



**Report of the individual review of the annual submission of the Netherlands  
submitted in 2010**

**Note by the secretariat**

The report of the individual review of the annual submission of the Netherlands submitted in 2010 was published on 20 May 2011. 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/2010/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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\* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

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## I. Introduction and summary

### A. Overview

1. This report covers the centralized review of the 2010 annual submission of the Netherlands, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 6 to 11 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Suvi Monni (Finland) and Mr. Dennis Rudov (Belarus); energy – Mr. Benon Yassin (Malawi), Mr. Takeshi Enoki (Japan), Mr. Jongikhaya Witi (South Africa) and Mr. Alexander Zahar (Australia); industrial processes – Ms. Alice Au (Canada), Ms. Laura Dawidowski (Argentina) and Ms. Natalya Parasyuk (Ukraine); agriculture – Ms. Yauheniya Bertosh (Belarus) and Mr. Donald Kamdonyo (Malawi); land use, land-use change and forestry (LULUCF) – Mr. Vladimir Korotkov (Russian Federation) and Ms. Naoko Tsukada (Japan); and waste – Ms. Mayra Rocha (Brazil) and Mr. Kai Skoglund (Finland). Ms. Monni and Mr. Witi were the lead reviewers. The review was coordinated by Mr. Javier Hanna and Ms. Inkar Kadyrzhanova (UNFCCC secretariat).

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

### B. Emission profiles and trends

3. In 2008, the main greenhouse gas (GHG) in the Netherlands was carbon dioxide (CO<sub>2</sub>), accounting for 84.9 per cent of total GHG emissions<sup>1</sup> expressed in carbon dioxide equivalent (CO<sub>2</sub> eq), followed by methane (CH<sub>4</sub>) (8.3 per cent) and nitrous oxide (N<sub>2</sub>O) (5.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 1.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 83.2 per cent of total GHG emissions, followed by the agriculture sector (8.9 per cent), the industrial processes sector (5.1 per cent), the waste sector (2.7 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 206,916.56 Gg CO<sub>2</sub> eq and decreased by 2.4 per cent between the base year<sup>2</sup> and 2008.

4. Table 1 shows GHG emissions from Annex A sources, and emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP-LULUCF), by gas. Table 2 shows GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and from KP-LULUCF activities, by sector and by activity. In table 1 CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector, and also do not include the emissions from deforestation that were included in the initial report of the Netherlands under the Kyoto Protocol for 1990 and subsequently used for the calculation of the assigned amount.

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

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

Table 1  
**Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2008<sup>a</sup>**

	Greenhouse gas	Gg CO <sub>2</sub> eq								Change		
		Base year	1990	1995	2000	2005	2006	2007	2008	Base year–2008 (%)		
Annex A sources	CO <sub>2</sub>	159 320.85	159 320.85	170 604.45	169 721.56	175 782.25	172 504.84	172 257.07	175 685.10	10.3		
	CH <sub>4</sub>	25 548.56	25 548.56	24 145.82	19 775.58	17 233.92	16 837.24	16 848.27	17 078.02	-33.2		
	N <sub>2</sub> O	20 223.77	20 223.77	21 540.91	19 285.30	17 312.00	17 142.50	15 418.90	11 755.11	-41.9		
	HFCs	6 017.94	4 432.03	6 017.94	3 891.00	1 513.60	1 728.13	1 844.93	1 923.26	-56.6		
	PFCs	1 937.81	2 264.48	1 937.81	1 581.54	266.20	256.54	323.15	251.07	-88.9		
	SF <sub>6</sub>	301.26	217.32	301.26	317.89	254.39	216.61	226.00	223.99	3.1		
KP-LULUCF	Article 3.3 <sup>b</sup>	CO <sub>2</sub>								-546.68		
		CH <sub>4</sub>								NA		
		N <sub>2</sub> O									NA	
	Article 3.4 <sup>c</sup>	CO <sub>2</sub>	NA								NA	NA
		CH <sub>4</sub>	NA								NA	NA
		N <sub>2</sub> O	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.

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

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

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

Table 2

Greenhouse gas emissions by sector and activity, base year to 2008<sup>a</sup>

	Sector	Gg CO <sub>2</sub> eq								Change
		Base year <sup>a</sup>	1990	1995	2000	2005	2006	2007	2008	Base year– 2008 (%)
Annex A	Energy	154 033.61	154 033.61	165 756.79	164 709.43	171 180.50	167 879.51	167 783.47	172 061.70	11.7
	Industrial processes	23 533.43	22 190.24	23 555.06	20 282.68	15 670.86	15 785.11	14 660.01	10 480.76	–52.8
	Solvent and other product use	541.19	541.19	439.85	306.94	212.99	212.21	205.14	203.72	–62.4
	Agriculture	22 474.31	22 474.31	23 504.50	20 393.94	18 482.60	18 395.95	18 254.68	18 515.56	–17.6
	Waste	12 767.65	12 767.65	11 291.99	8 879.89	6 815.40	6 413.07	6 015.02	5 654.81	–55.7
	Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
	LULUCF	NA	2 597.10	2 329.63	2 511.52	2 379.79	2 400.38	2 537.23	2 446.75	NA
	<b>Total (with LULUCF)</b>	<b>NA</b>	<b>214 604.11</b>	<b>226 877.82</b>	<b>217 084.40</b>	<b>214 742.15</b>	<b>211 086.23</b>	<b>209 455.55</b>	<b>209 363.30</b>	<b>NA</b>
	<b>Total (without LULUCF)</b>	<b>213 350.19</b>	<b>212 007.01</b>	<b>224 548.20</b>	<b>214 572.88</b>	<b>212 362.36</b>	<b>208 685.85</b>	<b>206 918.33</b>	<b>206 916.56</b>	<b>–2.4</b>
KP-LULUCF	Article 3.3 <sup>b</sup>									
	Afforestation & reforestation								–546.68	
	Deforestation								780.45	
	<b>Total (3.3)</b>								<b>233.77</b>	
	Article 3.4 <sup>c</sup>									
	Forest management								NA	
	Cropland management	NA							NA	NA
Grazing land management	NA							NA	NA	
Revegetation	NA							NA	NA	
	<b>Total (3.4)</b>	<b>NA</b>							<b>NA</b>	<b>NA</b>

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

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

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

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

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

Table 3

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

	<i>As reported</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>	<i>Accounting quantity<sup>c</sup></i>
<b>Commitment period reserve</b>	901 135 927		901 135 927	
<b>Annex A emissions for current inventory year</b>				
CO <sub>2</sub>	175 685 073		175 685 098	
CH <sub>4</sub>	17 072 307		17 078 023	
N <sub>2</sub> O	11 755 115		11 755 115	
HFCs	1 923 260		1 923 260	
PFCs	251 071		251 071	
SF <sub>6</sub>	223 991		223 991	
<b>Total Annex A sources</b>	<b>206 910 815</b>		<b>206 916 556</b>	
<b>Activities under Article 3, paragraph 3, for current inventory year</b>				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-546 677		-546 677	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA		NA	
3.3 Deforestation for current year of commitment period as reported	780 449		780 449	
<b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>				
3.4 Forest management for current year of commitment period				
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

*Abbreviation:* NA = not applicable.

