Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2012/8**
17 April 2012

Report of the individual review of the annual submission of the Netherlands submitted in 2011

Note by the secretariat

The report of the individual review of the annual submission of the Netherlands submitted in 2011 was published on 16 April 2012. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2011/NLD, 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 the Netherlands submitted in 2011*

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

Contents

I. Introduction and summary

1. This report covers the in-country review of the 2011 annual submission of the Netherlands, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 26 September to 1 October 2011 in Utrecht, the Netherlands, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Jongikhaya Witi (South Africa); industrial processes – Ms. Ils Moorkens (Belgium); agriculture – Mr. Jorge Alvarez (Peru); land use, land-use change and forestry (LULUCF) – Ms. Bridget Fraser (New Zealand); and waste – Mr. Sabin Guendehou (Benin). Mr. Eggleston and Mr. Witi were the lead reviewers. The review was coordinated by Mr. Javier Hanna and Ms. Xuehong Wang (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 the Netherlands, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. In 2009, the main greenhouse gas (GHG) in the Netherlands was carbon dioxide (CO_2), accounting for 85.3 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (8.6 per cent) and nitrous oxide (N_2O) (4.9 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 83.8 per cent of total GHG emissions, followed by the agriculture sector (8.5 per cent), the industrial processes sector (5.0 per cent), the waste sector (2.7 per cent) and the solvent and other product use sector (0.001 per cent). Total GHG emissions amounted to 199,072.57 Gg CO_2 eq and decreased by 6.1 per cent between the base year[2] and 2009.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_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, and also do not include the emissions from deforestation that were included in the base year in the Netherlands's initial report under the Kyoto Protocol and subsequently used for the calculation of the assigned amount.

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

[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 Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A sources		CO_2	159 270.26	159 270.26	170 757.00	169 966.33	175 974.30	172 407.32	175 246.76	169 887.96	6.7
		CH_4	25 674.41	25 674.41	24 285.12	19 881.75	17 339.88	16 965.64	17 160.60	17 055.10	–33.6
		N_2O	20 146.55	20 146.55	20 100.19	17 671.78	15 713.18	13 846.24	9 942.57	9 725.45	–51.7
		HFCs	6 017.94	4 432.03	6 017.94	3 886.29	1 494.35	1 819.71	1 889.06	2 060.93	-65.8
		PFCs	1 937.81	2 264.48	1 937.81	1 581.54	266.20	323.15	251.07	167.97	-91.3
		SF_6	301.26	217.32	301.26	315.38	238.83	192.35	185.87	175.16	-41.9
KP-LULUCF	Article 3.3[b]	CO_2							336.46	295.59	
		CH_4							NE, NO	NE, NO	
		N_2O							0.002	0.002	
	Article 3.4[c]	CO_2	NA						NA	NA	NA
		CH_4	NA						NA	NA	NA
		N_2O	NA						NA	NA	NA

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

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

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

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2009

			Gg CO_2 eq								*Change*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A		Energy	153 976.50	153 976.50	165 925.18	164 934.16	171 258.40	167 754.46	171 767.34	166 766.89	8.3
		Industrial processes	22 191.54	22 191.54	23 556.90	20 277.11	15 734.24	14 740.13	10 202.98	9 906.04	–55.4
		Solvent and other product use	541.19	541.19	439.85	306.94	212.99	208.50	206.57	195.36	–63.9
		Agriculture	22 511.92	22 511.92	22 171.91	18 895.86	17 003.71	16 786.17	16 821.27	16 862.25	–25.1
		Waste	12 783.90	12 783.90	11 305.48	8 889.01	6 817.40	6 065.15	5 677.76	5 342.03	–58.2
		LULUCF	NA	2 691.86	2 539.54	2575.83	2687.38	2 506.59	2 668.03	2 475.03	NA
		Total (with LULUCF)	**NA**	**214 696.91**	**225 938.86**	**215 878.90**	**213 714.12**	**208 060.99**	**207 343.96**	**201 547.60**	**–NA**
		Total (without LULUCF)	**212 005.05**	**212 005.05**	**223 399.32**	**213 303.07**	**211 026.74**	**205 554.41**	**204 675.93**	**199 072.57**	**–6.1**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation							–484.61	–537.09	
		Deforestation							821.57	833.20	
		Total (3.3)							**336.96**	**296.12**	
	Article 3.4[d]	Forest management							NA	NA	
		Cropland management	NA						NA	NA	NA
		Grazing land management	NA						NA	NA	NA
		Revegetation	NA						NA	NA	NA
		Total (3.4)	**NA**						**NA**	**NA**	**NA**

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

[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.

[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 the national totals.

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

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

Table 3
Information to be included in the compilation and accounting database in t CO_2 eq

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	901 135 927			901 135 927	
Annex A emissions for current inventory year					
CO_2	169 822 870	169 887 959		169 887 959	
CH_4	16 922 450	17 055 096		17 055 096	
N_2O	9 722 190	9 725 447		9 725 447	
HFCs	2 060 933			2 060 933	
PFCs	167 974			167 974	
SF_6	175 163			175 163	
Total Annex A sources	**198 871 587**	**199 072 573**		**199 072 573**	
Activities under Article 3, paragraph 3, for current inventory year					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–537 085			–537 085	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA, NE, NO			NA, NE, NO	
3.3 Deforestation for current year of commitment period as reported	833 204			833 204	
Activities under Article 3, paragraph 4, for current inventory year[d]					
3.4 Forest management for current year of commitment period					
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation infor base year					

Abbreviations: NA = not applicable, NE = not estimated, 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] "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one of these activities.

6. The Netherlands' 2011 GHG inventory is generally in line with 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), the 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). The estimation of potential emissions of HFCs and PFCs is incomplete and not in line with the IPCC good practice guidance (see para. 87 below).

7. The 2011 inventory submission is generally of a good quality and covers most categories but the expert review team (ERT) identified a need for further improvements, particularly in the LULUCF sector, where many categories are reported as not estimated ("NE"). The only emissions/removals reported in the LULUCF sector are those occurring as a result of changes in the biomass pools (living biomass and dead organic matter) associated with land conversion to and from forest land and those from lime application (see para. 120 below).

8. By submitting the revised inventory on 15 November 2011 and supplying the additional information requested by the ERT during the review week, the Netherlands has demonstrated sufficient capacity to comply with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). However, the ERT did note some weaknesses in the functioning of the national system (see para. 12 below).

9. The Netherlands has submitted supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with chapter I of the annex to decision 15/CMP.1.

10. The Netherlands has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol at the end of the commitment period. The Netherlands has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. The Netherlands has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol in accordance with decisions 15/CMP.1 and 6/CMP.3. However, the Netherlands still needs to transparently demonstrate and document, in the national inventory report (NIR), that all non-reported pools are not net sources of emissions (see para. 147 below) and that any wildfires only lead to a temporary unstocking of forest lands (see para. 149 below), in accordance with paragraphs 21 and 5 of the annex to decision 16/CMP.1, respectively.

11. The Netherlands has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and has used the standard electronic format (SEF) tables as required by decision 14/CMP.1.

12. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1, although the ERT identified some weaknesses with the national system relating to the archiving system and the implementation of the quality assurance/quality control (QA/QC) plan (see paras. 24 and 34 below).

13. The national registry continues to perform the functions set out in the annex to decision 5/CMP.1 and the annex to decision 13/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).

14. The Netherlands has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its NIR.

15. In the course of the review, the ERT formulated a number of recommendations relating to:

(a) The lack of completeness of the annual submission, in particular relating to emissions or removals reported as not estimated in the LULUCF sector (see para. 120 below);

(b) The lack of transparency of the annual submission, in particular regarding the documentation in the NIR on the methodologies used for the estimates (see paras. 36, 56, 63, 76, 87, 103, 109, 123 and 124 below).

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

16. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and an NIR. The Netherlands also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraph 3, of the Kyoto Protocol, the accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The SEF tables were submitted on 16 February 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

17. The Netherlands officially submitted revised emission estimates on 9 and 15 November 2011 in response to the list of potential problems and further questions raised by the ERT during the review. The values used in this report are based on the values contained in the submission of 15 November 2011.

18. The ERT also used the previous years' submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

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

Completeness of inventory

20. The inventory covers the period 1990–2009 and is complete in terms of years, gases, sectors and geographical coverage. The inventory is generally complete in terms of source and sink categories except for the LULUCF sector, where the only emissions/removals estimated are those associated with land conversion to and from forest land and emissions from lime application. In addition, wildfires are reported as "NE", which is not in

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

accordance with the UNFCCC reporting guidelines as wildfires do occur in the Netherlands. The ERT recommends that the Netherlands report these emissions in the next annual submission. During the review week, the ERT identified that CO_2, CH_4 and N_2O emissions from the use of compressed natural gas in road transportation; CO_2 emissions from natural gas pipeline transmission; and N_2O emissions from septic tanks were reported as not occuring ("NO"). In addition, estimates of fugitive emissions from solid fuels did not include CH_4 emissions from charcoal production, and energy use in other sectors did not include CO_2, CH_4 and N_2O emissions from the use of charcoal. The ERT considered that these emissions are likely to occur in the country and recommended that the Netherlands revise its assumptions and report emissions from these categories. In response to the list of potential problems and further questions raised by the ERT, the Netherlands provided revised estimates for these categories (see paras. 61, 62, 65, 66, 69, 70, 71 and 139 below). The ERT agreed with these emission estimates.

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

Overview

21. The ERT concluded that the national system continues to perform its required functions.

22. The Netherlands described in its NIR the changes to the national system since the previous annual submission. On 1 January 2010 the organization with primary responsibility for the preparation of the inventory changed from the Netherlands Environmental Assessment Agency (PBL) to the National Institute for Public Health and the Environment (RIVM). In addition, the name of the single national entity changed from SenterNovem to NL Agency. The ERT does not consider that these changes affect the functioning of the national system (see para. 160 below).

Inventory planning

23. During the review week, the Netherlands explained the national system for the preparation of the inventory. The Ministry of Infrastructure and Environment (IenM) (previously known as VROM) has overall responsibility for the national inventory. IenM assigned NL Agency as the single national entity. The main sources of data are the Pollution Release and Transfer Register (PRTR) and Statistics Netherlands (CBS). RIVM coordinates, compiles and maintains PRTR, which collects data on over 350 pollutants, including GHGs from a large number of companies that submit annual inventory reports, usually as a legal requirement, although some report under environmental covenants. These are validated by the competent authorities (usually those that issue permits). If the data are deemed to be of sufficient quality, they are used in the calculation of the emission estimates by RIVM; if not, they are used for the validation of the estimates based on data from CBS. The inventory also includes data from a number of agricultural institutes and consultants. This information is combined into the PRTR database from which the CRF tables are compiled by RIVM. LULUCF emissions/removals data are compiled by Wageningen University and are entered directly into the CRF tables by RIVM before they are added to the PRTR. The NIR is prepared by RIVM with inputs from all the expert groups involved, including NL Agency. Clear agreements, often consisting of legal requirements, between all the companies, organizations and experts involved in the inventory preparation process ensure the timely delivery of data. The ERT noted that, in the NIR, the description of the inventory preparation process does not always cite the most up-to-date names of the organizations involved, nor does it clearly describe the process of integrating the LULUCF

data into the compilation of the inventory. The ERT encourages the Netherlands to improve the description of the national system in its next annual submission.

24. Although the national system meets all the requirements of decision 19/CMP.1, in practice, there appear to be some weaknesses in several areas of the system. For example, some of the information requested by the ERT could not be produced from the archive during the review week (see para. 79 below). There were also a number of inconsistencies between the CRF tables and the NIR (e.g. livestock numbers) identified by the ERT. On the other hand, the Netherlands does have an adequate archiving system and a reasonable QA/QC plan. The ERT, therefore, recommends that the Netherlands examine the implementation of its archiving system and its QA/QC plan, in order to ensure that the plan is correctly followed by all those involved in the preparation of the inventory and that all data are correctly archived, and report thereon in its next annual submission. In addition, the ERT reiterates the recommendation from the previous review report that the Netherlands implement adequate QC measures to ensure consistency between the NIR and the CRF tables.

25. Some of the company inventory reports submitted to the PRTR, particularly on the industrial processes sector, are confidential and only emissions data are communicated to the relevant inventory expert. This makes it difficult for the inventory expert to assess the quality of the data, though they may be reviewed by RIVM in its role of managing PRTR. The ERT recommends that the Netherlands find a way to provide clearer information in the NIR of its next submission on the QA/QC measures applied to these data, while maintaining confidentiality.

26. The ERT further noted that the ability of the national system to report on the KP-LULUCF activities in the future depends on the successful compilation of land cover/land-use maps for 1 January 2009 and 1 January 2013 (see para. 146 below). The ERT recommends that the Netherlands ensure that sufficient resources and planning are put in place in advance, in order to ensure that these maps are produced on time.

