in Copenhagen, Denmark, in December 2009, the Party announced a contribution of DKK 1.2 billion for the implementation of fast-start financing;

(c) At the sixteenth session of the COP, held in Cancun, Mexico, in December 2010, the Danish Government launched the following projects funded by the Climate Pool: support for the federation of small island developing States for the development and implementation of reduction and adaptation efforts; support for the implementation of nationally appropriate mitigation actions in a number of major developing countries; support for the encouragement of private-sector investment in energy efficiency and

renewable energy in emerging economies among developing countries through fund deposits with mixed public and private investor participation; and collaboration with South Korea's Global Green Growth Institute regarding the implementation of various emission reduction projects through sustainable growth plans in selected developing countries.

86. The ERT concluded that the information provided continues to be complete and transparent.

III. Conclusions and recommendations

A. Conclusions

87. Table 8 summarizes the ERT's conclusions on the 2013 annual submission of Denmark, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2013 annual submission of Denmark

		Paragraph cross-references
The ERT concludes that the inventory submission of Denmark is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Denmark has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Denmark's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Yes	44, 60
Denmark has reported information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	
Denmark has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	

		Paragraph cross-references
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did Denmark provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	No	85

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

88. The ERT identified the issues for improvement listed in table 9 below. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph references*
Cross-cutting	General	Increase QA/QC efforts when harmonizing the data reported in the NIR and the CRF tables, notably where complex methods are used, and when finalizing the CRF tables and the NIR	Table 3
		Increase transparency in both the NIR and the CRF tables by expanding the discussions of country-specific methods, and by clarifying the reporting of the notation keys, the key category analysis and the uncertainty analysis, especially when reporting combined emission estimates for Denmark and Greenland	Table 3
		Provide the results of the uncertainty analysis excluding LULUCF in the NIR	Table 4
Energy	International bunker fuels	Include emissions from the use of lubricants in international marine bunkers in the CRF tables	20
	Feedstocks and non-energy use of fuels	Provide a more detailed explanation of the use of lubricants in the energy and industrial processes sectors, and the selected methods, in the NIR, in order to demonstrate that there is no underestimation of	21

Sector	*Category*	*Recommendation*	*Paragraph references*
		emissions	
	Manufacture of solid fuels and other energy industries: gaseous fuels – N_2O	Correct the N_2O EF for natural gas combustion	24
Industrial processes and solvent and other product use	Cement production – CO_2	Intensify efforts to collect and report information on imports and exports of cement for the years 1990–1997	27
		Clarify whether cement kiln dust is included in the emission estimates for the years prior to 1998	28
	Consumption of halocarbons and SF_6 – HFCs and PFCs	Report emissions from refrigerators, air-conditioning equipment and aerosols as "NO", and perform more careful QC checks of the values used in the CRF tables to avoid the incorrect use of the notation keys	29
	Other (mineral products) – CO_2	Provide additional information regarding the consistency of the EFs for yellow bricks for the whole time series	31
		Provide additional information on the extrapolation of emissions from mineral wool for the years prior to 2006	32
Agriculture	Overview	Implement the recommendations from the previous review reports regarding the use of biogas and associated energy output, for example by providing disaggregated data on the amount of crop residue used for each purpose (i.e. feeding, bedding and energy production), and providing a time series for crop yields	36
		Include information on the prioritization of planned inventory improvements for the agriculture sector	38
		Implement the activities in "stage V" of the QA/QC plan as described in section 6.11 of the NIR, specifically to compare the calculations from the Integrated Database model for Agricultural emissions (IDA) with estimates from other institutions as far as available data makes it possible	39
		Provide more detailed descriptions of the geographic coverage of information provided in the NIR	
	Enteric fermentation – CH_4	Provide an explanation in the NIR regarding the source of the information on the number of sheep	40
		Correct the inconsistencies between the NIR and the CRF tables and introduce appropriate QC procedures	41
		Include a description of the interpolation method and the	42