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

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



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

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

## II. Technical assessment of the annual submission

### A. Overview

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

6. The 2010 annual inventory submission was submitted on 14 April 2010; it contains a complete set of common reporting format (CRF) tables for the period 1990–2008. The Netherlands submitted a national inventory report (NIR) on 15 April 2010 and resubmitted it on 7 May 2010. The Netherlands also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol; accounting of Kyoto Protocol units; changes in the national system and in the national registry; and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 14 April 2010 and resubmitted on 28 April 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The Netherlands officially submitted revised emission estimates on 14 October 2010 in response to questions raised by the expert review team (ERT) during the course of the centralized review. The Party submitted revised information on 21 October 2010 on KP-LULUCF in response to questions raised by the ERT during the review. The additional information related to the KP-LULUCF was resubmitted on 11 November 2010 (see para. 116 below). The values in this report are based on the submission of 14 October 2010.

8. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.<sup>3</sup> Where necessary, the ERT also used the 2009 annual submission during the review.

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

#### Completeness of inventory

10. The 2010 annual submission is generally complete in terms of categories and is complete in terms of gases, geographical coverage, years and sectors. The Netherlands reported fugitive emissions of CO<sub>2</sub> and CH<sub>4</sub> from transport (oil) in the energy sector as not estimated (“NE”). In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided the missing emission estimates (see paras. 58–59 below). The ERT recommends that the Netherlands include these

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

emission estimates and report on methods, activity data (AD) and emission factors (EFs) used in its next annual submission. The Netherlands also reported CH<sub>4</sub> emissions from sludge in industrial wastewater handling as “NE”. In response to a question raised by the ERT during the review, the Party provided additional information justifying the use of “NE”. However, the ERT considers that the correct notation key would be included elsewhere (“IE”). (see para. 109 below).

11. The Netherlands reported in annex 5 of the NIR that CH<sub>4</sub> and N<sub>2</sub>O emissions from charcoal combustion and CH<sub>4</sub> emissions from charcoal production for barbecuing are not included in the energy sector due to lack of AD. The ERT notes that methods and EFs for this category are available in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and strongly recommends that the Party include the emission estimates in its next annual submission (see para. 56 below).

12. The Netherlands reported CO<sub>2</sub> emissions from asphalt roofing and road paving with asphalt in the industrial processes sector (see para. 61 below) and N<sub>2</sub>O emissions from industrial wastewater in the waste sector as “NE”. The ERT notes that the methodologies to estimate these emissions are not available in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) or the Revised 1996 IPCC Guidelines. The ERT encourages the Netherlands to make efforts to estimate the emissions for those categories currently reported as “NE” and report these emission estimates in its next annual submission. Several categories for which methodologies and EFs are available in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) are also reported as “NE”. The ERT recommends that the Party report emissions and removals from those categories in its next annual submission (see para. 95 below).

13. The Netherlands used the monitoring protocols (documents which are available at <<http://www.greenhousegases.nl>>) to describe methods, EFs and AD sources. The ERT noted that, due to the use of monitoring protocols, information on some important reporting elements (e.g. updated uncertainty estimates) and some methodological descriptions and information on AD and EFs (e.g. country-specific EFs in the agriculture sector) is not presented in the NIR.

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

### Overview

14. The ERT concluded that the national system continued to perform its required functions. The Netherlands described in its NIR the changes to the national system since the previous annual submission. These changes are discussed in chapter II.G of this report. The main responsibility for inventory preparation 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 the SenterNovem to the NL Agency.

### Inventory planning

15. The NIR described the national system for the preparation of the inventory. Since 1 January 2010 the RIVM has taken overall responsibility for the national inventory from the PBL. The NIR mainly referred to the current institutional arrangements, but the ERT noted

that some parts of the NIR still referred to the earlier institutional arrangements (e.g. in the section on institutional arrangements on pages 15–16 of the NIR, including figure ES.2 on the inventory process, where the RIVM is not mentioned). The ERT recommends that the Netherlands update the relevant chapters in the NIR of its next annual submission.

16. The Netherlands pollutant release and transfer register (PRTR) encompasses data collection processes, data processing, registering and reporting of emission data for some 350 compounds and compound groups that are present in air, water and soil, including GHGs. In addition to the RIVM, various external agencies contribute to the PRTR by performing calculations or submitting AD, including Statistics Netherlands, PBL, Netherlands Organisation for Applied Scientific Research (TNO), NL Agency, Centre for Water Management, Deltares and several institutes related to the Wageningen University and Research Centre (WUR).

17. The provision of relevant statistical data, for example, by Statistics Netherlands, is guaranteed through covenants, and one of the related orders in decree is currently under preparation. The relevant agreements for the provision of AD between the NL Agency, Ministry of Agriculture, Nature and Food Quality (LNV) and related institutions were established in 2005. A large number of companies have a legal obligation to submit annual environmental reports, which are used in the inventory compilation. Emissions data in the annual environmental reports are validated by the competent authorities. The PBL, TNO and other institutes and consultants are contracted by the NL Agency to collect information for the inventory.

18. WUR's Forest and Nature Conservation Policy Group is responsible for the inventory preparation of the LULUCF sector, including the KP-LULUCF activities. The project team responsible for the LULUCF sector oversees data management, the preparation of the reports on the LULUCF activities and the implementation of the quality assurance/quality control (QA/QC) procedures. The project team also decides on further improvements in the inventory of the LULUCF sector.

### Inventory preparation

#### *Key categories*

19. The Netherlands reported in the NIR that it used the tier 1 and tier 2 approaches for its key category analysis, both level and trend assessments, as part of its 2010 annual submission. The key category analysis performed by the Netherlands and that performed by the secretariat<sup>4</sup> produced different results due to differences in the level of disaggregation of categories. In response to a question raised by the ERT during the review, the Netherlands explained that the disaggregation is based on table 7.1 of the IPCC good practice guidance, except for some very small categories that were aggregated. The Party also confirmed that all the categories are included in the key category analysis. The ERT recommends that the Netherlands include, in the NIR, the explanation for this level of disaggregation and include an additional row with a sum of all the categories in the table on the key category analysis that is presented in the NIR in order to improve the transparency of its next annual submission.

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

20. The Netherlands 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. The results of the key category analysis are presented in annex I to the NIR and in CRF table 7. However, the ERT noted that there is no separation between the key categories identified with and without LULUCF in CRF table 7. In addition, the comments provided in CRF table 7 are not entirely clear and consistent with the information provided in annex I to the NIR. Furthermore, CRF table 7 lists all the categories instead of only key ones. The ERT recommends that the Netherlands fill in CRF table 7 correctly and ensure consistency between the NIR and CRF table 7 to improve the transparency of its next annual submission.

21. As noted in the previous review report, it was not clear from the NIR whether the key category analysis was used to prioritize inventory improvements. In response to a question raised by the ERT during the review, the Netherlands informed the ERT that the key category analysis had been used to prioritize the improvements in the inventory improvement plan at the time of establishment of the national system. Since then, the key category analysis has been used to plan for specific methodological improvements. The ERT encourages the Netherlands to include this information in its next annual submission.

22. Under the Convention, land converted to forest land and forest land converted to grassland are identified as key categories. Consequently, the Netherlands identified afforestation and reforestation, and deforestation as key categories under Article 3, paragraph 3, under the Kyoto Protocol.