Inventory preparation

Key categories

27. The Netherlands has reported key category tier 1 and tier 2 analyses, both level and trend assessments, as part of its 2011 submission. The tier 1 key category analysis performed by the Netherlands and that performed by the secretariat[4] produced similar results. The Netherlands has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

28. The Netherlands has reported the results of the key category analysis with and without LULUCF in the NIR. The Netherlands has not reported a key category analysis for 1990 and the ERT recommends that the Netherlands do so in its next annual submission and correctly report the results in the CRF tables. For the reporting of KP-LULUCF activities, both afforestation/reforestation and deforestation are key categories as the corresponding categories in the reporting under the Convention are key categories. The

[4] The secretariat identified, for Netherlands, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Netherlands performed a key category analysis, the key categories presented in this report follow the Netherlands's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

ERT noted that the QA/QC plan does not make any mention of the use of the key category analysis in the development of inventory improvements. The ERT reiterates the recommendation in the previous review report that the Netherlands update its QA/QC plan to include the use of the key category analysis in the prioritization of inventory improvements.

Uncertainties

29. The Netherlands has performed a tier 1 uncertainty analysis. While this is in accordance with the IPCC good practice guidance, the ERT noted that where new methodologies were adopted in the inventory, the Netherlands did not provide updated uncertainty values, even when these data were available (e.g. N_2O emissions from agricultural soils). Thus, the uncertainty analysis does not reflect any of the impacts of the inventory improvements (see para. 134 below). The ERT recommends that the Netherlands update the uncertainty data to reflect the current inventory methodologies used and ensure that, in future, any changes to the methodologies are reflected in changes to the uncertainty analysis. The ERT also noted that neither the QA/QC plan nor the NIR make any mention of the use of the uncertainty analysis in the development of inventory improvements. The ERT reiterates the recommendation in the previous review report that the Netherlands update its QA/QC plan to include the use of the uncertainty analysis in the prioritization of inventory improvements.

Recalculations and time-series consistency

30. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations undertaken and reported by the Netherlands of the time series 1990–2008 include the following:

(a) In the energy sector: emissions from combustion of biomass due to the correction of an error; the revision and reallocation of fuel use for off-road machinery; CH_4 emissions based on new estimates of the CH_4 mass fraction in total volatile organic compound (VOC) emissions for light and heavy duty vehicles; CO_2, CH_4 and N_2O emissions from woodstoves due to revised AD; and CO_2, CH_4 and N_2O emissions from oil transport by pipelines;

(b) In the industrial processes sector: CO_2 emissions from limestone and dolomite use due to improved AD; CO_2 and CH_4 emissions from the carbide production due to improved AD; CO_2 emissions form iron and steel industry (2005-2008); CO_2 emissions from food and drink due to the correction of an error in 2008; HFC and SF_6 emissions from refrigeration and air conditioning, and electrical equipment due to improved AD; and CO_2, CH_4 and N_2O emissions from other emissions (fireworks and candles) due to revised methods;

(c) In the agriculture sector: N_2O emissions from manure management and agricultural soils due to improved methods;

(d) In the LULUCF sector: CO_2 emissions/removals from forest land remaining forest land and land converted to forest land due to improved harvest, dead wood and liming data.

31. These recalculation lead to decreases in the total GHG emissions without LULUCF of 0.07 per cent in 1900 and 1.12 per cent in 2008 and decreases in total GHG emissions including LULUCF of 0.03 per cent in 1990 and 1.0 per cent in 2008.

32. While the recalculations are reported in the CRF tables and in the NIR, full details of the recalculations are not always provided, and the rationale for the recalculations, as well as the methodologies used to recalculate emissions, are not always clear. In addition, the

methodologies are provided in separate Monitoring Protocols published by NL Agency (hereinafter referred to as protocols) as discussed below (see para. 36 below), and not all of these have been revised to include details of the methodologies used in the preparation of the inventory for the 2011 submission. The ERT recommends that the Netherlands ensure that, in future, the descriptions of the methodologies in the protocols are always updated to reflect the latest methods in use, prior to the submission of the inventory. The ERT further recommends that the Netherlands provide full details of the recalculations, including the rationale and the methods used, in the NIRs of its next annual submissions.

Verification and quality assurance/quality control approaches

33. The Netherlands has a QA/QC plan, in line with decision 19/CMP.1 and the IPCC good practice guidance. In practice, the Netherlands has an extensive QA/QC system that covers all steps of the inventory preparation process. Where data are collected through PRTR, the submission of data by companies, their approval by the competent authorities (usually the local authority that licences the plant) and their acceptance and use by PRTR are overseen by experts at RIVM. The data, EFs, models and other information used in the preparation of the inventory are stored electronically by RIVM using an electronic system which collects information from all the institutions involved in inventory preparation. A system of QC checks is implemented and records are kept by RIVM covering all the institutions. Where individual institutions have International Organization for Standardization (ISO) quality accreditation, they are relied upon to perform their own QA/QC checks, but the national system does commission audits of the QA/QC systems of those institutions. The ERT was able to examine the records of the QA/QC system, both of PRTR data and data from other institutions, and an audit of one of the institutions. The records are kept in Dutch and appear to show that the Netherlands has a thorough QA/QC system in place.

34. While the QA/QC system appears to be complete, there are gaps in the QA/QC plan and procedures, as follows:

(a) The data flow for the estimates of emissions in the LULUCF sector, which differs from the rest of the inventory, is not covered in the QA/QC plan;

(b) The sectoral QA/QC checks (documented in the protocols) state that: “For reasons of efficiency a minimum level has been set for obligatory documentation, i.e. 5 per cent changes at target group level, and 0.5 per cent at levels concerning the national total.” The Party explained that these small changes are in fact documented in CRF table 8(b) – recalculations. The ERT noted that the IPCC good practice guidance states that “it is good practice to document and archive all information required to produce the national emissions inventory estimates” (section 8.10.1). The ERT does not believe that the Party’s treatment of these small changes is consistent with the claim that the protocols document all the methods and data used as required by the IPCC good practice guidance. The ERT recommends that the Netherlands archive all information required to produce the national emissions inventory estimates; explain in the protocols how all changes are documented; and explicitly include in the QA/QC plan guidance on ensuring that the above procedure is carried out;

(c) The treatment of confidential data is not covered in the QA/QC plan;

(d) The results from the key category and uncertainty analyses are not explicitly used as inputs to decisions on inventory improvements.

35. The ERT recommends that the Netherlands update its QA/QC plan and procedures to include the items mentioned in paragraph 34 above.

Transparency

36. In general, the NIR provides much of the information necessary to assess the inventory; detailed information on the methodologies used is contained in separate protocols that are available on the internet.[5] These protocols contain both EFs and describe AD. This approach would be transparent if the protocols were kept up-to-date with the latest changes and if the NIR contained sufficient information to enable the ERT to understand the approaches and data used. However, this is not always the case. Not all the protocols were updated with the new methods used in the 2011 annual submission (e.g. direct N_2O emissions from agricultural soils) and, in some cases, the models used were referenced only, with no details provided on how they work or the assumptions involved. The ERT reiterates the recommendations from the previous review reports that the protocols should reflect the methods used in the preparation of the inventory.

37. The inclusion of some additional information in the NIR could improve its transparency. For example, it is not possible to understand the reported land use and land-use changes in the Netherlands from the data provided in the NIR as the LUC matrices are not included in the NIR; the NIR shows livestock data provided by CBS, but the aggregation of the data and any additional information used is unclear; the description of the national system does not cover the incorporation of LULUCF emissions and removals data; and the explanations of anomalous data that differ considerably from similar countries are insufficient (e.g. a short explanation why commercial fuel use is a large contributor to the overall uncertainty of the inventory would have helped to improve transparency). The ERT recommends that the Netherlands include additional information in the next NIR, including:

(a) A land-use change matrix;

(b) Complete the description of the national system by including the procedures for performing estimates of emissions in the LULUCF sector;

(c) Brief explanations of anomalous data and information;

(d) Complete explanations of data sources;

(e) Sufficient detailed information to allow for a full understanding of the recalculations performed.

Inventory management

38. The Netherlands has a centralized archiving system held at RIVM, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been aggregated for the preparation of the inventory. However, much of the background information about the derivation of the underlying data and how they have been used, as well as detailed information about the methods, is archived at the various institutions where the estimates are calculated (e.g. Alterra Wageningen UR for LULUCF), not at the centralized archive. The audits of the QA/QC systems of those institutions also cover the archiving of this information. The centrally archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

39. During the review, the Netherlands was unable to provide the following information that should have been archived: measurements of N_2O emissions from the nitric acid production plant before the abatement technology was fitted; the derivation of the population statistics used for estimating emissions from solid waste disposal sites for the

[5] <http://www.greenhousegases.nl/>.

years before 1990; and a complete explanation of how the data for iron and steel production were reallocated between the energy and the industrial processes sectors. The ERT noted that, in the discussions during the review week, not all individual experts responsible for estimating the emissions from individual categories had a clear understanding of the inventory QA/QC activities and data archiving system. The ERT recommends that the Netherlands ensure that the data archiving at all institutions contributing to the GHG inventory is conducted thoroughly, and that all those involved in the preparation of the inventory are made aware of the Netherlands' QA/QC system and procedures.

3. Follow-up to previous reviews

40. The main improvement in the 2011 annual submission has been the improved model on nitrogen (N) flows in the agriculture sector, leading to improvements in the accuracy of the estimates of N_2O emissions from manure management and agricultural soils. Other improvements include: the use of the IPCC method for reporting emissions from oil pipelines; the improved accuracy of the N_2O emissions from nitric acid production; improved KP-LULUCF reporting on carbon pools; and more detailed explanations of fuel use in off-road machinery and woodstoves as well as the AD for fireworks, which provided the ERT with a better understanding of these issues. Improved country-specific EFs for waste incineration and composting were also used in the estimation of emissions. The ERT commends the Netherlands for all these improvements.

41. However, not all the recommendations from the previous review report have been addressed by the Netherlands. These include the recommendations that the Netherlands: ensure that the protocols used to document the methodologies reflect the methods used in the current submission; include the missing categories in the LULUCF sector; and implement adequate QC checks in order to improve consistency between the NIR and the CRF tables. In addition, a number of sector-specific recommendations have not been implemented, such as: the accounting of oxidation losses for chemical waste gas in the production of ethylene, methanol and carbon black (see para. 50 below); and the estimation of emissions from charcoal use (see paras. 67 and 68 below) and of fugitive emissions from charcoal production (see paras. 69 and 70 below). The ERT recommends that the Netherlands address the pending recommendations in its next annual submission.

4. Areas for further improvement

Identified by the Party

42. The 2011 NIR identifies several areas for improvement, including:

(a) The improvement of the fuel consumption estimates for aviation and railways using tax data;

(b) The introduction of a regional differentiation of CH_4 emissions from dairy cattle;

(c) The inclusion of the impacts of abatement technologies on emissions from manure management;

(d) The improvement in the accuracy of N_2O emissions from fertilizer use;

(e) The improvement in the accuracy of CH_4 emissions from SWDS by measuring the organic carbon content of soils at the site.

Identified by the expert review team

43. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 176 below.

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

B. Energy

1. Sector overview

45. The energy sector is the main sector in the GHG inventory of the Netherlands. In 2009, emissions from the energy sector amounted to 166,766.89 CO_2 eq, or 83.8 per cent of total GHG emissions. Since the base year, emissions have increased by 8.3 per cent. The key driver for the rise in emissions is a 12.0 per cent increase in natural gas consumption and a 31.0 per cent increase in liquid fuel use in fuel combustion resulting from increase in demand for public electricity and heat production and the growth in the number of vehicles in transport. Within the sector, 38.7 per cent of the emissions were from energy industries, followed by 23.9 per cent from other sectors, 20.7 per cent from transport and 15.0 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 1.1 per cent and fugitive emissions from solid fuels accounted for 0.3 per cent. The remaining 0.2 per cent were from other. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands officially submitted revised emission estimates for the energy sector on 15 November 2011. The total emissions in the energy sector increased by 37.31 Gg CO_2 eq, or 0.02 per cent compared to the original submission.

46. The Netherlands has made recalculations for the energy sector between the 2010 and 2011 submissions in response to the recommendations of the 2010 annual review report, making changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on the energy sector is a decrease in emissions of 0.1 per cent for 2008 and increase in emissions of 0.04 per cent in 1990. The main recalculations took place in the following categories:

(a) Public electricity and heat production: CO_2, CH_4, N_2O emissions from combustion of biomass due to the correction of an error;

(b) Other (manufacturing industries and construction) and agriculture/forestry/fisheries: revision and reallocation of fuel use for off-road machinery;

(c) Road transportation: CH_4 emissions based on new estimates of the CH_4 mass fraction in total VOC emissions for light and heavy duty vehicles and CO_2 and N_2O emissions due to improved AD;

(d) Residential: CO_2, CH_4, N_2O emissions due to revised AD and new methodology for woodstoves;

(e) Oil – transport (oil and natural gas): CO_2 emissions from oil transport by pipelines. The ERT further notes that combustion emissions in pumping stations under other transportation category are reported as "NO" and that combustion emissions related to oil transport are reported under manufacture of solid fuels and other energy industries. Therefore, the ERT recommends that the Netherlands use the appropriate notation key "IE" to report combustion emissions related to oil transport by pipelines.