Sector	*Category*	*Recommendation*	*Paragraph references*
		parameters used in the NIR	
		Include in the NIR information on the inter-annual changes in the number of goats and swine	43
	Manure management – CH_4 and N_2O	Improve the transparency of the AD used for biogas-treated slurry, by providing additional documentation on the reduction potential or on the associated energy output	44
	Direct soil emissions – N_2O	Provide information on the amount of crop residue used for feeding, bedding and energy production	46
		Include the time series of the crop yield in the NIR	47
LULUCF	Forest land remaining forest land – CO_2	Provide additional information on the area and volume of clear cutting and the area subject to destructive disturbance	51
	Cropland remaining cropland – CO_2	Provide additional information on inter-annual changes of areas of set-aside	53
Waste	Solid waste disposal on land – CH_4	Analyse and report updated information on the composition of the waste category "other combustibles", divided into the different waste types	58
	Wastewater handling – CH_4 and N_2O	Perform a review of the measurement-based information for the entire time series, consistent with the requirements of the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, and include a time-series trend for the amount of recovered CH_4, in order to improve transparency	60
KP-LULUCF	Afforestation and reforestation – CO_2	Provide any available data on harvested areas and the associated estimation of emissions and removals	65
National registry	Changes to the national registry	Report any change(s) in the national registry in accordance with decision 15/CMP.1, annex, chapter I.G	84

Abbreviations: CRF = common reporting format, EF = emission factor, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

IV. Questions of implementation

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

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 10
Recalculations in the 2013 annual submission for the base year and the most recent year

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy	**13.05**	**–72.17**	**0.0**	**–0.1**	**Changed AD**
A. Fuel combustion (sectoral approach)	13.05	–77.07	0.0	–0.2	
1. Energy industries	–0.68	21.86	0.0	0.1	
2. Manufacturing industries and construction		–31.69		–0.7	
3. Transport	–6.43	–25.40	–0.1	–0.2	
4. Other sectors	20.13	–59.00	0.2	–0.9	
5. Other	0.03	17.16	0.0	14.9	
B. Fugitive emissions from fuels		4.89		1.1	
1. Solid fuels					
2. Oil and natural gas		4.89		1.1	
2. Industrial processes		**0.09**		**0.0**	**Changed AD**
A. Mineral products		–4.26		–0.5	
B. Chemical industry					
C. Metal production					
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6		4.34		0.5	
G. Other					
3. Solvent and other product use	**22.76**	**111.05**	**24.3**	**144.9**	**Changed AD**
4. Agriculture	**82.60**	**94.11**	**0.7**	**1.0**	**Changed AD and methods**
A. Enteric fermentation		5.63		0.2	
B. Manure management		14.12		0.8	
C. Rice cultivation					
D. Agricultural soils	82.60	74.36	1.1	1.5	
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					
5. Land use, land-use change and forestry	**1 049.71**	**1 696.41**	**23.7**	**–78.2**	**Changed AD and EFs**
A. Forest land	954.79	1 326.80	–116.5	–23.4	

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
B. Cropland	401.17	344.31	8.6	10.8	
C. Grassland	–222.50	30.72	–54.8	16.4	
D. Wetlands	4.55	75.18	5.2	312 176.4	
E. Settlements	–88.31	–80.60	–84.6	–60.0	
F. Other land					
G. Other					
6. Waste	**–2.30**	**19.67**	**–0.1**	**1.9**	**Changed AD and EFs**
A. Solid waste disposal on land	0.57	27.27	0.0	3.9	
B. Wastewater handling	–4.57	–7.65	–2.4	–4.5	
C. Waste incineration					
D. Other	1.70	0.06	2.9	0.0	
7. Other					
Total CO_2 equivalent without LULUCF	**116.11**	**152.75**	**0.2**	**0.2**	
Total CO_2 equivalent with LULUCF	**1 165.82**	**1 849.16**	**1.6**	**3.1**	