#### *Uncertainties*

23. The Netherlands reported in the NIR a tier 1 uncertainty analysis in addition to a tier 2 uncertainty analysis that was carried out in 2006. During the review, the ERT identified an error in the combination of category-level uncertainties. In response to a question raised by the ERT during the review, the Netherlands provided a revised uncertainty estimate of the level (4.2 per cent) and trend (3.2 per cent) for 2008. The ERT recommends that the Netherlands report a corrected uncertainty analysis in its next annual submission.

24. According to chapter 10 of the NIR, the improvements made to the uncertainty estimates were based on a study by Ecofys.<sup>5</sup> However, the information on updated uncertainty estimates is not reflected in chapter 1.7 of the NIR, which refers to a study of Olivier et al.,<sup>6</sup> and therefore it is not clear whether the results of the Ecofys study were actually used in the uncertainty analysis presented in the NIR. Furthermore, at the category level, the updated uncertainty estimates were only reported in the monitoring protocols and not in the NIR. The Netherlands also reported in the NIR that it planned to fully implement the recommendations of the Ecofys study in the next annual submission. The ERT commends the Netherlands for its efforts to improve uncertainty estimates and recommends that the Netherlands report on the improved estimates consistently in different parts of the NIR in its next annual submission. The ERT also encourages the Netherlands to extend the section in the NIR on the qualitative discussion on uncertainties for the key categories, which currently only presents quantitative information.

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<sup>5</sup> Ecofys, 2010 (in preparation) *Assessment of uncertainties and QA/QC procedures in the Dutch*. GHG Inventory Report, Utrecht.

<sup>6</sup> Olivier, J.G.J., L.J. Brandes, R.A.B. te Molder, 2009 (in print): *Uncertainty in the Netherlands' greenhouse gas emissions inventory: Estimate of annual and trend uncertainty for Dutch sources of greenhouse gas emissions using the IPCC Tier 1 approach*. PBL Report 500080013, Bilthoven: PBL (Netherlands Environmental Assessment Agency).

*Recalculations and time-series consistency*

25. Recalculations have been performed and reported in accordance with the IPCC good practice guidance and this contributed to improvements in the accuracy of inventory. The ERT notes that the recalculations were undertaken to take into account: methodological changes (in the industrial processes sector); changes in emissions allocation (in the energy sector); and correction of errors (in the energy, industrial processes and agriculture sectors). The magnitude of the impact of recalculations is an increase in the total GHG emissions of 0.005 per cent in 1990 and a decrease in the total GHG emissions of 0.3 per cent in 2007.

26. Recalculations were discussed in chapter 10 of the NIR. However, the description of recalculations was not consistent. For example, the recalculations performed in the waste sector were not mentioned in chapter 10. Furthermore, the recalculations were not always reflected in the sectoral chapters of the NIR. For example, for some categories in the energy and industrial processes sectors no recalculations were reported in the NIR, whereas these recalculations were reported in CRF table 8. The ERT reiterates the recommendation of the previous review report that the Party increase internal consistency of information reported in the NIR and the CRF tables to improve the transparency and accuracy of reporting in its next annual submission.

*Verification and quality assurance/quality control approaches*

27. The single national entity, the NL Agency, coordinates the overall QA/QC activities. The Netherlands has established QA/QC procedures in accordance with the IPCC good practice guidance and provided an updated QA/QC plan to the ERT, in response to a question from the ERT during the review.

28. The Party applied the tier 2 QC procedures, but information on these procedures was not included in the NIR. The ERT reiterates the recommendation of the previous review reports that the Party improve documentation on the tier 2 QC procedures in the NIR of its next annual submission. The Netherlands stated in the NIR that the recommendations and suggestions of the Ecofys project aimed to improve the QA/QC procedures will be implemented and reported in its next annual submission. The ERT welcomes this planned improvement.

29. The ERT found inconsistencies between the different chapters in the NIR; between the NIR and the CRF tables; and between the NIR and the monitoring protocols (see para. 30 below). The ERT recommends that the Party strengthen its QC procedures to minimize the occurrence of these inconsistencies in its next annual submission.

*Transparency*

30. The ERT noted that the inventory of the Netherlands is generally transparent, but the use of monitoring protocols reduces transparency because detailed information on the methodologies, AD, EFs, uncertainties and QA/QC is presented only in the monitoring protocols. The information in the NIR has not been updated in parallel to the update in the monitoring protocols, and therefore the NIR includes outdated information. According to the UNFCCC reporting guidelines, the NIR should ensure the transparency and contain sufficiently detailed information to enable the review of inventory. The ERT found that the inventory cannot be fully reviewed on the basis of the NIR. This is the case, in particular, when no reference to monitoring protocols is given in the NIR or when changes in the inventory (for example, in uncertainty estimates and QA/QC procedures) are only reflected in the monitoring protocols, whereas the NIR reflected the situation of the previous annual submission. The ERT reiterates the recommendation of the previous review report that the Netherlands: include more information from the monitoring protocols in the NIR; ensure that the information presented in the monitoring protocols and the NIR is consistent; and

ensure that when information is included only in the monitoring protocol, clear reference to the correct protocol is given in each chapter of the NIR of its next annual submission. The NIR follows in general the outline set out in the UNFCCC reporting guidelines.

31. The ERT noted that in the agriculture sector, the Party did not provide sufficiently transparent information on the country-specific EFs in the NIR and did not provide all information required in the CRF tables 4.A and 4.B (see para. 79 below). The ERT reiterates the recommendation of the previous review report that the Party improve the transparency of reporting both in the NIR and the CRF tables in the agriculture sector.

32. The Netherlands used the notation key confidential (“C”) for reporting PFCs and SF<sub>6</sub> emissions from semiconductor manufacture and electrical equipment in the industrial processes sector. Furthermore, the Netherlands reported as “C” the AD and EFs used for N<sub>2</sub>O emission estimates from nitric acid production across the time series (see paras. 68–72). The ERT noted that the use of this notation key reduces the transparency. The ERT encourages the Party to provide an explanation of the reasons for using this notation key and to explore the possibilities to improve the transparency in its next annual submission.

#### Inventory management

33. The Netherlands reported in the NIR that its archiving system is not fully centralized. The archives are physically located at NL Agency and the RIVM, but electronic access to the archived material is possible from both sites. Therefore, the ERT considers that the data are accessible at one single location. This refers to the following: disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory; internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories, key category identification and planned inventory improvements. The ERT recommends that the Netherlands include a description of the archived information to improve the transparency of reporting in its next annual submission.

34. The Netherlands reported in the NIR that it is considering the options to further centralize the archiving of intermediate and supporting data calculations. The ERT welcomes the planned improvement.

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

35. The Netherlands reported the recommendations implemented since the previous review in table 10.3 of the NIR. However, the ERT notes that not all the recommendations, which were reported as implemented in table 10.3, were actually implemented. In particular, the ERT notes that the following cross-cutting recommendations from the previous review report have not been addressed by the Netherlands and the ERT reiterates the following recommendations: increase internal consistency of the annual submission and consistency between the NIR and the monitoring protocols; and include more information from the monitoring protocols into the NIR.

36. In response to the recommendations of the previous review report, the Netherlands: improved documentation on nitrogen (N) excretion rates in the agriculture sector; changed the methodology for estimating HFCs emissions from refrigeration and air-conditioning equipment in the industrial processes sector; improved reporting of potential emissions of fluorinated gases (F-gases) by adding a table in the NIR; increased the use of plant-specific EFs in the energy sector; and corrected some errors in the text of the NIR. Furthermore, the Party implemented all the recommendations of the previous review report in relation to the national registry.