47. The ERT considers that these recalculations are consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

48. The reporting of the energy sector is complete in terms of geographical coverage, gases and years, and is generally complete in terms of categories. The ERT noted that a few categories were reported as "NE", such as: CH_4 emissions from the distribution of oil products and from other (oil); CO_2 emissions from the distribution of oil products, from

other (oil) and from other leakage (natural gas); and N_2O emissions from refining and storage (oil) that are reported as "NA". The ERT further noted that IPCC estimation methods and/or EFs are not available for these categories. In some cases, such as the subcategory other (oil), the Netherlands used an incorrect notation key. The ERT encourages the Netherlands to provide estimates for CH_4 emissions from the distribution of oil products. Responding to a question raised during the review by the ERT on oil exploration, Dutch experts confirmed that CH_4 and CO_2 emissions from the category other leakage (natural gas) that includes "industrial plants and power stations" and "residential and commercial sectors" as sources are under natural gas distribution. The ERT recommends that the Netherlands include this information and modify the notation key incorrectly used in its next annual submission.

49. The ERT notes that the Netherlands has used higher-tier methods to estimate emissions from the key categories in the energy sector. For stationary combustion, statistical data for fuel use, which are the AD used for the estimation of emissions from energy industries and manufacturing industries and construction, are derived from national energy statistics from CBS (plant-specific energy data are available for the major emitters). The CO_2 emissions are to a large extent collected from individual companies through the central database PRTR. The AD from the energy statistics and the emissions reported to the PRTR are used to calculate the country-specific EFs which are then included in the national energy statistics. In response to a question raised by the ERT during the review, the Netherlands indicated that the gaps in data (emissions) of individual companies are due to the rejection of PRTR data during the first round of QC checks (the local authority review) and the inability to resubmit the revised emission estimates in time for the compilation of the inventory. In cases where PRTR data are rejected, the country-specific EFs are used to calculate the emissions from these companies (using data from the national energy statistics and, where possible, plant-specific energy data). This situation only occurs as an exception and the emissions are recalculated when the data from these companies become available. However, the ERT notes that this process is not transparently reported in the NIR. The ERT recommends that the Netherlands provide detailed information on this process in its next annual submission. This should include the total energy use by category, divided into those covered by the PRTR data and the rejected data, if any.

50. The ERT notes that the Netherlands has addressed some of the recommendations from the previous review reports, such as the updating of CH_4 emissions from road transportation using the latest data on the mass fractions of different compounds in the total emissions of VOCs, the reporting of the uncertainty of the CO_2 EF for natural gas and the estimation of CO_2 and CH_4 emissions from oil transport. However, not all of the recommendations have been addressed by the Netherlands. These include the accounting of oxidation losses for chemical waste gas combusted during the production of ethylene, methanol and carbon black and the estimation of emissions from charcoal use and of fugitive emissions from charcoal production. Emissions from charcoal use and production have been addressed as a result of the potential problems and other questions (see paras. 69 and 70 below). During the review, the Netherlands indicated that this information will be reported in its next annual submission. The ERT reiterates the recommendations from the previous review reports that the Netherlands address all pending issues identified in the previous review reports that have not been addressed.

51. The Netherlands has described its QA/QC procedures for the energy sector and how it implements these procedures. Following a recommendation from the previous review report, the Netherlands now uses the data from the European Union emissions trading scheme (EU ETS) to verify the data from the sector-specific inventory reports and from energy surveys. As part of the QA procedure, each year a research project is carried out to compare the different data, taking into account differences in definitions and scope, etc. (De

Ligt, 2011).[6] The ERT welcomes this effort by the Netherlands and recommends that it include the results of these annual studies in its future annual submissions.

52. The Netherlands performed a tier 1 uncertainty assessment for the energy sector. The ERT further noted that the Netherlands used expert judgement to derive the uncertainty estimates for many of its categories. The information sources include: the default uncertainty estimates provided by the IPCC good practice guidance, uncertainty data provided by the national experts and data from the RIVM fact sheets on calculation methodology and data uncertainty. Further information used for uncertainty analysis is listed in the NIR (page 34). In the case of CO_2 emissions from road transportation, which ranks within the top ten largest contributing categories to total annual uncertainty, the ERT noted that the uncertainty associated with the CO_2 EF was initially based on the results of measurements taken in 2004, but has since been changed to one that is based on expert judgement. The ERT recommends that the Netherlands describe, in its next annual submission, the process used to derive the uncertainty estimates using expert judgement.

2. Reference and sectoral approaches

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

53. The Netherlands has calculated CO_2 emissions from fuel combustion using the reference and sectoral approaches for all years of the time series. For 2009, CO_2 emissions calculated using the reference approach are 1.1 per cent higher than those estimated using the sectoral approach. The differences between the two approaches vary across the time series, from 3.8 per cent in 1990 to 8.1 per cent in 1992 and have been explained in annex 4 to the NIR. However, the ERT noted that in CRF table 1.A(c) on the comparison of CO_2 emissions from fuel combustion, the apparent consumption excluding non-energy use and feedstocks has been reported as "NA" (not applicable), which leads to an overestimation of the difference between the reference approach and the sectoral approach. Therefore, the ERT recommends that the Netherlands include, in CRF table 1.A(c), the apparent consumption excluding non-energy use and feedstocks in its next annual submission.

International bunker fuels

54. Emissions from marine bunkers were calculated based on energy statistics provided by statistics Netherlands. Distinction between national and international navigation based on ton-kilometres travelled by ships is achieved through the use of the Dutch Emission Monitor Shipping (EMS). The ERT concluded that emissions from marine bunkers were calculated in accordance with the IPCC good practice guidance and the Revised 1996 IPCC Guidelines.

Feedstocks and non-energy use of fuels

55. During the review, the ERT noted that the reporting of feedstocks and non-energy use of fuels was in accordance with the Revised 1996 IPCC Guidelines and considering country-specific circumstances, including through the use of country-specific carbon storage factors. The methodology used is documented in the NIR.

Country-specific issues

56. The previous review reports found that the Netherlands's accounting of oxidation losses for chemical waste gas combusted in the production of ethylene, methanol and carbon black remained incomplete. The 2010 review report states that the Netherlands

[6] De Ligt, 2011. Analyse verschillen CO_2-eq. –emissies EU-ETS en MJV-rapportage 2009 t.b.v NIR 2011.

informed the ERT that it intended to commission a study on this issue, and that, depending on budget allocations, the study could start in November 2010. In response to a question raised by the ERT during the review, the Netherlands indicated that, due to budgetary reasons, it had not commissioned the study and would reconsider the commissioning of the study. The ERT reiterates the recommendation from the previous review report that the Netherlands investigate ways of accounting oxidation losses for chemical waste gas combustion and include the results in its next annual submission.

57. In response to a question raised by the ERT during the review, the Netherlands confirmed that there are abandoned coal mines in the country, all of which are underground. The Netherlands further explained that there are currently no CH_4 recovery projects in place as all coal mines are sealed and filled with groundwater. In addition, old mine areas are rehabilitated and used as building areas for houses, offices, industry, parks, etc. The ERT welcomes this explanation from the Netherlands and recommends it to include this information in the NIR of its next annual submission.

3. Key categories

Stationary combustion: other fuels – CH_4

58. The ERT noted that in CRF table 1.A(a), the Netherlands has reported CH_4 emissions from waste incineration for energy recovery using the notation key "NA". During the review, the ERT was provided with a report entitled "Update of emission factors for N_2O and CH_4 for composting, anaerobic digestion and waste incineration". The ERT found that this report contains a country-specific CH_4 EF of 3 g/t waste incinerated; this was an intermediate result from the research. The report also concluded that these CH_4 emissions might be below the background level. Additional research, as referred to in the NIR,[7] demonstrated that these CH_4 emissions are indeed lower than the background concentration on the basis of the waste incineration plant emissions measured. The ERT recommends that the Netherlands improve the documentation of this CH_4 EF (in English) in its next annual submission.

Stationary combustion: solid fuels – CO_2

59. During the review week, the ERT requested information about the recalculation of CO_2 emissions from iron and steel production, both for the energy and the industrial processes sector. In response to the ERT's questions, the Netherlands presented data on carbon flows using an Excel spreadsheet. Upon investigation of the spreadsheet in consultation with the experts from the Netherlands, the ERT noted that the total carbon flows in the CRF tables do not match those presented in the spreadsheet. During the review week, the Dutch inventory experts were unable to explain the figures presented in the CRF tables. This lack of transparency did not allow the ERT to assess whether there are potential underestimations of emissions, whether the estimates are in line with the IPCC good practice guidance, or whether there is a potential for overestimation of emissions. The ERT noted that the carbon flows in the iron and steel related categories in the Netherlands are not transparent overall. During the review week, the ERT recommended that the Netherlands provide either a detailed carbon mass balance (a process flow diagram) showing all the inputs and outputs in the iron and steel production processes (see para. 81 below) and how these carbon flows are accounted for in the energy and industrial processes sectors or revise and document emission estimates for all iron and steel categories in the energy and industrial processes sectors.

[7] AgentschapNL. 2010b. *Work Package 66 Methodology Report, WI Plants, IPCC Air, Update 2010*; in Dutch.

60. The ERT further noted that the Netherlands has reported in the NIR (page 51) that CO_2 emissions from fuel combustion from the on-site coke production in iron and steel plants in the Netherlands including the independent coke production plant, Sluiskil closed in 1990, are reported under the iron and steel category. The ERT noted that this allocation is not consistent with the Revised 1996 IPCC Guidelines which require these emissions to be reported under manufacture of solid fuels and other energy industries. The ERT recommends that the Netherlands correctly allocate these emissions in line with the requirements of the Revised 1996 IPCC Guidelines. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided a detailed carbon mass balance for 2009 showing all the inputs and outputs in the iron and steel production processes and how these carbon flows are accounted for in the energy and industrial processes sectors. The analysis of the carbon flows by the Netherlands resulted in minor changes to the reported fugitive emissions from coke production, representing an increase in 2009 of 0.2 Gg CO_2 eq (0.03 per cent). The ERT agrees with the revised estimates, the reported carbon mass balance and its carbon flows presented by the Netherlands and recommends that it include this carbon mass balance in its next annual submission.

Road transportation: gaseous fuels – CO_2, CH_4 and N_2O

61. In response to a question raised by the ERT during the review week, the Netherlands confirmed that compressed natural gas (CNG) is used in the vehicle fleet (comprised of 1,000 cars and 400 buses) since 2006. Given this information, the ERT noted that the use of the notation key "NO" for the years 2006–2009 to report CO_2, CH_4 and N_2O emissions arising from the use of gaseous fuels for road transportation is not appropriate. The ERT further noted that guidance is provided in the Revised 1996 IPCC Guidelines on default EFs for CO_2, CH_4 and N_2O emissions from gaseous fuels used for road transportation. In addition, the ERT noted that the relevant Dutch expert explicitly stated that, in his discussion with CBS, it was confirmed that the natural gas used for road transportation is not included in the data on the total natural gas used to estimate emissions from stationary combustion. The ERT recommended that the Netherlands estimate emissions from the use of CNG for road transportation using default EFs provided in tables 1-43 and 1-8 of the Revised 1996 IPCC Guidelines. Alternatively, the ERT recommended that the Netherlands provide documentary evidence demonstrating that this fuel use is included in the stationary fuel consumption, providing details of where this is accounted for, and consider reallocating this fuel consumption to the correct category. During the review week, the Netherlands informed the ERT that it has calculated preliminary emission estimates for all GHGs in this category.

62. In response to the list of potential problems and further questions raised by the ERT during the review week, the Netherlands identified that 20 per cent of CNG used for road transportation was not accounted for in the estimation of GHG emissions from this category and in other energy categories. The Netherlands collected the missing AD for the time series (2005–2009) and applied the tier 1 EFs from the Revised 1996 IPCC Guidelines to estimate CO_2, CH_4 and N_2O emissions from gaseous fuels used in road transportation. The resulting emission estimates amounted to 1.95 Gg CO_2 eq for 2009 (0.01 per cent of the sectoral total) and 1.80 Gg CO_2 eq for 2008 (0.01 per cent of the sectoral total). The ERT agrees with the emission estimates and commends the Netherlands for this improvement in the accuracy of its inventory.

Road transportation: liquid fuels – CO_2, CH_4 and N_2O

63. The ERT noted that the last measurements for the country-specific diesel oil and gasoline CO_2 EFs were conducted in 2004. In response to a question raised by the ERT during the review week, the Netherlands indicated that it intends to assess the currently

available data on the carbon content of the different types of fuels used for road transportation to revise its country-specific EFs. The ERT welcomes this initiative and recommends that the Netherlands include the findings of this assessment and use the updated country-specific EFs for this category in its next annual submission.