Abbreviations: AD = activity data, EF = emission factor, LULUCF = land use, land-use change and forestry.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	249 155 060			249 155 060
Annex A emissions for 2011				
CO_2	44 614 526			44 614 526
CH_4	5 505 695			5 505 695
N_2O	6 040 821			6 040 821
HFCs	765 778			765 778
PFCs	11 057			11 057
SF_6	73 191			73 191
Total Annex A sources	**57 011 068**			**57 011 068**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–73 097			–73 097
3.3 Afforestation and reforestation on harvested land for 2011	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2011	82 834			82 834
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011	–6 313 625			–6 313 625
3.4 Cropland management for 2011	3 367 887			3 367 887
3.4 Cropland management for the base year	5 053 868			5 053 868
3.4 Grazing land management for 2011	235.841			235.841
3.4 Grazing land management for the base year	184 135			184 135
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

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

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

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

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	49 488 606			49 488 606
CH_4	5 601 077			5 601 077
N_2O	5 981 354			5 981 354
HFCs	810 953			810 953
PFCs	13 270			13 270
SF_6	38 289			38 289
Total Annex A sources	**61 933 550**			**61 933 550**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–321 820			–321 820
3.3 Afforestation and reforestation on harvested land for 2010	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2010	80 150			80 150
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010	–4 028 322			–4 028 322
3.4 Cropland management for 2010	3 560 153			3 560 153
3.4 Cropland management for the base year	5 053 868			5 053 868
3.4 Grazing land management for 2010	205 022			205 022
3.4 Grazing land management for the base year	184 135			184 135
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

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

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

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

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	49 051 090			49 051 090
CH_4	5 539 766			5 539 766
N_2O	6 023 314			6 023 314
HFCs	805 408			805 408
PFCs	14 177			14 177
SF_6	36 689			36 689
Total Annex A sources	**61 470 443**			**61 470 443**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–211 961			–211 961
3.3 Afforestation and reforestation on harvested land for 2009	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2009	78 553			78 553
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009	–24 511			–24 511
3.4 Cropland management for 2009	2 835 121			2 835 121
3.4 Cropland management for the base year	5 053 868			5 053 868
3.4 Grazing land management for 2009	213 620			213 620
3.4 Grazing land management for the base year	184 135			184 135
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

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

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

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

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	51 554 860			51 554 860
CH_4	5 632 391			5 632 391
N_2O	6 395 199			6 395 199
HFCs	859 246			859 246
PFCs	12 791			12 791
SF_6	31 602			31 602
Total Annex A sources	**64 486 089**			**64 486 089**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	351 793			351 793
3.3 Afforestation and reforestation on harvested land for 2008	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2008	78 853			78 853
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008	–5 923 584			–5 923 584
3.4 Cropland management for 2008	3 939 587			3 939 587
3.4 Cropland management for the base year	5 053 868			5 053 868
3.4 Grazing land management for 2008	226 276			226 276
3.4 Grazing land management for the base year	184 135			184 135
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

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

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

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

Annex II

Documents and information used during the review

A. Reference documents

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

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FCCC/ARR/2012/DNK. Report of the individual review of the annual submission of Denmark submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/dnk.pdf>.

Standard independent assessment report, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Ole-Kenneth Nielsen (Department of Environmental Science, Aarhus University), including additional material on the methodologies and assumptions used.

Annex III

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
$CaCO_3$	calcium carbonate
CKD	cement kiln dust
CHR	Central Husbandry Register
CER	certified emission reduction unit
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DCE	Danish Centre for Energy and Environment
DOC	degradable organic carbon
EF	emission factor
ERU	emission reduction unit
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading Scheme
FOD	first order decay
$Frac_{GASF}$	fraction of synthetic fertilizer N applied to soils that volatilizes as NH_3 and NO_X
$Frac_R$	fraction of total above-ground crop biomass that is removed from the field as a crop product
FAO	Food and Agriculture Organization of the United Nations
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
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
k	methane generation rate constant
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	national forest inventory
NH_3	ammonia
NIR	national inventory report
NO	not occurring
NO_x	nitrogen oxides
PFCs	perfluorocarbons

PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change
Ym	methane conversion rate