#### 4. Areas for further improvement

##### Identified by the Party

37. The Party reported in the NIR on the following plans: to improve uncertainty estimates and QA/QC procedures based on the Ecofys study; to carry out research in relation to the share of CH<sub>4</sub> in volatile organic compounds (VOCs) emissions from liquid fuels in road transportation, soil organic matter in landfills, and use of compost; to include anaerobic digestion of manure in the inventory; and to collect AD to estimate CO<sub>2</sub> emissions from road paving with asphalt and asphalt roofing in the industrial processes sector. The ERT welcomes these planned improvements.

##### Identified by the expert review team

38. The ERT identified the following cross-cutting issues for improvement:

(a) The provision of more information from the monitoring protocols in the NIR regarding methodologies, EFs, AD, uncertainties and QA/QC procedures and the improvement of consistency of information presented in different chapters of the NIR, between the NIR and the monitoring protocols, between different CRF tables and between the NIR and the CRF tables (see para. 30 above);

(b) The provision in the NIR of a more detailed description of archived information (see para. 33 above);

(c) The estimation of emissions from the use and production of charcoal for barbecuing and from anaerobic treatment of industrial sludge in aerobic wastewater treatment plants (see paras. 56 and 110 below);

(d) The improvement of time series consistency for categories in the industrial processes sector for which the emission estimation methodologies changed.

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

## B. Energy

### 1. Sector overview

40. The energy sector is the largest sector in the GHG inventory of the Netherlands. In 2008, emissions from the energy sector amounted to 172,061.70 Gg CO<sub>2</sub> eq, or 83.2 per cent of total GHG emissions. Since 1990, emissions in this sector have increased by 11.7 per cent. The key drivers for the rise in emissions are the increasing demand for public electricity and heat production, and the growth in the number of vehicles in the transport sector. Within the sector, in 2008, 38.1 per cent of the emissions were from energy industries, followed by 23.4 per cent from other sectors, 20.9 per cent from transport and 16.0 per cent from manufacturing industries and construction. Fugitive emissions from fuels accounted for 1.3 per cent and the category other accounted for 0.2 per cent.

41. The energy sector inventory is complete in terms of gases, years and geographical coverage and generally complete in terms of categories. Though, the fugitive emissions of CO<sub>2</sub> and CH<sub>4</sub> from transport (oil) were reported as "NE". In response to the list of potential problems and further questions raised by the ERT, the Netherlands submitted the missing emission estimates for this category using the default EFs provided in the IPCC good practice guidance (see para. 59 below).

42. The ERT notes that the Netherlands used higher-tier methods to estimate emissions for key categories. For the energy industry, this was generally done by multiplying fuel-use

statistics with country-specific EFs (tier 2 method); AD were generally derived from aggregated statistical data based on data provided by individual companies. Similarly, a country-specific top-down (tier 2) method was used for calculating emissions for fuel combustion in the manufacturing industries and construction. Emissions from road transportation were estimated using domestic data on fuel sales from Statistics Netherlands and country-specific EFs. For the two key categories under other sectors, namely CO<sub>2</sub> emissions from liquid fuels and from gaseous fuels, the IPCC tier 2 methodologies were used by the Party to calculate emissions from stationary and mobile combustion in this sector. This is in accordance with the IPCC good practice guidance. The methods are described in the NIR and the Party's monitoring protocols. The QA/QC procedures were used throughout the sector's inventory and are also described in the NIR and monitoring protocols.

43. The Netherlands used the tier 1 methodology for estimating the uncertainty in emission estimates and trends. 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. A comparison with uncertainty ranges reported by other European countries was performed to improve the assumptions made in estimating uncertainties. The Netherlands also reported in the NIR on some updates in the uncertainty estimates. For example, based on a recent fuel-quality analysis, uncertainty in CO<sub>2</sub> EF for natural gas is now estimated as 0.3 per cent (instead of 1 per cent, as was reported in the previous annual submission). During the review, the Party informed the ERT that it would include the revised uncertainty estimate for the CO<sub>2</sub> EF for natural gas in its next annual submission. The ERT welcomes the planned improvement.

44. Recalculations for most categories in the energy sector have been performed as part of the general inventory improvements. The Netherlands reported that the emission estimates for 2007 have been updated when improved statistical data became available. The most important update was a correction of the erroneously estimated CO<sub>2</sub> and CH<sub>4</sub> emissions from manufacture of solid fuels and other energy industries and from fugitive emissions from flaring (combined). This correction amounted to a reduction of 152.00 Gg CO<sub>2</sub> eq in 2007. The Netherlands reported in the NIR that in public electricity and heat production the basic AD for waste combustion were analyzed in greater detail than before, and errors in estimates of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions prior to 2005 were discovered and corrected. This recalculation resulted in an increase in emissions of 9.10 Gg CO<sub>2</sub> eq in 1990.

45. As the Party explained in its monitoring protocol No. 42, CO<sub>2</sub> emissions from stationary combustion were estimated using the national annual energy balance, which is published by Statistics Netherlands, and country-specific EFs. CO<sub>2</sub> emission estimates were then refined by including CO<sub>2</sub> emissions reported by selected companies in their annual environmental reports. The ERT commends the Netherlands for the increased use of plant-specific EFs, but reiterates the recommendation of the previous review report that the Netherlands document in the NIR of its next annual submission how it ensures the consistency of the time series when using plant-specific data.

46. In response to a question raised by the ERT during the review on the potential use of the European Union emissions trading scheme (EU ETS) data on CO<sub>2</sub> emissions for verification and QA/QC purposes, the Netherlands provided the ERT with information on a study<sup>7</sup> comparing CO<sub>2</sub> emissions of 38 companies in the energy and industrial processes sectors as reported to: the EU ETS; in their annual environmental reports; and according to

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<sup>7</sup> Zijlema, P. (2010) "Explanation of Differences Between CO<sub>2</sub> Emissions in the EU ETS and Other Reports for the Purpose of the NIR 2010".



the requirements of Statistics Netherlands. The compared emissions are from the 2008 reporting year and total about 70 Mt CO<sub>2</sub>. The main conclusions are that: first, for many companies there are no differences, or only minor differences, in the emissions reported for three different purposes; and second, where larger differences exist in three reported emissions amounts, these can be explained in most cases by the different scope of the reporting obligations under three different regimes. The ERT encourages the Netherlands to describe and make use of this study in its next annual submission and to do this annually as part of its QA/QC activities.

## 2. Reference and sectoral approaches

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

47. The Netherlands calculated CO<sub>2</sub> emissions from fuel combustion using the reference and sectoral approaches for all years of the time series. For 2008, CO<sub>2</sub> emissions calculated using the reference approach are 0.3 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. The Netherlands reported that the differences are caused by: the non-inclusion of CO<sub>2</sub> emissions from waste incineration in the reference approach; the use of fossil fuels in the industrial processes sector, which are not included in the sectoral approach; the use of multi-year averages for country-specific carbon-storage factors in the reference approach; the use of facility-specific EFs in the sectoral approach. Correction for these factors across the time series could lead to the reduction of the difference to a range of  $\pm 1.2$  per cent.

48. The ERT notes that the differences in apparent energy consumption data in the 2010 annual submission and those reported to the International Energy Agency (IEA) are generally small.