64. In the previous annual submission, the Netherlands reported that it calculates CO_2 emissions from road transportation using an IPCC tier 2 methodology, using data from domestic fuel sales, which are provided by CBS. The ERT established that the Netherlands actually estimates CO_2 emissions in this category using a tier 1 methodology as the Netherlands uses aggregated fuel sales that may not be disaggregated according to vehicle type. Therefore, the ERT reiterates the recommendation from the previous review report that the Netherlands correct the information in the NIR and in the CRF tables regarding the methodology used to estimate CO_2 emissions from road transportation.

4. Non-key categories

Oil and natural gas: gaseous fuels – CO_2

65. The Netherlands has reported fugitive CO_2 emissions from natural gas transmission as "NO" in CRF table 1.B.2 for all years of the time series. However, during the review, the Netherlands confirmed that emissions from this category exist. The ERT notes that the IPCC good practice guidance provides a CO_2 EF of 1.6 x 10^{-5} Gg CO_2/year/km transmission pipeline (table 2.16 of the IPCC good practice guidance). The ERT notes that this missing estimate results in an underestimation of emissions. During the review, the ERT recommended that the Netherlands estimate fugitive CO_2 emissions from gas transmission using AD on the length of the transmission pipeline and the IPCC default CO_2 EF described above. During the review week, the Netherlands provided information on the length of its transmission pipeline (11,500 km in 2009).

66. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands used the data on the length of the transmission pipeline and applied the default CO_2 EF for gas transmission provided in the IPCC good practice guidance to calculate the gas transmission related CO_2 emissions for the entire time series. The resulting emission estimates amounted to 0.18 Gg CO_2 eq for 1990 (0.05 per cent of the sectoral total), 2008 (0.05 per cent of the sectoral total) and 2009 (0.04 per cent of the sectoral total). The Netherlands submitted the missing emission estimates in the revised CRF tables. The ERT agrees with the emission estimates and commends the Netherlands for this improvement in the accuracy of its inventory. The ERT noted that that combustion emission related to transportation of gaseous fuels in CRF table is reported using the notation key "NO" in other transportation. However, in the NIR it is stated that combustion emission related to production and transport of gaseous fuels is reported under manufacture of solid fuels and other energy industries. Therefore, the ERT recommends that the Netherlands apply the appropriate notation key "IE" instead of "NO".

Stationary combustion: biomass – CO_2, CH_4 and N_2O

67. In the previous review report it is recommended that the Netherlands continue to explore ways to calculate emissions relating to charcoal use in the residential category. During the review, the Netherlands confirmed that charcoal is used in the country. However, the ERT notes that these emissions have not been included in the current submission. The ERT further notes that the Revised 1996 IPCC Guidelines provide guidance on the EFs for CO_2, CH_4 and N_2O emissions. During the review week, the Netherlands indicated that a new methodology has already been developed, for which the AD will be based on estimated production data and the EFs based on literature related to the specific production process in the Netherlands. During the review week, the ERT

recommended that the Netherlands estimate emissions from charcoal use using the AD based on estimated production data and using country-specific EFs or the default EFs provided in tables 1-7 and 1-8 of the Revised 1996 IPCC Guidelines. The ERT noted that the CO_2 emissions from charcoal use are of biogenic origin, which should be reported as a memo item and not included in the national total emission estimate.

68. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands collected AD on charcoal use from CBS and applied tier 1 default EFs provided in the Revised 1996 IPCC Guidelines to calculate CO_2, CH_4 and N_2O emissions related to charcoal use for the complete time series. The resulting emission estimates were 0.91 Gg CO_2 eq for 1990 (0.01 per cent of the sectoral total), 1.01 Gg CO_2 eq for 2008 (0.01 per cent of the sectoral total) and 1.04 Gg CO_2 eq for 2009 (0.01 per cent of the sectoral total). The ERT agrees with the revised estimates.

Solid fuel transformation: biomass – CH_4

69. The ERT noted that fugitive CH_4 emissions from charcoal production have not been reported in the current submission for the whole time series. The NIR indicates that a charcoal production plant has been in operation for the entire time series. The ERT notes that the Revised 1996 IPCC Guidelines provide guidance on the CH_4 EFs for charcoal production. During the review week, the Netherlands informed the ERT that CBS had included the production of charcoal in the statistics on renewable energy and, as a result, AD on charcoal production are now available. The Netherlands further explained that the charcoal production plant was closed in 2010, but it will estimate the historic emissions from 1990 to 2010 based on the production capacity and the EFs from literature sources. During the review week, the ERT recommended that the Netherlands estimate fugitive CH_4 emissions using AD on charcoal production, which the Netherlands confirmed are available, and multiply these AD by a country-specific CH_4 EF or the default CH_4 EF provided in table 1-14 of the Revised 1996 IPCC Guidelines.

70. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands collected AD based on national charcoal production statistics and applied the IPCC default CH_4 EFs provided in the Revised 1996 IPCC Guidelines to calculate fugitive CH_4 emissions from charcoal production for the complete time series. The resulting emission estimates were 3.15 Gg CO_2 eq for 1990 (0.01 per cent of the sectoral total) and 0.0014 Gg CO_2 eq for 2008 and 2009 (less than 0.01 per cent of the sectoral total). The large difference in the CH_4 emission estimates between 1990 and 2009 is due to the change in EF, as the operator changed from a traditional production method to a Twin retort system (charcoal production with reduced emissions). The ERT agrees with the revised estimates.

Civil aviation: liquid fuels – CO_2, CH_4 and N_2O

71. The ERT noted that there is a 740.6 per cent difference in the jet kerosene for civil aviation reported in the CRF tables (230.20 TJ) and in the data reported to the International Energy Agency (IEA) (1,935.00 TJ) for 2009. The ERT further notes that these data are for the year 2000 but are used to estimate emissions for the whole time series (1990–2009). During the review week, the Netherlands confirmed that the IEA data on fuel used for domestic aviation originates from CBS. As CBS is the original source for both figures, the discrepancy cannot be understood. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands demonstrated that the estimates of emissions for 2009 and 2008 from civil aviation did not result in the underestimation of emissions. A comparison of the fuel consumption data for civil aviation between the IEA data and the data presented in the CRF tables showed that the large difference in the two datasets is as a result of the inclusion of military aviation data in the

civil aviation data in the IEA dataset. When the military aviation fuel consumption data are removed from the IEA dataset, the fuel consumption data in the CRF tables are comparable. The ERT agreed with the assessment by the Netherlands and recommends that the Netherlands include this clarification in its next annual submission.

5. Areas for further improvement

Identified by the Party

72. The Netherlands has identified the following areas for further improvement:

(a) Continuing to estimate CO_2 plant-specific EFs from refineries;

(b) The improvement of the quality of the fuel sales data for emissions from civil aviation;

(c) The investigation of losses from chemical waste gas combusted in ethylene and carbon black plants;

(d) The improvement of the quality of the fuel sales data for emissions from railways.

Identified by the expert review team

73. The ERT has identified the following areas for further improvement:

(a) The estimation of CH_4 emissions from waste incineration for energy recovery;

(b) The inclusion of the apparent consumption excluding feedstocks and non-energy use in CRF table 1.A(c) (comparison of CO_2 emissions from fuel combustion);

(c) The allocation of combustion-related emissions from coke production in iron and steel plants from iron and steel to manufacture of solid fuels and other energy industries.

C. Industrial processes and solvent and other product use

1. Sector overview

74. In 2009, emissions from the industrial processes sector amounted to 9,906.04 Gg CO_2 eq, or 5.0 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 195.36 Gg CO_2 eq, or 0.001 per cent of total GHG emissions. Since the base year, emissions have decreased by 55.4 per cent in the industrial processes sector, and decreased by 63.9 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 decrease in N_2O emissions from nitric acid production due to the installation of emission abatement equipment, which was responsible for an emission reduction of 93.0 per cent during the period 1990–2009. The other major contributors to the decrease in emissions from the industrial processes sector are related to the production of HCFC-22 and the corresponding HFC-23 emissions, which decreased by 97.0 per cent during the period 1998–2000 due to the installation of a thermal afterburner, and to aluminium production and the corresponding PFC emissions, which decreased by 98.0 per cent during the period 1998–2003 due to the switch from side feed to point feed technology. Within the industrial processes sector, in 2009, 48.4 per cent of the emissions were from chemical industry, followed by 21.2 per cent from consumption of halocarbons and SF_6, 13.6 per cent from metal production, 10.5 per cent from mineral products and 3.3 per cent from other and 0.3 per cent from other production. In response to the list of potential problems and further

questions raised by the ERT during the review, the Netherlands officially submitted revised emission estimates for the industrial processes sector on 15 November 2011. The total emissions in the industrial processes sector increased by 29.09 Gg CO_2 eq, or 0.3 per cent compared to the original submission.

75. The Netherlands has performed recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report recommendations, following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on the industrial processes sector is a decrease in emissions of 0.03 per cent for 2008 and changes for 1990 (increase of 2.7 per cent). The main recalculations took place in the following categories:

(a) Limestone and dolomite use: CO_2 emissions decreased by 2.65 Gg CO_2 eq (0.2 per cent) in 2008 and CO_2 emissions did not change for 1990. Recalculation took place because more detailed information on AD for various sources become available;

(b) Carbide production: CO_2 emissions increased by 22.90 Gg (0.7 per cent) and CH_4 emissions decreased by 7.61 Gg CO_2 eq (3.0 per cent) in 2008 and there is no change for 1990. Recalculation took place because more detailed information on AD for various sources become available;

(c) Iron and steel production: CO_2 emissions from this category decreased by 251.48 Gg (14.0 per cent) in 2008 and increased by 1.16 Gg (0.04 per cent) in 1990. For the period 2005–2008 there was a reallocation of emissions from the integrated steel producer from iron and steel production to the category solid fuel transformation in the energy sector;

(d) Food and drink production: CO_2 emissions from food and drink for 2008 increased by 31.81 Gg CO_2 (2,052.1 per cent) due to an error in the previous submission. There were no changes for 1990;

(e) Consumption of halocarbons and SF_6: HFC emissions decreased by 34.05 Gg CO_2 eq (2.0 per cent) and SF_6 emissions by 38.12 Gg CO_2 eq (17.0 per cent) in 2008. For 1990 there were no changes. Recalculations were made because more detailed information on AD for cooling (stationary and mobile) as well as new SF_6 emissions from the category electrical equipment become available;

(f) Other: CO_2, CH_4 and N_2O emissions increased slightly in 2008 (1.56 Gg CO_2 eq and 0.4 per cent) due to a change in the method used to calculate the emissions from fireworks.

76. The inventory is complete in terms of geographical coverage, gases and years, and is generally complete in terms of categories, except for the estimation of: CO_2 emissions from consumption of electrodes in electric arc furnaces (EAFs); potential emissions from consumption of substitutes for ozone-depleting substances (ODS) (HFCs, PFCs and SF_6 from aerosols and metered dose inhalers; solvent uses; foam; stationary refrigeration; mobile air conditioning; fire protection; and other applications) except for potential emissions of stationary refrigeration and mobile air-conditioning, and CO_2 emissions from road paving with asphalt and asphalt roofing. The Revised 1996 IPCC Guidelines and the IPCC good practice guidance provide methods for the estimation of emissions from these categories with the exception of emissions from road paving with asphalt and asphalt roofing. During the review, the ERT recommended that the Netherlands assess these categories and submit the related emissions or explanations about its occurrence in the country. Regarding the missing potential emissions from consumption of ODS substitutes the ERT encourages that the Netherlands include the relevant emissions in its next annual submission. With regard to emissions from road paving with asphalt and asphalt roofing, the previous ERT had encouraged the Netherlands to report emissions for the whole time

series in the 2011 submission. The ERT reiterates this encouragement to the Netherlands report the emissions from road paving with asphalt and asphalt roofing for the whole time series in its next annual submission.

77. The descriptions of methodologies in the NIR are very brief and are supplemented with specific information in the protocols. Further, the descriptions in the NIR are not always complete (e.g. regarding the production of steel in EAFs). The ERT noted that the protocols are not always up-to-date, such as the one for mobile air-conditioning. The ERT recommends that the Netherlands carefully update the information in the NIR and in the protocols in a timely fashion for its next annual submission.

78. In the NIR, reference is made to the general QA/QC procedures for the industrial processes sector which refers to the protocols. For confidential categories (e.g. emissions from caprolactam production and HCFC-22 production) only information on the emissions reported in the sector-specific inventory reports to the PRTR is transferred to the relevant inventory expert. The inventory reports are submitted to QA/QC checks by the companies, local authorities and PRTR team. It is not mandatory to report AD and EFs because of a law governing confidentiality, although the Netherlands was not able to specify the exact law. However, the Dutch inventory experts receive some confidential information (e.g. indexes of AD) on a voluntary basis, which makes it difficult for those compiling the emissions from the industrial processes sector to assess the accuracy of the emission estimates. The ERT recommends that the Netherlands explore ways to allow the reporting of sufficient data to the inventory experts to ensure adequate QC, while maintaining the confidentiality of the data.

2. Key categories

Nitric acid production – N_2O

79. The Netherlands uses a plant-specific EF of 7.4 kg N_2O/t nitric acid to estimate emissions for the period 1990–1998. The plant-specific EF is based on measurements taken in 1998 and 1999. From 1999 onwards, the emission estimates are based on measurements taken annually. The results of the measurements taken in 1998 and 1999 which have been used to determine the country-specific EF for the period 1990–1998 could not be provided to the ERT by the Netherlands as they had not been archived correctly. Therefore, the emissions for the period 1990–1999 and the time-series consistency could not be assessed by the ERT. The ERT recommends that the Netherlands retrieve the results of the 1998 and 1999 measurements in order to demonstrate time-series consistency in its next annual submission and that the Netherlands archive all such results properly and, when necessary, make them available for ERTs in the future.

80. In response to the recommendations of the previous review report, the Netherlands provided in the NIR more information about the abatement technologies at each plant and the increased abatement efficiencies from all the nitric acid producing installations. Information on the AD and implied emission factors (IEFs) are reported as confidential in the inventory. During the review, the Netherlands provided the ERT with information on the AD and emissions for the period 2005–2009. This enabled the ERT to assess the emissions for the years 2005–2009. The ERT compared the IEF with the IEF from another reporting Party using the same Envinox technology as in the Netherlands and concluded that the IEF used by the Netherlands is of the same magnitude. The ERT also referred to some publicly available literature on the new abatement technologies and found comparable abatement efficiencies (98 per cent) between the literature and the information contained in the NIR. Moreover, emissions from nitric acid production are continuously measured and reported in verified emission reports under the EU ETS for all installations since 2008. The

ERT has assessed the time series for the years 2005–2009 and considers it to be consistent and accurate.

Iron and steel production – CO_2

81. During the review, the Netherlands clarified questions about the recalculations performed in the categories related to iron and steel production in the country in both the energy and the industrial processes sectors (see paras. 59 and 60 above for details). In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided a detailed carbon mass balance for 2009 showing all the inputs and outputs in the iron and steel production processes and how these carbon flows are accounted for in the energy and industrial processes sectors. The ERT agrees with the carbon mass balance and its carbon flows presented by the Netherlands and recommends that the Party include this carbon mass balance in its next annual submission.

82. The Netherlands also detected some errors in its original annual submission during the review, including the EF for blast furnace gas and the correction of the process emissions from limestone use in the iron and steel industry and carbon loss from coke/coal inputs. As the Netherlands could not provide full explanation of the data in the NIR and the CRF tables during the review week, the ERT recommends that the Netherlands resolve this issue by correctly archiving all these calculations in the future.

83. Further, the ERT noted during the review week, that it is not clear if the Netherlands included CO_2 emissions from consumption of electrodes in EAFs in the CO_2 emissions from the category iron and steel. In the NIR, the Netherlands only discusses one integrated iron and steel plant. However, in response to questions raised by the ERT about the allocation of emissions from the iron and steel category under the energy sector and under the industrial processes sector it became clear to the ERT that the Netherlands also has another plant that produces steel in EAFs. The ERT noted that it is good practice, when estimating the emissions from the steel produced in EAFs, to add the carbon released from the consumed electrodes to the emissions, roughly a value of 1–1.5 kg C/t steel (page 3.26 of the IPCC good practice guidance). During the review, when the Netherlands provided a carbon mass balance of the iron and steel production, it did not transparently include the emissions from the EAFs. Therefore, the ERT could not check whether the emissions from the EAFs have been correctly included in the inventory. This could lead to an underestimation of emissions.

84. During the review, the ERT recommended that the Netherlands either: provide clear and detailed information on the emissions from the EAFs in the iron and steel industry by providing a carbon mass balance to include all the steel producers in the country and detailed information about all the methods used to estimate emissions from the iron and steel industry. The emissions from the carbon mass balance should have a clear link to the emissions reported in the CRF tables; and provide documented estimates of the emissions from EAFs.

85. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided a detailed carbon mass balance for 2009 showing all the inputs and outputs in the iron and steel production processes, including steel production in EAFs. It transpired that the emissions from the consumption of electrodes in the iron and steel sector had not been included in the original submission. The Netherlands provided documented estimates for the emissions from EAFs and included the emissions from this source in the revised CRF tables. For the category other (iron and steel production): a decrease of 28.83 Gg (4.0 per cent) for 2008; an increase of 13.30 Gg (2.0 per cent) in 2009 and a slight increase of 1.16 Gg (0.1 per cent) in 1990. The ERT agrees with these estimates and recommends that the Netherlands include information about the methods used and the emission estimates in its next NIR.

Production of halocarbons and SF_6 – HFCs

86. For this category, only emissions documented in the sector-specific inventory reports are transferred to the relevant Dutch inventory expert. The quality of the emission estimates/measurements in the inventory reports is dependent on the QA/QC checks carried out by the companies and local authorities. The reporting of AD and EFs is not obligatory for the annual inventory reports and can be difficult to collect due to the law on confidentiality. This makes it very difficult for the Dutch inventory experts and the ERT to assess the quality, completeness and consistency of the emission estimates. The ERT recommends that the Netherlands explore ways to allow the reporting of sufficient data to the Dutch inventory experts, in order to ensure completeness, consistency and adequate QC of the emission estimates, while maintaining the confidentiality of the data.

Consumption of halocarbons and SF_6 – HFCs and SF_6

87. The calculations of HFC emissions from stationary refrigeration are based on a stock model with assumptions for the average lifetime, leakage rate and dismantling losses (tier 2 top-down method). In the Netherlands, all the appliances are combined into one group with one average lifetime. Studies are currently being conducted into whether actual figures per appliance can be obtained on the refilling of existing installations, the filling of new installations, and dismantled installations (protocol 11-020). In addition, a large amount of information will be generated via the new obligation within the framework of the F-gas regulation (Leidraad koudemiddelenregistratie). However, the method used does not provide an insight into the division of emissions between appliances and categories. The ERT considers that this is not a fully transparent method. The ERT encourages the Netherlands to explore possibilities to make available the information generated via the new registration for the preparation of the GHG inventory in order to refine the model, taking into account the different cooling applications in different categories and possibly improve the accuracy of the estimates.

88. Confidential emissions of SF_6 in semiconductor manufacture, electrical equipment and glass are included under the sub-category other. Confidential emissions of HFCs (aerosols and foam blowing) are reported under the category other (consumption of halocarbons and SF_6). During the review, the ERT was provided with information on all the underlying data. According to the relevant Dutch inventory expert, confidentiality should be guaranteed to the companies according to law. However, the Dutch expert was not able to specify the exact law concerned. The confidentiality of this information does not contribute to the transparency of the inventory. The ERT encourages the Netherlands to provide detailed information on this law in the NIR of its next annual submission and explore possibilities to increase the transparency of its reporting.

89. Potential emissions are estimated only for stationary refrigeration and air conditioning by adding together all the coolant in the installed equipment. This method is not in accordance with the IPCC good practice guidance tier 1 methodology. According to the IPCC good practice guidance, inventory agencies should use the tier 1 potential emissions method to check the accuracy of the tier 2 actual estimates. In addition, inventory agencies may consider developing accounting models that can reconcile potential and actual emission estimates, which may improve the determination of EFs over time. The ERT recommends that the Netherlands calculate potential emissions of all ODS substitutes according to the tier 1 method contained in the IPCC good practice guidance. This calculation method will contribute to the completeness of the inventory and to the transparency and comparability of the emissions.

90. SF_6 emissions are obtained from the semiconductor manufacturers. The manufacturers request that emissions of SF_6 are treated confidentially. The ERT

recommends that the Netherlands report the SF_6 emissions under semiconductor manufacture instead of under the sub-category other for transparency reasons.

3. Non-key categories

Lime production – CO_2

91. The category lime production is reported as "IE" (included elsewhere) in CRF table 2(I).A-G for the entire time series, in addition in the CRF table it is stated that the only known lime production is in the sugar industry and is accounted for under the category food and drink. However, in the Netherlands, there is paper industry and this industry could regenerate lime from waste materials. During the review week, the ERT was not able to clarify whether the paper producers in the Netherlands produce lime. This causes a lack of transparency and, if this source exists, could lead to an underestimation of emissions.

92. Therefore, during the review week, the ERT recommended that the Netherlands: collect relevant information to demonstrate whether lime production occurs in paper industry in the Netherlands; and if lime production does occur, collect the data to estimate these emissions for the complete time series in accordance with the IPCC good practice guidance and report this in the CRF tables as well as provide supporting documentation for the reported figures.

93. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands demonstrated that there are no emissions of lime production in the paper industry. In the Netherlands, paper and cardboard are mainly produced from recycled fibres, while new pulp is mainly imported from abroad. The production of wood pulp is minimal and amounts to only a few per cent of total production. In the Netherlands, pulp production only takes place by mechanical or thermo-mechanical processes. The kraft (sulphate) pulping process, the only source for CO_2 emissions (originating from biomass), is not used in the Netherlands. The ERT agreed with this explanation and recommends that the Netherlands include this information in its next annual submission.

Asphalt roofing and road paving with asphalt– CO_2

94. Emissions from the categories asphalt roofing and road paving with asphalt are reported as "NE", although AD for the period 1990–2002 are available and the Netherlands provided an estimate for emissions from road paving with asphalt in the NIR in annex 5. The ERT encourages the Netherlands to explore ways of including a time series for emissions from road paving with asphalt and asphalt roofing and report them in its next annual submission.

Aluminium production – CO_2

95. According to the NIR, an IPCC tier 1a method is used to estimate CO_2 emissions from the anodes used in the primary production of aluminium, with the data collected from aluminium production used as the AD. The NIR further indicates that a country-specific CO_2 EF of 1.45 t CO_2/t aluminium is used to estimate the CO_2 emissions. During the review, the ERT found that, for the years 2007–2009, an EF with a lower value (1.35 t CO_2/t aluminium) is used. During the review, the Netherlands agreed that this is an error. The lower EF leads to a lower CO_2 emissions estimate for the years 2007–2009 and an underestimation of CO_2 emissions from aluminium production for the same period.

96. During the review, the ERT recommended that the Netherlands provide revised estimates for this category using the CO_2 EF of 1.45 t CO_2/t aluminium for 2007–2009.

97. In response to the list of potential problems and further questions raised by the ERT, the Netherlands revised the CO_2 process emissions from anode use in primary aluminium

production for the years 2007–2009, using the correct country-specific CO_2 EF of 1.45 t CO_2/t aluminium. The CO_2 emissions increased by 32.32 Gg CO_2 (7.5 per cent) in 2007, 33.71 Gg CO_2 (7.5 per cent) in 2008 and 15.80 Gg CO_2 (7.1 per cent) in 2009. The ERT agrees with the revised figures.

4. Areas for further improvement

Identified by the Party

98. No sector-specific improvements have been identified by the Netherlands.

Identified by the expert review team

99. The ERT identified the following areas for further improvement:

(a) The exploration of ways to allow the reporting of sufficient data to the relevant national inventory expert to ensure completeness, consistency and adequate QC of emission estimates, while maintaining the confidentiality of the data of production and consumption of halocarbons and SF_6;

(b) The improvement of the QA/QC procedures by analysing the reasons for the errors identified in the iron and steel sector and the aluminium production (including non-completeness and non-transparency) and by introducing measures to prevent these errors from reoccurring in the future and adjusting the QA/QC plan accordingly;

(c) The improvement of the documentation of the inventory by inserting more and up-to-date information in the NIR, such as providing the carbon mass balance for the iron and steel production and adjusting the protocol for mobile air conditioning.

D. Agriculture

1. Sector overview

100. In 2009, emissions from the agriculture sector amounted to 16,862.25 Gg CO_2 eq, or 8.5 per cent of total GHG emissions. Since the base year, emissions have decreased by 25.1 per cent. The key drivers for the fall in emissions are the reduction in the number of dairy cattle, sheep and swine, the decrease in N excretion rates and the decline in synthetic fertilizer application due to the manure and fertilizer policy in the country. Within the sector, in 2009, 39.2 per cent of the emissions were from enteric fermentation, followed by 37.7 per cent from agriculture soils. The remaining 23.1 per cent were from manure management.

101. The Netherlands has made recalculations for the agriculture sector between the 2010 and 2011 submissions following changes in EFs. The impact of these recalculations on the agriculture sector is a decrease in emissions of 9.9 per cent for 2008 and 4.2 per cent in 1990. The use of a new model to estimate N flow developed by the Netherlands considering its climate and national circumstances, had generated the recalculations in the following categories:

(a) Manure management;

(b) Agriculture soils.