### *International bunker fuels*

49. Emissions from international bunkers were calculated based on energy statistics provided by Statistics Netherlands. The ERT concludes that these emissions have been calculated in accordance with the IPCC good practice guidance and the Revised 1996 IPCC Guidelines. In the previous review report an error in AD for jet kerosene was identified for 2007 and this was corrected in the 2010 annual submission.

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

50. The reporting on feedstocks and non-energy use of fuels was in accordance with the Revised 1996 IPCC Guidelines and adjusted to country-specific circumstances, including through the use of country-specific carbon storage factors. The methodology was documented in the NIR.

51. The previous review report had found that the Party's accounting of oxidation losses for chemical waste gas in the production of ethylene, methanol and carbon black remained incomplete. The previous ERT reiterated a recommendation that the Netherlands resolve this issue and report on it in its 2010 annual submission. In its 2010 NIR, the Party reported that it is considering commissioning a study into this matter to update the data, but it did not specify a time frame. In response to a question raised by the ERT during the review, the Netherlands informed the ERT that it still intends to commission a study into this matter, and that, depending on budget allocations, the study could start in November 2010. The ERT recommends that the Party proceed with the proposed study and report on any results obtained, or progress made, in its next annual submission.

### 3. Key categories

#### Stationary combustion: gaseous fuels – CO<sub>2</sub>

52. The emissions from this category are estimated in accordance with the IPCC good practice guidance. To calculate CO<sub>2</sub> emissions from fossil fuels from stationary sources, the Netherlands uses consumption data taken from the national energy balance and standard EFs from the Netherlands' list of defined fuels. The calculation is refined by including CO<sub>2</sub> emissions reported by selected companies in their annual environmental reports. This refinement is primarily applied to companies with deviating fuel types and for companies with extremely high emissions.

53. In the previous review report, it was noted that the emission estimates for manufacture of solid fuels and other energy industries were calculated, but not reported in the 2009 annual submission due to time constraints. In the 2010 annual submission, the Netherlands included the emission estimates and documented the impact of the recalculation in the CRF tables and the NIR. The ERT commends the Netherlands for this improvement.

#### Road transportation: liquid fuels – CO<sub>2</sub>

54. In the NIR, the Netherlands reported that it calculates CO<sub>2</sub> emissions from road transportation using the IPCC tier 2 methodology, relying on data from domestic fuel sales, which are provided by Statistics Netherlands, and on country-specific EFs. In relation to the latter, the Netherlands has developed country-specific CO<sub>2</sub> EFs for the most common fuels (including diesel oil, petrol/gasoline and liquefied petroleum gas (LPG)); otherwise, default IPCC EFs are used. The ERT notes that the Party actually estimates CO<sub>2</sub> emissions in this category using the IPCC tier 1 methodology, because it uses aggregated fuel sales data that are not disaggregated according to the vehicle type. The ERT noted that the method used by the Netherlands is in line with the IPCC good practice guidance, but encourages the Netherlands to correct the information in the NIR regarding the methodology used.

### 4. Non-key categories

#### Road transportation: liquid fuels – CH<sub>4</sub>

55. The Netherlands estimated CH<sub>4</sub> emissions from road transportation using data on the mass fractions of different compounds in the total emissions of VOCs, which are estimated using vehicle-kilometre data and VOC EFs based on the 1993 study by TNO.<sup>8</sup> Although these EFs distinguish between vehicle age, fuel type, and weight, the study has not been validated since 1993. The Netherlands reported in the NIR that it is possible that the mass fraction of CH<sub>4</sub> has changed since 1993 due to, for example, recent changes in the aromatic content of road transportation fuels or improved exhaust after-treatment technology. In response to a question raised by the ERT during the review, the Party stated that research on the composition of VOC emissions from road transportation is currently being undertaken by TNO, and that results should be available in time for inclusion in its next annual submission. The ERT welcomes the planned improvement and encourages the Party to update these values within the stated time frame.

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<sup>8</sup> Klein J., G. Geilenkirchen (PBL), A. Hoen, J. Hulskotte, N. van Duynhoven, R. de Lange, A. Hensema, D. Broekhuizen, H. Molnár-in 't Veld, Methoden voor de berekening van de emissies door mobiele bronnen in Nederland, November 2009.

Other sectors: biomass – CO<sub>2</sub> and CH<sub>4</sub>

56. The Netherlands reported emissions from biomass combustion in other sectors. However, the use of charcoal for barbecuing is reported as “NE” due to the lack of AD. Two previous review reports have recommended that the Netherlands continue to explore ways to estimate emissions relating to charcoal use in the category other sectors. On page 185 of the NIR, and in response to a question raised by the ERT during the review, the Netherlands stated that it is not planning to collect the AD for this category. Even though the ERT understands that this category is likely to be minor, it strongly recommends that the Netherlands collect AD and estimate emissions in its next annual submission to improve the completeness of the inventory, as the methodology and EFs exist in the Revised 1996 IPCC Guidelines.

57. A similar issue arises in relation to CH<sub>4</sub> emissions from charcoal production. The previous review report reiterated a recommendation of the preceding review report that the Netherlands continue to explore ways to estimate CH<sub>4</sub> emissions from charcoal production, for which AD are reported in the NIR as not available. On page 185 of the NIR, the Party states that one company might produce charcoal and that CH<sub>4</sub> emissions from the technology used are negligible, based on study published in 2002.<sup>9</sup> The ERT strongly recommends that the Netherlands, in its next annual submission, clarify whether the activity occurs in the country and estimate the emissions, for example, by deriving a country-specific EF based on the study cited in the NIR, to improve the completeness of the inventory.

Oil and natural gas – CO<sub>2</sub> and CH<sub>4</sub>

58. The Netherlands reported fugitive emissions of CO<sub>2</sub> and CH<sub>4</sub> from transport (oil) as “NE”. The ERT noted the recommendation of the previous review report that the Netherlands continue to explore ways to estimate these emissions. In its NIR, the Netherlands reported that the emissions from oil transport by pipelines were a very minor source, and that it was not possible to estimate the emissions due to missing AD as well as missing information on the material of the pipeline system. The ERT concluded that this may imply that estimates for this category are underestimated. During the review, the ERT recommended that the Netherlands collect AD and estimate fugitive emissions of CO<sub>2</sub> and CH<sub>4</sub> from transport (oil) using the available methodology, for example, by applying the default EFs for CO<sub>2</sub> and CH<sub>4</sub> (IPCC good practice guidance, page 2.87, table 2.16) to the volume of oil transported by pipeline in the country.

59. In response to the list of potential problems and further questions, the Netherlands collected AD for the time series, which was rendered as the weight of the crude oil transported by pipeline within the Netherlands and to Belgium. The Party applied the tier 1 EFs to estimate CO<sub>2</sub> and CH<sub>4</sub> emissions from the IPCC good practice guidance, converted from Gg/volume to Gg/weight, to calculate the pipeline-related emissions for CO<sub>2</sub> and CH<sub>4</sub> for the entire time series. 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 its inventory.

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<sup>9</sup> Reuermann P., Fredericks B. (2002). *Charcoal Production with Reduced Emissions*. Available at <[http://www.cleanfuels.nl/Projects%20&%20publications/Charcoal%20Production%20with%20Reduced%20Emissions%20\(paper\).pdf](http://www.cleanfuels.nl/Projects%20&%20publications/Charcoal%20Production%20with%20Reduced%20Emissions%20(paper).pdf)>.