102. The agriculture sector inventory is complete in terms of categories, gases, geographical coverage and years. Emissions from the key categories were estimated using a tier 2 or tier 3 method in accordance with the IPCC good practice guidance.

103. The ERT identified some inconsistencies between the NIR and the CRF tables. For example, there are inconsistencies in the number of animals reported between the information in table 6.2 of the NIR ("numbers of animals in 1990–2009 (1,000 heads)"), table a8.1 in annex 8 to the NIR ("emission factor and activity data for agriculture") and in CRF tables 4.A and 4.B(a). The ERT also identified a limited use of notation keys or incorrect reporting in some tables. For example, in the additional information tables of table 4.B(a), and for the cells for "feeding situation" in CRF table 4.A, many values are reported as 0.00, while many other values are reported as "IE", making it impossible for the ERT to understand where the corresponding values have been reported, which are these values, or in this case if an animal waste management system exists in the Netherlands. The ERT recommends that the Netherlands improve the consistency between the CRF tables and the NIR and correct the use of notation keys and improve its reporting in its next annual submission and encourages the Netherlands to develop category-specific tier 2 QC procedures for the agriculture sector for the key categories.

104. The ERT noted a lack of transparency regarding some of the information reported in the NIR and the CRF tables. For example, information about the methodologies in the NIR or in the protocols lacks clarity; insufficient information has been provided about the parameters and values used in the models to estimate the N flow; some of the information provided in the protocols and during the review is not available in English; is unclear how the Netherlands addressed recommendation made in previous review reports. The ERT therefore recommends that the Netherlands:

(a) Follow the recommendations made in the previous review report, and include in the QC procedure, a mechanism to follow these recommendations;

(b) Report in the NIR the key elements used for the calculation of the estimates, especially information related to the model to estimate N flow used, and include references and explanations in English for the protocols.

105. The Netherlands used different numbers of animals for different estimates. For example, the numbers of sheep used in the estimation of enteric fermentation CH_4 and manure management N_2O emissions were not the same. No explanation for this difference was provided in the NIR. During the review, the ERT verified that the results were in fact correct: for the estimation of N_2O emissions from manure management, the mothers and offspring were treated as a single animal because it was difficult to separate the amount of food for each animal type. To ensure transparency of the estimates, the ERT recommends that the Netherlands report in the NIR the data used for the estimation of emissions for each category and subcategory, and explain any differences or apparent inconsistencies and their reasons where needed.

106. The Netherlands has carried out various improvements to the inventory for the agriculture sector for the 2011 submission; however, the data used in the uncertainty analysis are the same as those reported in the previous submission. During the review, the ERT verified that these data have not been updated. The ERT recommends that the Netherlands update the uncertainty analysis for its next annual submission, so that the estimated uncertainties relate to the emissions data reported.

107. The ERT noted that the Netherlands reported the CH_4 and N_2O emissions from rabbits and mink under the category poultry. In order to improve the transparency and comparability of the inventory, the ERT recommends that the Netherlands create a new subcategory under other livestock to report emissions of rabbits and minks in its next annual submission.

2. Key categories

Enteric fermentation – CH_4

108. During the review week, the ERT found that the Netherlands had not included the total number of horses (which has been correctly reported in the NIR) in the CRF tables or in the estimation of CH_4 emissions from enteric fermentation for the entire time series. In 2009, the number of horses in the Netherlands was 444,924; however, the Netherlands used 144,924 as the number of horses when calculating the emission estimates. During the review, the Netherlands acknowledged this error. These missing estimates lead to an underestimation of CH_4 emissions from enteric fermentation for 2009. The ERT recommended that the Netherlands provide a revised estimate for CH_4 emissions from horses for enteric fermentation using the correct data for the entire time series and revise the CRF accordingly. In response to the list of potential problems and further questions raised by the ERT, the Netherlands resubmitted the CRF tables and revised estimates for the entire time series and the ERT accepted the revised values. The new estimations result in an increased emissions from enteric fermentation of 113.4 Gg CO_2 eq for the entire time series, representing an increase of 1.5 per cent in 1990 and 1.7 per cent in 2009. The ERT agrees with the revised values.

109. During the review, the Netherlands provided the ERT with the results of a country-specific study in Dutch ("Gestandaardiseerde berekeningsmethode voor dierlijke mest en mineralen" – Standardized method for calculating manure and minerals) used to determinate the value of CH_4 conversion fraction for cattle that the Netherlands used for the estimations. This study was based on field measurements and analysis, however this study is not referenced in the NIR nor in the corresponding protocol. In order to improve the transparency of reporting, the ERT recommends that the Netherland include this information in English for its next annual submission, either in the NIR or in the relevant protocol.

110. The Netherlands reports the figure 0.00 for the "feeding situation" of all animals in the additional information table of CRF table 4.A. During the review, the ERT verified that the CRF tables had been incorrectly filled. The ERT recommends that the Netherlands improve the accuracy of its reporting by filling in the CRF tables correctly in its next annual submission.

111. During the discussions between the ERT and the Netherlands regarding the planned improvements mentioned in the NIR of the previous submission, the ERT found that some of these planned improvements might not be implemented. For example, the Netherlands planned to estimate emissions by region; however, the Netherlands explained during the review that it is uncertain whether this improvement will be implemented in 2011 for the 2012 submission. Further, there is also a possibility that this improvement will not be implemented in the near future. The ERT recommends that the Netherlands include in the NIR only planned improvements that will take place in the next one or two years.

Manure management – CH_4 and N_2O

112. During the review week, the ERT found that the Netherlands had not included the correct total number of horses (although the number has been correctly reported in the NIR), in the estimation of CH_4 emissions from manure management for the entire time series, as noted for CH_4 emissions from enteric fermentation (see para. 108 above). The ERT recommended that the Netherlands provide a revised estimate for CH_4 emissions from horses for manure management using the correct data for the entire time series and revise the CRF accordingly. In response to the list of potential problems and further questions raised by the ERT, the Netherlands submitted correct CRF tables and revised estimates for the entire time series, including all existing horses in the Netherland. The ERT agrees with

the revised values. The new estimations result in an increase of emissions from manure management of 263.5 Gg CO_2 eq for the entire time series, which represents an increase of 0.6 per cent in 1990 and in 2009.

113. The ERT noted that the Netherlands stated in the NIR 2011 and the previous submission that improvements were planned regarding the estimation of emissions from anaerobic digesters of animal waste. During the review, the Netherlands explained that it is uncertain whether this improvement will be implemented in 2011 for the 2012 submission, and that while the Netherlands is planning to compile an inventory of animal waste management systems for the future, it has not yet defined a time frame for its implementation. The ERT recommends that the Netherlands include in the NIR only planned improvements that will take place in the next one or two years.

Agricultural soils – N_2O

114. The quantity of N in sludge applied to agricultural soils reported by the Netherlands was 1 million kg N/year for 2009. The Netherlands mentioned that this information comes from CBS. During the review week, the ERT found that the quantity reported by CBS is actually 0.9 million. The ERT recommends that the Netherlands correct this information in its next annual submission.

115. The Netherlands reported in the NIR that a growing portion of the manure N is exported, from 1 per cent in 1990 to 10 per cent in 2009. During the review, the ERT found that this was correctly taken into account in the emission estimates (including the emissions from manure management and excluding those from agricultural soils). The ERT concluded that the approach used by the Netherlands is in accordance with the Revised 1996 IPCC Guidelines. However, the value used by the Netherland for 2009 is the same information used for 2008. During the review week the Netherlands informed that the value of 2009 was not available for the estimations and copied the information of 2008. In order to improve the accuracy of estimation, the ERT strongly recommends that the Netherlands use the correct value in its next and subsequent annual submissions.

116. The ERT notes that, following a recommendation made in the previous review report, some improvements have been made. These include: the use of a tier 3 method for the estimation of N_2O emissions from all agricultural soils; and the inclusion of the deposition of nitrogen oxide (NO_X) and ammonia (NH_3) emissions in the model. However, the uncertainty estimates for N_2O emissions from agricultural soils have not been updated. The previous submission estimated an uncertainty of 60 per cent for this category and this percentage has still been used in the 2011 submission, despite the improvements to the methodology that should have improved the accuracy of the estimates. The ERT recommends that the Netherlands prepare a new uncertainty estimate for this category for the 2012 submission and ensure that, in future, whenever methods are improved, the changes are reflected in updates to the uncertainty estimates.

3. Areas for further improvement

Identified by the Party

117. The Netherlands has identified the following areas for further improvement:

(a) The estimation of emissions from enteric fermentation for cattle by region;

(b) The estimation of emissions from anaerobic digesters of animal waste.

Identified by the expert review team

118. The ERT has identified the following areas for further improvement:

(a) Include only the planned improvements that will take place in the next one or two years in the NIR;

(b) Ensure consistency between the CRF tables and the NIR and correct the use of notation keys to improve its reporting in its next annual submission, and develop category-specific tier 2 QC procedures for the agriculture sector for the key categories;

(c) Follow the recommendations made in the previous review report, and include in the QC procedure, a mechanism to follow these recommendations;

(d) Report in the NIR the key elements used for the calculation of the estimates, especially information related to the model to estimate N flow, and include references and explanations in English (the protocols);

(e) Report in the NIR the data used for the estimation of emissions for each category and subcategory, and explain any differences or apparent inconsistencies and their reasons where needed;

(f) Update the uncertainty analysis, so that the estimated uncertainties relate to the emissions data are reported;

(g) Create a new subcategory under other livestock to report emission of rabbits and minks in its next annual submission;

(h) Include information on the estimation of the CH_4 conversion fraction for cattle in English, in the NIR or in the relevant protocol;

(i) Improve the accuracy of its reporting by filling in the CRF tables correctly especially with the national animal feeding situation;

(j) Include information about the use of sludge in agriculture;

(k) Include information about of the portion of the manure N exported in 2009.

E. Land use, land-use change and forestry

1. Sector overview

119. In 2009, net emissions from the LULUCF sector amounted to 2,475.03 Gg CO_2 eq, or 1.2 per cent of total GHG emissions including LULUCF. Since 1990, net emissions have decreased by 8.1 per cent. The key driver for the decrease in emissions is the increase in removals from forest land due to reforestation activities, which compensates for the increase of emissions from cropland, grassland, wetlands and settlements. Within the sector, in 2009, emissions of 4,802.21 Gg CO_2 eq were from grassland, followed by removals of 2,849.69 Gg CO_2 eq from forest land. The remaining emissions were: 300.17 Gg CO_2 eq from land converted to settlements, 56.80 Gg CO_2 eq from land converted to wetlands, 48.98 Gg CO_2 eq from land converted to cropland, 25.52 Gg CO_2 eq from land converted to other land and 91.05 Gg CO_2 eq from lime application in all land-use categories reported under the category other.

120. The LULUCF sector inventory is incomplete. Only emissions/removals from the changes in the biomass pools (living biomass and dead organic matter) associated with land-use conversion to and from forest land, and emissions from lime application are reported. For 2009 as for 2008, the Netherlands has reported emissions/removals from cropland remaining cropland using the notation keys “IE”, “NA” and “NE”. In addition, for the optional categories, such as wetlands remaining wetlands and settlements remaining settlements, the Netherlands has used the notation key “NE”. Furthermore, the Netherlands has reported direct N_2O emissions from N fertilization in forest land as “NO”; and non-CO_2 emissions from the drainage of soils and wetlands and N_2O emissions from disturbance

associated with land-use conversion to cropland as "NE". The AD, IEFs and CO_2, CH_4 and N_2O emissions from biomass burning were reported as "NA", "NE" and "NO". Non-CO_2 emissions from controlled burning in forest land were reported as "NO" and non-CO_2 emissions from wildfires in forest land were reported as "NE" and "NO".

121. As tier 1 methodologies exist for the estimation of the carbon stock change associated with land-use conversion to and from grassland and cropland, the ERT strongly recommends that the Netherlands include the emissions/removals associated with land-use conversion to and from cropland and grassland in its next annual submission.

122. The changes in mineral soil carbon stocks are reported as '"NE" for all categories in the LULUCF sector. The Netherlands informed the ERT that it had reported all mineral soils in an aggregated way and had reported a "zero" for the LULUCF total (though still using the notation key "NE", as zero is not allowed to be used in the CRF tables). The ERT noted that tier 1 methodologies exist, and that for the reporting under the Kyoto Protocol the Netherlands has calculated the changes in mineral soil carbon stocks associated with afforestation and deforestation using a tier 2 method. The ERT recommends that the Netherlands improve the documentation in the NIR and report on the emissions and removals from mineral soils using either a tier 1 or a tier 2 method in its next annual submission.

123. The Netherlands reports net carbon stock change in organic soils for grassland remaining grassland and cropland remaining cropland. However, the carbon stock changes in organic soils associated with land-use change to and from cropland and grassland are reported as "NE". The ERT recommends that the Netherlands report the carbon stock change in organic soils associated with land-use changes in its next annual submission.

124. The Netherlands has not included a land-use change matrix in its annual submission. A land-use change matrix provides a compact format for representing the areas that have been affected by the different transitions between all possible land-use categories and helps the ERT to identify which land uses and land-use changes most commonly occur. To increase the transparency of the sector, the ERT recommends that the Netherlands include a land-use change matrix in the NIR of its next annual submission.

125. The Netherlands has made recalculations for the LULUCF sector between the 2010 and 2011 submissions following the receipt of updated data for liming of agricultural soils, a change in the parameter used to describe the removal of dead wood, and the correction of an error involving changes to the calculation of biomass loss due to harvesting. The impact of these recalculations on the LULUCF sector is an increase in emissions of 9.0 per cent for 2008, and an increase of 3.65 per cent for 1990. The main recalculations took place in the following categories:

(a) Forest land remaining forest land;

(b) Land converted to forest land.

126. A tier 1 uncertainty analysis was performed for the sector using both country-specific uncertainty estimates (some based on expert judgement) and tier 1 default uncertainty values. It is reported in the NIR that the LULUCF sector is subject to general QA/QC procedures discussed in chapter 1 of the NIR but, during the review, it became evident that the LULUCF sector was not included in these procedures, although sector-specific QA/QC measures are performed. The sector-specific QA/QC measures are reported in the protocol documents and in the reference reports supporting the annual submission. The ERT recommends that the Netherlands include a description of the QA/QC measures and data flows in the LULUCF sector in the overview section and in the sectoral chapter of the NIR of its next annual submission as these differ from those of the other sectors.

2. Non-key categories

N_2O emissions from disturbance associated with land-use conversion to cropland – N_2O

127. N_2O emissions from disturbance associated with land-use conversion to cropland are currently reported as "NE". The tier 1 methodology for estimating N_2O emissions from this category is dependent on the availability of estimates of CO_2 emissions from soils. The ERT has recommended that the Netherlands calculate estimates of CO_2 emissions from soils associated with land-use changes (see paras. 122 and 123 above); taking into account that these estimates will be available, the ERT recommends that the Netherlands also calculate estimates of N_2O emissions from disturbance associated with land-use conversion to cropland in its next annual submission.

Biomass burning – CO_2, CH_4 and N_2O

128. In the 2011 submission, there is very little information on biomass burning in the Netherlands. During the review, the Netherlands explained to the ERT that there is legislation preventing controlled burning. The ERT recommends that the Netherlands include information in its next annual submission on the legislation that prevents controlled burning.

129. For biomass burning, data on wildfires until 1996 exists, and these data were presented to the ERT during the review week. Data show that, while only occurring at a low level, wildfires do occur in the Netherlands. No estimates of emissions from wildfires are included in the CRF tables for the complete time-series; instead, the notation keys "NE", and "NO" are used to report emissions from wildfires. The ERT recommends that the Netherlands report emissions from wildfires in CRF table 5(V) in its next annual submission for the complete time-series.

3. Areas for further improvement

Identified by the Party

130. No planned improvements are listed in the NIR although, during the review, the Netherlands informed the ERT that the production of a new land-use map as at 1 January 2009 is under way. This will be used to update the AD used for this sector for the 2012 submission.

Identified by the expert review team

131. ERT identifies the following areas for improvement:

(a) Improve the completeness of the LULUCF sector reporting by:

(i) Estimating the carbon stock changes in the living biomass and dead organic matter pools associated with land-use changes to and from cropland and grassland;

(ii) Estimating the carbon stock changes in mineral soils associated with land-use changes;

(iii) Estimating the carbon stock changes in organic soils associated with land-use changes;

(iv) Estimating the N_2O emissions from disturbance associated with land-use conversion to cropland;

(v) Estimating the emissions from biomass burning.

(b) Increasing the transparency of the reporting on the sector by including a land-use change matrix in the NIR.

F. Waste

1. Sector overview

132. In 2009, emissions from the waste sector amounted to 5,342.03 Gg CO_2 eq, or 2.7 per cent of total GHG emissions. Since the base year, emissions have decreased by 58.2 per cent. The key drivers for the fall in emissions are the decreases in the amount of waste disposed and the organic fraction in the waste sent to landfills, and the increase in the amount of CH_4 recovered as a result of the implementation of the national waste management policies. Within the sector, 86.8 per cent of the emissions were from solid waste disposal on land, followed by 12.1 per cent from wastewater handling and 1.1 per cent from other (compost production). The inventory data in the waste sector cover all categories and gases and are reported for the entire time series (1990–2009). However, the ERT noted that sectoral emissions were underestimated as the Netherlands did not report estimates of N_2O emissions from septic tanks (see para. 139 below). Information on the methods, AD, EFs and assumptions used provided in the NIR and during the review was sufficiently complete to allow the ERT to understand how the emissions were calculated. However, the ERT noted that the approach used to fill the data gaps in the historical amount of waste landfilled was not satisfactorily explained either in the NIR or during the review week (see para. 137 below).

133. No recalculations have been reported for the waste sector, and those performed for emissions from waste incineration are reported in the energy sector as in the Netherlands the waste is incinerated for energy purposes.

134. Since the publication of *Estimate of annual and trend uncertainty for Dutch sources of greenhouse gas emissions using the IPCC tier 1 approach* (Olivier et al., 2009),[8] the Netherlands has started using the uncertainty values contained therein for its uncertainty analysis. The uncertainty data were not updated to reflect the changes in data quality in recent years. During the review, the Netherlands was not able to explain how the uncertainty data based on expert judgement were derived. The ERT recommends that the Netherlands include, in its next annual submission, documentation on the expert judgement used in the uncertainty analysis of the waste sector. Moreover, the ERT identified that the uncertainties associated with the emission estimates are relatively high (for e.g. the uncertainty in annual CH_4 emissions from solid waste disposal on land was 35 per cent) and that the Netherlands has not identified an improvement plan to reduce the uncertainty. The ERT also noted that this high uncertainty is in spite of the Netherlands's increasing use of higher-tier methodologies, which should reduce the uncertainty. This suggests that the Netherlands does not use the uncertainty estimate to identify improvement priorities in the waste sector. The ERT recommends that the Netherlands use the uncertainty data to identify sectoral improvement priorities.

135. In the NIR and during the discussions that took place during the review, references and documentation were provided on the QA/QC activities implemented in the waste sector. All relevant recommendations from the previous review report concerning the waste sector have been addressed.

[8] Olivier, J.G.J., L.J. Brandes, R.A.B. te Molder, 2009: Estimate of annual and trend uncertainty for Dutch sources of greenhouse gas emissions using the IPCC tier 1 approach. PBL Report 500080013, PBL, Bilthoven.

2. Key categories

Solid waste disposal on land – CH_4

136. The Netherlands applied the first order decay (FOD) model from the IPCC good practice guidance to estimate CH_4 emissions from landfills. The ERT found the use of this method appropriate as this category is a key category. The information documented in the spreadsheets on the implementation of the method and the explanations provided during the review week suggest that the method was mostly properly applied. The input data used in the model were included in the NIR and additional data and assumptions used were provided during the review week. The Netherlands also explained how surveys were conducted to collect information on the amount of waste and its composition.

137. Through these surveys, reliable data were collected for the period 1990–2009. However, from 1945 to 1989, the Netherlands has incomplete data. During the review week, the Netherlands provided annual data on the amount of waste sent to landfills. However, the Netherlands was not able to provide information on the methods and assumptions used to fill the data gaps in the historical amount of waste landfilled as requested by the ERT. Inventory experts from the Netherlands indicated that they were not responsible for the generation of these data. During the review week, the inventory experts provided copies of e-mail exchanges, which showed some attempts to understand how the data were derived. The ERT identified that the omission of this information is not in line with the transparency principle of the IPCC good practice guidance and constitutes a failure to provide justifications and explanations for the data used.

138. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided additional documentation on the data used for the FOD method and described the interpolation/extrapolation approach applied to derive the historical data on the amount of waste sent to landfills. Actual values on degradable organic carbon (DOC) exist in the Netherlands from 1989 onwards and the Netherlands used the 1989 value for the years 1945–1989. The Netherlands also provided information demonstrating that all landfills have been managed and justified the use of the IPCC default value 1 for the methane correction factor and 10 per cent for the oxidation factor. The fraction of DOC dissimilated and the decay rate constant (k) values were based on national studies provided during the review. The ERT agreed that this information explained the data used. The ERT recommends that the Netherlands include this information in its next annual submission. In addition, the ERT encourages the Netherlands to analyse the possibility of applying the interpolation/extrapolation approach based on drivers such as population and gross domestic product as this probably will improve the quality of the historical missing data.

Wastewater handling – N_2O

139. The Netherlands has reported emissions from industrial, and domestic and commercial wastewater handling systems including direct emissions from biological N removal processes in wastewater treatment plants, and indirect emissions from effluents discharged to surface waters. The Netherlands uses plant-specific data on removed N loads and N content in discharged effluents together with the IPCC default EF. However, the Netherlands has reported in the NIR that N_2O emissions from sewage sludge in septic tanks were considered negligible. During the review week, the Netherlands was not able to confirm that these emissions were accounted for in the inventory. In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided estimates for N_2O emissions from septic tanks, using the method and EFs contained in the Revised 1996 IPCC Guidelines, protein consumption data from the Food and Agriculture Organization of the United Nations and population data from national

statistics. The resulting emission estimates were 16.25 Gg CO_2 eq for 1990 (representing an increase of 2.2 per cent of total emissions in the category compared to the original submission), 3.39 Gg CO_2 eq for 2008 (representing an increase of 0.5 per cent) and 3.17 Gg CO_2 eq for 2009 (representing an increase of 0.5 per cent). The ERT agreed with these estimates. The ERT recommends that the Netherlands include N_2O emissions from septic tanks in its future annual submissions together with the background data used, in order to improve completeness and transparency of the inventory.

3. Non-key categories

Wastewater handling – CH_4

140. The Netherlands has estimated and reported CH_4 emissions from wastewater treatment plants (industrial, and domestic and commercial wastewater) and septic tanks. The DOC values were derived from the measured chemical oxygen demand of wastewater and the EFs used were a combination of country-specific values and IPCC default data (e.g. the CH_4 conversion factor for septic tanks was taken from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*). Documentation is provided in the NIR on the country-specific data used.

Other – CH_4 and N_2O

141. The ERT noted the inclusion in the inventory of CH_4 and N_2O emissions from composting of organic household waste. The AD on the amount of composted waste were collected through annual surveys at industrial composting sites. The Netherlands indicated that the time series of the AD will be included in the NIR of its next annual submission following the encouragement of the ERT from the previous review report. The country-specific EFs used were provided to the ERT during the review. The ERT recommends the Netherlands to include the EFs and AD used for the estimates of this category in its next annual submission.

4. Areas for further improvement

Identified by the Party

142. The Netherlands reported no planned improvements for the waste sector in the NIR. From the discussions that took place during the review on why there are no planned improvements to reduce the uncertainty even though the uncertainties associated with the emission estimates are relatively high (e.g. the uncertainty in CH_4 emissions from landfills was 35 per cent), inventory experts from the Netherlands indicated that a major source of uncertainty could be the DOC. The experts justified this by the fact that the waste composition data in the Netherlands are collected according to the European Waste Catalogue and that matching these data in accordance with the IPCC classification was a source of the uncertainties. They indicated that this will be considered as an area for improvement, although they did not provide details about when this improvement will be implemented.

Identified by the expert review team

143. The following areas for further improvement were identified by the ERT:

(a) The improvement of the transparency of reporting on the methods and assumptions used to generate the missing historical data on the amount of waste sent to landfills;

(b) The reduction of the uncertainties in the waste sector and use of the uncertainty analysis results to identify sectoral improvement priorities;

(c) The inclusion of the EFs and AD used for the estimates of emissions from compost production.

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

144. The Netherlands has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol for the years 2008 and 2009. These are generally in line with the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1 with the exception being under-reporting of emissions/removals from the clearance of land prior to afforestation or growth of biomass on the land following deforestation (see para. 147 below). The Netherlands has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol.

145. The Netherlands has complete and spatially explicit land-use mapping that allows for geographical stratification at 25 m x 25 m (0.0625 ha) pixel resolution with maps dated 1 January 1990 and 1 January 2004. This corresponds to the wall-to-wall approach used for reporting under the Convention (approach 3 in chapter 2 of the IPCC good practice guidance for LULUCF) and is described as reporting method 2 in chapter 4 of the IPCC good practice guidance for LULUCF. Each individual pixel clearly shows whether it is part of a patch that complies with the forest definition or not. An overlay was made between those two maps resulting in a land-use change matrix between January 1990 and January 2004. Mean annual rates of change for all land-use transitions were calculated by linear interpolation for the period 1990–2004 and by extrapolation after 2004 onwards. The values based on extrapolation after 1 January 2004 will be subject to recalculation when a new land-use map is created. The map as at 1 January 2009 is expected to be completed for the 2012 submission.