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

### 1. Sector overview

60. In 2008, emissions from the industrial processes sector amounted to 10,480.76 Gg CO<sub>2</sub> eq, or 5.0 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 203.72 Gg CO<sub>2</sub> eq, or 0.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 52.8 per cent in the industrial processes sector and decreased by 62.4 per cent in the solvent and other product use sector. The fall in emissions between 1990 and 2008 from the industrial processes sector is mainly driven by a decrease in emissions from chemical industry, resulting from a decrease in emissions from nitric acid production due to the installation of emission abatement equipment, which was responsible for an emission reduction of 91.2 per cent during the period 1990–2008. The other major contributors to the decrease in emissions from the industrial processes sector are related to the production of HFC-22 and the corresponding HFC-23 emissions, which decreased by 96.0 per cent owing to the installation of a thermal afterburner during the period 1998–2000, and to aluminum production and the corresponding PFC emissions, which decreased by 97.0 per cent owing to the switch from side feed to point feed during the period 1998–2003. Within the industrial processes sector, in 2008, 45.7 per cent of the emissions were from chemical industry, followed by 20.0 per cent from consumption of halocarbons and SF<sub>6</sub>, 17.8 per cent from metal production, 10.8 per cent from mineral products, 3.4 per cent from other and the remaining 2.2 per cent from production of halocarbons and SF<sub>6</sub>.

61. The inventory of the industrial processes sector is generally complete. Although, CO<sub>2</sub> emissions from asphalt roofing and road paving with asphalt are reported as “NE,” the Netherlands explained in annex 5 to its NIR that, following the encouragement of the previous review report, information on roofing and asphalt production for road paving has been collected and CO<sub>2</sub> emissions have been roughly estimated as 0.5 kt CO<sub>2</sub>. The Netherlands also reported in the NIR that attempts will be made to retrieve basic AD and to estimate the emissions on a regular basis. The ERT encourages the Netherlands to estimate and report CO<sub>2</sub> emissions from asphalt roofing and road paving with asphalt in its next annual submission.

62. In response to a recommendation of the previous review report with respect to potential emissions of F-gases, the Netherlands added a table in its NIR with aggregated estimates of potential emissions (but only from refrigeration and air-conditioning equipment). However, the Party did not include potential emissions in the CRF tables, and it was stated in the NIR that the potential emissions cannot be calculated in detail (which is required in the CRF tables) due to the absence or confidentiality of AD. The ERT encourages the Netherlands to explain in the NIR the method used for the estimation of potential emissions, and to make efforts to present a complete time series of potential emissions to improve the transparency of reporting in its next annual submission.

63. In response to a recommendation of the previous review report with respect to emissions from lime production, the Netherlands reported this category as “IE” instead of “NE” in the 2010 annual submission. In the NIR, the Netherlands explained that lime production is known to occur only in the sugar industry and it is not possible to separate the emissions from lime production from other emissions. In response to a question raised by the ERT during the review, the Party also confirmed that the four plants involved in lime production are indeed all sugar producers, whose emissions are accounted for as part of the food and drink category.

64. The transparency of reporting continues to be diminished by the use of the notation key “C” in several areas. For example, in the case of SF<sub>6</sub> emissions from electrical equipment, the Netherlands reported “C” for emission estimates that were not reported as

confidential by any other reporting Party in 2010. The Party explained in the NIR that it used “C” for SF<sub>6</sub> emissions from electrical equipment because only one or two companies have processes related to the use of HFCs and SF<sub>6</sub>. Due to the sensitivity of the data, the total HFCs emissions from foam blowing and aerosols/metered dose inhalers, and that of SF<sub>6</sub> emissions from semiconductor manufacture and from electrical equipment were reported under the category other. The ERT recommends that the Party explore ways to improve the transparency of the reporting of this category.

65. The Netherlands implemented some of the recommendations of the previous review report in relation to the use of notation keys, for example, in the case of emissions of HFCs from foam blowing and aerosols/metered dose inhalers, where the Netherlands used the notation key “IE” instead of “NO”. The ERT recommends that the Party correctly use the notation keys, for example, replace “NO” with “IE” for consumption of halocarbons and SF<sub>6</sub> in electrical equipment in its next annual submission. To address a recommendation of the previous review report, the Party reported more details in the NIR on the elaboration of the important aspects of the methodology, AD, EFs, uncertainties and recalculations at a subcategory level. However, the ERT recommends that, to increase the transparency of reporting, the Netherlands integrate the information presented in the monitoring protocols into the NIR, following the outline of the NIR as required by the UNFCCC reporting guidelines.

66. Recalculations were carried out due to a change of the method to estimate CO<sub>2</sub> from chemical industry and HFCs emissions from stationary refrigeration and due to new AD about pre-charged refrigeration equipment and new SF<sub>6</sub> emission data from the only electrical equipment testing company. Recalculations represent an increase of emissions by 0.2 per cent in 1990 and by 0.8 per cent in 2007. The uncertainties were estimated using the IPCC tier 1 approach. Category-level uncertainty estimates for AD and EFs used by the Party in the tier 1 uncertainty analysis are included in the NIR. In accordance with the IPCC good practice guidance, since no detailed information was available for assessing the uncertainties of the emissions reported by the facilities, these uncertainty estimates are generally based on expert judgement.

67. The ERT noted that the Netherlands applied general QA/QC procedures for the sector. However, the Party did not report on any tier 2 QC procedures in the industrial processes sector. The ERT encourages the Party to apply category-specific QC procedures for the key categories and report on the results in its next annual submission.

## 2. Key categories

### Nitric acid production – N<sub>2</sub>O

68. The Netherlands applied a tier 2 approach based on plant-specific measurement data, and reported both AD and EFs as “C”. In the NIR, the Netherlands reported that technical measures have been implemented in nitric acid production plants, resulting in the following reductions in N<sub>2</sub>O emissions: in 2001, changes in one of the six existing plants resulted in a reduction in emissions of 9.4 per cent compared to 2000; at the end of 2007, changes in all plants produced a reduction in emissions of 23 per cent compared to 2006; and in 2008 the full effect of the technical measures adopted in 2007 reduced the emissions by 87 per cent (from 4,305 Gg CO<sub>2</sub> eq in 2007 to 558 Gg CO<sub>2</sub> eq in 2008). The overall reduction in emissions was 91.2 per cent from 1990 to 2008.

69. The Netherlands stated in the monitoring protocol for nitric acid production (page 2) that different abatement technologies reduce emissions by 30–90 per cent. However, the data provided by the Netherlands in response to a question raised by the ERT during the review suggested that, for two of the plants, the reduction in emissions was unusually high, namely 92 and 99 per cent. The plant-specific implied emission factors (IEFs) were found

to be one and two orders of magnitude lower than those reported by the rest of the reporting Parties. Taking into account this information, the ERT concluded that this may imply that estimates for this category were underestimated.