146. The Netherlands informed the ERT during the review that there are plans to produce new land-use maps for 1 January 2009 and 1 January 2013. These maps will be very important for reporting under Article 3, paragraph 3, of the Kyoto Protocol. The ERT noted that if these improvements are not completed on time, the Netherlands will not meet the requirements outlined in decision 15/CMP.1 for the final report of the commitment period. The ERT recommends that the Netherlands continue to support this work in order to ensure that it is completed in a timely manner.

147. The Netherlands has reported the carbon stock changes in the litter and dead wood pools with afforestation as “NE”, the losses in above-ground and below-ground biomass as “NO” for afforestation and reforestation activities, and the changes in the litter and dead wood pools associated with the deforestation of “forests according to definitions” (FAD) (i.e. forests that meet the values selected for the definition of forests under the Kyoto Protocol) converted to “trees outside forests” (TOF) (i.e. areas of trees that fall outside of the definition of forests) as “NE”. The Netherlands has also reported as “NO” the gains in above-ground and below-ground biomass for all deforestation, except FAD converted to TOF, and the losses in above-ground and below-ground biomass for FAD converted to TOF. The ERT noted that, while the Netherlands did provide additional information in its protocols which demonstrated that the litter and dead wood are not accumulating in land converted to FAD (afforestation and reforestation activities), it did not provide sufficient

verifiable information demonstrating that the above-ground and below-ground biomass pools were not net sources of emissions. When a land use is changed, the biomass of the previous land use is removed, resulting in emissions and, following a change in land use, there is an accumulation of biomass (removals). IPCC tier 1 methodologies for the estimation of these changes are provided in the IPCC good practice guidance for LULUCF. The ERT recommends that the Netherlands include estimates of the carbon stock changes for the above-ground and below-ground biomass pools with land-use changes in future annual submissions.

148. Both "NE" and "NO" are used to report controlled burning in the CRF tables. During the review, the Netherlands informed the ERT that there is national legislation preventing controlled burning. The ERT recommends that the Netherlands include information in its next annual submission on the legislation that prevents controlled burning and make consistent the notation keys used in the CRF tables and NIR tables.

149. For biomass burning, wildfire data exist until 1996. These data were presented to the ERT during the review week. This shows that, while only occurring at a low level, wildfires do occur in the Netherlands. However, no estimates of emissions from wildfires are included in the CRF tables; instead, the notation key "NE" is used. If wildfires only result in the temporary unstocking of forest land, then the emissions and subsequent removals need not be reported (IPCC good practice guidance for LULUCF sections 4.2.5.1 and 4.2.6.1), but this should be transparently documented and reported in the annual submission. The ERT recommends that the Netherlands report emissions from wildfires or transparently explain how they have been treated in accordance with paragraph 5 of the annex to decision 16/CMP.1.

150. Some minor errors have been identified by the ERT in the NIR tables for KP-LULUCF activities. In table 1 of the NIR, emissions from litter, dead wood and soils are incorrectly reported as "not reported", and in table 3 of the NIR, the key category information has not been completed. The ERT recommends that the Netherlands improve its QC procedures regarding the completion of these information tables.

151. The Netherlands has performed recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to recommendations of the 2010 annual review report, in order to include estimates for the carbon stock changes in mineral and organic soils. Some of the key references for these recalculations are still to be published and the protocol which provides more detail on these changes is not referenced in the NIR. The ERT welcomes the improvement to include the estimation of emissions associated with the carbon stock changes in soils, which increases the completeness of the reporting under Article 3, paragraph 3, of the Kyoto Protocol, and recommends that the Netherlands improve its referencing of this section and to continue to support the publication of key documents containing the methodologies used for the estimates.

152. The recalculations for 2008 of the carbon stock changes in mineral soils resulted in a decrease in emissions from afforestation and reforestation of 8.77 Gg CO_2 (1.6 per cent) and a decrease in emissions from deforestation of 1.20 Gg CO_2 (0.2 per cent). During the review, the Netherlands explained why both changes resulted in removals. An explanation for the recalculations in carbon stock change in afforestation and reforestation is included in the NIR but the explanation for the effect on deforestation is not. The ERT recommends that the Netherlands increase the transparency of the reporting on recalculations and include a discussion on the trend for deforestation resulting in removals in the NIR.

153. Other recalculations between the 2010 and 2011 submissions include corrections to harvest values and the build-up of dead wood. The overall impact of all the recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) Emissions from afforestation and reforestation have increased by 62.07 Gg CO_2 eq or 11.4 per cent;

(b) Emissions from deforestation have increased by 41.12 Gg CO_2 eq or 5.3 per cent.

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

Afforestation and reforestation

154. No problems have been identified for afforestation and reforestation.

Deforestation – CO_2

155. With regard to the deforestation of FAD to TOF, the Netherlands has reported no carbon stock changes in the dead wood and litter pools. This is inconsistent with other reporting of land-use changes related to deforestation under the Convention and with the discussion in the protocols supporting the NIR, which state: "…it is assumed that, with deforestation, all carbon stored in above-ground and below-ground biomass, as well as in dead wood and litter, is lost to the atmosphere." The ERT recommends that the Netherlands review the calculation of the carbon stock changes in the dead wood and litter pools with deforestation of FAD to TOF.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

156. The Netherlands has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.[9] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

157. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88(a–j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

National registry

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

[9] The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

159. The Netherlands has reported its commitment period reserve in its 2011 annual submission. The Netherlands reported that its commitment period reserve has not changed since the initial report review (901,135,927 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

160. The Netherlands reported that there have been changes to its national system since the previous annual submission. On 1 January 2010 the organization with primary responsibility for the preparation of the inventory changed from the Netherlands Environmental Assessment Agency (PBL) to the National Institute for Public Health and the Environment (RIVM). In addition, the name of the single national entity changed from SenterNovem to NL Agency. The ERT concluded that, taking into account the confirmed changes, 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

161. The Netherlands reported that there have been changes to its national registry since the previous annual submission. The software version was updated and changes were made to security and data integrity. The ERT concluded that, taking into account the confirmed changes, the Party'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 CMP decisions.

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

162. The Netherlands reported that there have been changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission discussed below. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided continues to be complete and transparent.

163. The Netherlands has adopted policies and measures focusing on activities at the national, European and international levels. As most of the impacts on other countries are indirect, they cannot, therefore, be attributed to a specific national policy. Where possible, the economic, social and environmental effects of these policies in developing countries are taken into account.

164. The Netherlands is participating in a number of specific actions to minimize adverse impacts, including on: CO_2 capture and storage project in China, where the knowledge gained will be made publicly accessible; ensuring biofuel used in transport is sustainably produced and this has to be demonstrated; international negotiations under the Convention, where the Netherlands has focused strongly on finance, specifically the transparency of fast-start financing; and assisting developing country Parties in the promotion of renewable energy and renewable energy policies.

III. Conclusions and recommendations

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

166. The ERT concludes that in general the inventory submission of the Netherlands has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory is generally complete in terms of source and sink categories except for the LULUCF sector, where the only emissions/removals estimated are those associated with land conversion to and from forest land and emissions from lime application. In addition, wildfires are reported as "NE", which is not in accordance with the UNFCCC reporting guidelines as wildfires do occur in the Netherlands. During the review week, the ERT identified that CO_2, CH_4 and N_2O emissions for the use of compressed natural gas in road transportation; CO_2 emissions from natural gas pipeline transmission; and N_2O emissions from septic tanks were reported as NO. Also estimates of fugitive emissions from solid fuels did not include CH_4 emissions form charcoal production; and other sectors did not include CO_2, CH_4 and N_2O emissions from the use of charcoal. The ERT considered that these emissions are likely to occur in the country and recommended that the Netherlands revise its assumptions and report emissions from these categories. In response to the list of potential problems and further questions raised by the ERT, the Netherlands provided revised estimates for these categories. The ERT agreed with these estimates.

167. 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.

168. The Netherlands's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The following sectors were not in accordance with the guidance: CO_2, CH_4 and N_2O emissions from both the energy and industrial processes categories did not match the data supplied by the Netherlands; CO_2, CH_4 and N_2O emissions from civil aviation were, for all years, based on AD data from 2000; CO_2 from lime production was based on potentially incomplete AD; CO_2 estimates from iron and steel production (consumption of electrodes) were not correctly included; CO_2 from aluminium production used the wrong EF; CH_4 from enteric fermentation, horses used faulty AD; CH_4 from manure management, Horses used faulty AD; and CH_4 from solid waste disposal on land where the historic EF data could not be explained. In response to the list of potential problems the Party submitted revised estimates for all these categories. The ERT agreed with these estimates.

169. The Netherlands has made recalculations for the inventory between the 2010 and 2011 submissions following changes in AD and EFs and in order to rectify identified errors. These recalculation lead to decreases in the total GHG emissions without LULUCF of 0.07 per cent in 1900 and 1.12 per cent in 2008 and decreases in total GHG emissions including LULUCF of 0.03 per cent in 1990 and 1.0 per cent in 2008.The main recalculations took place in the following categories:

(a) N_2O emissions from agricultural soils;

(b) CO_2 emissions from other sectors;

(c) Fugitive CO_2 emissions from solid fuels;

(d) CO_2 emissions from metal production.

170. The Netherlands has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol for the years 2008 and 2009. These are generally in line with the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1 with the exception being under-reporting of emissions/removals from the clearance of land prior to afforestation or growth of biomass on the land following deforestation (see para. 147 above).

171. The Netherlands has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions following changes in EFs and in order to rectify identified errors, amounting to 103.19 Gg CO_2 eq or 44.1 per cent of the total emissions for activities under Article 3, paragraph 3, of the Kyoto Protocol in 2008. The impact of these recalculations on each KP-LULUCF activity is as follows:

(a) An increase of 62.07 Gg CO_2 eq (11.4 per cent) for afforestation and reforestation;

(b) An increase of 41.12 Gg CO_2 eq (5.3 per cent) for deforestation.

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

173. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified the implementation of the QA/QC plan and the operation of the archive as areas that need to be further addressed by the Netherlands.

174. 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.

175. The Netherlands has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The information is complete and transparent.

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

(a) The enhanced implementation of the QA/QC management system, especially with regard to ensuring consistency between the CRF tables and the NIR (see para. 24 above);

(b) Ensuring the correct operation of the archiving system (see paras. 24, 39 and 79 above);

(c) The provision of more precise and up-to-date descriptions of the methodologies used by the Netherlands that differ from those of the IPCC, in both the NIR and/or the associated protocols (see paras. 32 and 36 above);

(d) The improvement of transparency by including in the NIR a land-use change matrix; a complete the description of the QA/QC measures and data flows in the LULUCF sector; brief explanations of anomalous data and information; complete explanations of data sources; sufficient detailed information to allow for a full understanding of the recalculations performed;

(e) The provision of quantified uncertainty estimates that relate to the methodologies used in the inventory (see para. 29 above);

(f) Explore ways to allow the reporting of sufficient data to the inventory experts in order to ensure adequate QC, while maintaining the confidentiality of confidential plant data in the PRTR.

177. In the course of the review, the ERT formulated a number of recommendations relating to the completeness, transparency and comparability of the annual submission, particularly in the LULUCF sector. The key recommendations are that the Netherlands:

(a) Improve the completeness of the LULUCF sector reporting by:

(i) Estimating the carbon stock changes in the living biomass and dead organic matter pools associated with land-use changes to and from cropland and grassland;

(ii) Estimating the carbon stock changes in mineral soils associated with land-use changes;

(iii) Estimating the carbon stock changes in organic soils associated with land-use changes;

(iv) Estimating the N_2O emissions from disturbance associated with land-use conversion to cropland;

(v) Estimating the emissions from biomass burning.

(b) Include the apparent consumption of fuels excluding feedstocks and non-energy use in CRF table;

(c) Ensure the combustion-related emissions from coke production in iron and steel plants are correctly allocated to manufacture of solid fuels and other energy industries;

(d) Correctly estimate emissions from all ODS substitutes (HFCs, PFCs and SF_6 from aerosols and metered dose inhalers; solvent uses; foam; stationary refrigeration; mobile air conditioning; fire protection; and other applications.) If a tier 1 method is required then the IPCC tier 1 method should be correctly implemented;

(e) Increase the transparency of the reporting on the LULUCF sector by including a land-use matrix in the NIR.

IV. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

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

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B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Isabel van den Wijngaert and Mr. Jan Peter Lesschen (Alterra Wageningen UR), Mr. Klaas van der Hoek (National Institute for Public Health and the Environment) and Mr. Harry Vreuls and Mr. Peter Zijlema (NL Agency), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by the Netherlands:

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[1] Reproduced as received from the Party.

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Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
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
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
NA	not applicable
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
Tg	teragram (1 Tg = 1 million tonnes)
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change