70. In the list of potential problems and further questions, the ERT requested the Netherlands to provide information explaining in a transparent manner the significant reduction in N<sub>2</sub>O emissions from nitric acid production in 2007 and 2008. The information provided could be verification reports of direct N<sub>2</sub>O emission measurements for each plant, or type of production technology for each plant in the country, the share of the production of nitric acid of each plant in 2007 and 2008, details on the abatement technologies implemented at each plant, including the time of installation and the abatement efficiency, information on the methodology used for measuring N<sub>2</sub>O emissions at each plant, and figures for N<sub>2</sub>O emission levels before and after the installation of abatement technologies at each plant. In response to the list of potential problems and further questions, the Netherlands provided a table summarizing the following information for each of the currently operating plants: the type of production technology; the share of production; the type of abatement technology, including the time of installation; the implied EFs for the years 2006–2008; and the overall abatement efficiency for the years 2006–2008. These data indicate that the IEFs of six plants with abatement technologies installed in 2008 vary from 0.00022 kg N<sub>2</sub>O/t to 2.02 kg N<sub>2</sub>O/t nitric acid, depending on the type of production and abatement technology. Two of the six plants (which have an abatement technology based on the catalytic removal of N<sub>2</sub>O from the tail gas) had lower IEF values, achieving abatement efficiencies of around 99 per cent. Three of the six plants presented IEFs consistent with the typical IEFs for the production and abatement technologies installed. One plant had an abatement efficiency of about 93 per cent for a technology which usually has an abatement efficiency of about 90 per cent. The ERT considers that the additional information provided by the Netherlands was sufficient to explain the large emission reductions that occurred between 2006 and 2008.

71. The ERT commends the Netherlands for providing to the ERT information that helped to clarify the considerable decrease in N<sub>2</sub>O emissions between 1990 and 2008. To improve the transparency of reporting, the ERT recommends that the Netherlands report the significant reductions in N<sub>2</sub>O emissions achieved due to the emission abatement technologies implemented in 2007, along with a summary of the related information provided to the ERT, in the NIR of its next annual submission. Moreover, the ERT recommends that the Netherlands improve the consistency of the discussion in the NIR on the abatement potentials of different technologies and the abatement efficiencies gained in the plants in the Netherlands.

72. In addition, during the review the Netherlands provided the ERT with the following information that: (i) the responsibility for the quality of data lies with the companies themselves; (ii) the validation of the data is the responsibility of the competent authorities, usually provincial and occasionally local authorities, which also issue permits to these companies; and (iii) the industry expert of the inventory team is responsible for performing a final check consisting of a comparison of the emissions from previous years (trend). Nevertheless, the Party informed the ERT that the inventory team is not able to check, for example, the AD, because the inventories of the companies do not contain production levels and therefore, the quality of the data largely depends on the steps (i) and (ii). The ERT noted that the procedure used to check the data provided by the companies and verified by the environmental authorities is not described in the NIR. The ERT encourages the Netherlands to explain more transparently how the quality of data provided by plants is controlled at different levels (i.e. company, provincial authorities and inventory team) in the NIR of its next annual submission.

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

73. As most of CO<sub>2</sub> emissions from iron and steel production (from the combustion of blast furnace gas and oxygen furnace gas) are reported in the energy sector, the Netherlands reports in the industrial processes sector CO<sub>2</sub> emissions from the limestone use during the conversion from pig iron to steel and from the gases which are lost. The Party reported an overall reduction of CO<sub>2</sub> emissions of 46.3 per cent from 1990 to 2008 for iron and steel production, and a 32.9 per cent increase in the steel production in the same time period. The IEFs decreased from 0.49 in 1990 to 0.20 in 2008 (measured in terms of CO<sub>2</sub> emissions/crude steel produced). In response to a question raised by the ERT during the review, the Netherlands explained that the variation in the emissions reported is influenced by the accuracy of accounting of the blast furnace and oxygen furnace gas produced. The ERT recommends that the Netherlands explain the reasons for these variations in the NIR of its next annual submission, as these variations cause the differences in the emission estimates. Furthermore, the ERT recommends that the Netherlands reallocate emissions from limestone use in iron and steel production to limestone and dolomite use in accordance with the Revised 1996 IPCC Guidelines to improve the comparability of emission estimates across the Parties.

### Consumption of halocarbons and SE<sub>6</sub> – HFCs

74. The Netherlands used a new EF-based method to estimate HFCs emissions from air conditioning equipment in response to the recommendations of the previous review report. The new method is described in the monitoring protocol No. 60. In CRF table 2(II).Fs1, the Party reported the AD corresponding to the amount of fluid filled into new manufactured products and reported as “NE” the AD related to the amount of gas in systems currently in operation and remaining in products at decommissioning. Nevertheless, in the monitoring protocol the Party describes a complete methodology, including EFs used, and the sources of AD used. The ERT recommends that the Netherlands change the notation key from “NE” to “IE” in its next annual submission.

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

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

75. The Netherlands reported in the NIR and in the monitoring protocol that the emissions from cement production were estimated based on measured data on carbon content in raw material. The ERT noted that IEFs for the years 1990–2004 were almost the same (0.54 t CO<sub>2</sub>/t clinker), whereas for the years 2005–2008 IEFs had a decreasing trend, and in 2008 the IEF was 0.48 t CO<sub>2</sub>/t clinker. In response to a question by the ERT during the review, the Party stated that measured data were not available for the period 1990–2001, and for that period average the IEF for the years 2002–2003 was used. The ERT recommends that the Party explain in the NIR that two different methods are used to estimate emissions from this category (average IEF from the years 2002–2003 for the period 1990–2001 and annual measured data for the period 2002–2008). The ERT also recommends that the Party discuss time-series consistency in the NIR and consider whether the time-series consistency could be improved by using the recalculation techniques from the IPCC good practice guidance.

76. In response to a question from the ERT, the Party further stated that the IEF varies due to the variability of carbon content in the carbonate input of the raw material (marl) and the organic carbon in the raw material, and that these variables depend on the geological formation from which the raw material is extracted. The ERT notes that according to the response of the Party, in 2009 it will use the IEF 0.52 t CO<sub>2</sub>/t clinker. The ERT

recommends that the Party include more information on the raw materials used between 1990 and 2008, to explain the unusual trend.

## **D. Agriculture**

### **1. Sector overview**

77. In 2008, emissions from the agriculture sector amounted to 18,515.56 Gg CO<sub>2</sub> eq, or 8.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 17.6 per cent. The key drivers for the fall in emissions are a reduction in the number of dairy cattle, sheep and swine; a decrease in N-excretion rates; and a decline of synthetic fertilizer application due to manure and fertilizer policy in the country. Within the sector, in 2008, 45.7 per cent of the emissions were from agricultural soils, followed by 34.9 per cent from enteric fermentation and the remaining 19.4 per cent from manure management.

78. The agriculture sector inventory is complete in terms of categories, gases, geographical coverage and years. Though, rice cultivation, prescribed burning of savannas and field burning of agricultural residues were reported as “NO”, as these activities do not occur in the country.

79. The ERT notes that there is an issue of inconsistency in the reporting of CH<sub>4</sub> emissions from enteric fermentation and manure management. For example, the parameters of gross energy intake and methane conversion factor are reported in CRF tables 4.A and 4.B as “NE”, whereas in annex 8 to the NIR numerical values were reported. The ERT notes that the numerical values in annex 8 to the NIR are provided for more disaggregated animal categories than in the CRF tables. However, the ERT believes that it is possible to aggregate the values in annex 8 of the NIR into the CRF tables by calculating average values. Therefore, the ERT reiterates the recommendation from the two previous review reports that the Netherlands improve the transparency and consistency of reporting and report numerical values in the CRF tables. Furthermore, the ERT notes that the Party reports “0.00” for feeding situation of cattle in CRF table 4.A, and recommends that the Netherlands improve the transparency of reporting by filling in CRF table 4.A correctly.

80. The ERT notes that the transparency of reporting continues to improve, with the exception of the supporting information on country-specific EFs used, which was mostly presented in the background papers or monitoring protocols and not in the NIR. The ERT recommends that the Party include supporting information on country-specific EFs in the NIR to improve the transparency of its next annual submission.

81. Recalculations were performed to correct errors in CH<sub>4</sub> and N<sub>2</sub>O emission estimates and resulted in an increase of CH<sub>4</sub> emissions of 0.03 per cent in 1990 and of 0.1 per cent in 2007, no changes in N<sub>2</sub>O emissions in 1990 and a decrease of 1.9 per cent in 2007. The recalculations improved the accuracy of the reporting.

82. The ERT noted that a tier 1 uncertainty analysis was carried out for the sector and corresponding information is presented in the NIR. It is stated in the NIR that the categories in the agriculture sector are covered by the general QA/QC procedures discussed in chapter 1 of the NIR. The ERT encourages the Party to develop category-specific tier 2 QC procedures for key categories in the agriculture sector.

### **2. Key categories**

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

83. The Netherlands used a tier 2 method and country-specific EFs for estimating emissions from enteric fermentation of cattle and a tier 1 method and default EFs for other



livestock. The Netherlands also estimated emissions from enteric fermentation using option B for animal categorization (mature dairy cattle, mature non-dairy cattle and young cattle). This methodological approach is in accordance with the IPCC good practice guidance.

84. A recalculation was carried out to correct an error found in CH<sub>4</sub> EF for 2007. The recalculations did not have an impact on the emissions in 1990 and resulted in an increase in CH<sub>4</sub> emissions of 0.2 per cent in 2007.

#### Manure management – CH<sub>4</sub> and N<sub>2</sub>O

85. The Netherlands applied a tier 2 method and country-specific EFs to calculate CH<sub>4</sub> emissions from manure management. The ERT notes that the methodological approach used is in accordance with the IPCC good practice guidance. A recalculation was carried out in order to use a new method for calculating feed intake by cattle. The recalculations of CH<sub>4</sub> emissions did not have an impact on emissions in 1990 and resulted in an increase in CH<sub>4</sub> emissions of 0.1 per cent in 2007.

86. The Netherlands did not report the emissions from anaerobic digester of animal waste (0.6 per cent of manure) in its 2010 annual submission despite the recommendations by the previous review reports. The ERT noted that according to CRF tables 4.B and annex 8 to the NIR, liquid manure, solid manure and manure excreted in pasture includes 100 per cent of the manure excreted. The ERT concluded that the issue of not including emissions from anaerobic digester is an accuracy issue rather than a completeness issue. The ERT reiterates the recommendation of the previous review reports that the Netherlands improve the accuracy of the inventory by estimating and reporting emissions from anaerobic digester of manure in its next annual submission. The ERT further noted that CRF table 4.B is incorrectly filled with regard to allocation of manure from mature dairy cattle, and recommends that the Party correct the error in its next annual submission.

87. The Netherlands reported in the NIR that a portion of the manure produced in the country (1–7 per cent) is exported to Belgium and Germany and that the corresponding emissions were, therefore, subtracted from its total estimated emissions from manure management. The ERT concludes that the approach used by the Netherlands is in accordance with the Revised 1996 IPCC Guidelines.

88. The Netherlands used a tier 2 method and default EFs for estimating N<sub>2</sub>O emissions from manure management, which is in accordance with the IPCC good practice guidance. The ERT notes that, in response to the recommendation of the previous review report, the Netherlands improved its documentation in the NIR on the methodology used to calculate annual N excretion rates. The ERT commends the Netherlands for this improvement.

#### Agricultural soils – N<sub>2</sub>O

89. In the NIR, the Netherlands states that it used a tier 1b/2 method for animal production and a tier 1 method for indirect emissions, while using country-specific data (estimated at a tier 3 level) to estimate NH<sub>3</sub> emissions used to calculate indirect emissions from atmospheric deposition. The ERT notes that, following a recommendation of the previous review report, the Netherlands clarified that it used the tier 3 method only for estimating indirect N<sub>2</sub>O emissions from atmospheric deposition.

90. The ERT noted that in CRF table 4.B the Party reports that N excreted in pasture, range and paddock is 85,529,636.9 kg N/year, whereas in CRF table 4.D it reported as 79,074,533 kg N/year. The difference is due to the fact that the value in CRF table 4.D is adjusted for N emitted as NH<sub>3</sub>. The ERT noted that adjusting the value with N volatilized as NH<sub>3</sub> is in line with equation 4.20 of the IPCC good practice guidance.

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

### **1. Sector overview**

91. In 2008, net emissions from the LULUCF sector amounted to 2,446.75 Gg CO<sub>2</sub> eq. Since 1990, net emissions have decreased by 5.8 per cent. The key driver for the decrease in emissions is an increase in removals from forest land due to reforestation activities, which compensates for the increase of emissions from cropland, grassland, wetland and settlements. Within the sector, in 2008, emissions of 4,796.49 Gg CO<sub>2</sub> eq were from grassland, followed by removals of 2,847.14 Gg CO<sub>2</sub> eq from forest land. The remaining emissions were: 296.39 Gg CO<sub>2</sub> eq from land converted to settlements, 56.22 Gg CO<sub>2</sub> eq from land converted to wetlands, 48.42 Gg CO<sub>2</sub> eq from land converted to cropland, 25.28 Gg CO<sub>2</sub> eq from land converted to other land and 71.08 Gg CO<sub>2</sub> eq from lime application in all land-use categories reported under other.

92. The LULUCF sector inventory is generally complete with the exception of some emission and removal categories. For 2008, the Netherlands reported net CO<sub>2</sub> emissions/removals for most of the mandatory categories, except for cropland remaining cropland that was reported as “IE”, not applicable (“NA”) and “NE”. In addition, for the optional categories, such as wetlands remaining wetlands and settlements remaining settlements, the Netherlands reported “NE”. Furthermore, the Netherlands reported “NO” for direct N<sub>2</sub>O emissions from N fertilization; “NE” for non-CO<sub>2</sub> emissions from drainage of soils and wetlands and for N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland. The AD and CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass burning were reported as “NA”, “NE” and “NO”. Non-CO<sub>2</sub> emissions from controlled burning were reported as “NO” and non-CO<sub>2</sub> emissions from wildfires were reported as “NE”, as stated in the NIR forest fires either do not occur or occur seldom. The ERT recommends that the Netherlands make the necessary efforts to include the missing categories in its next annual submission.

93. The ERT notes that the accounting of CO<sub>2</sub> emissions and removals from the forest subcategory “trees outside forests” (fragmented forest plots with area less than 0.5 ha or less than 30 m width), which differs from forests as defined and accounted under the Kyoto Protocol (which states that forests are patches of land exceeding 0.5 ha with a minimum width of 30 m, with tree crown cover of at least 20 per cent and tree height at least 5 m), is now only reported under the Convention.

94. A tier 1 uncertainty analysis of the inventory was performed for the sector. It is reported in the NIR that the LULUCF sector is subject to general QA/QC procedures discussed in chapter 1 of the NIR. The ERT encourages the Party to develop and carry out category-specific tier 2 QC procedures for key categories.

95. The ERT noted that no recalculations have been performed in the 2010 annual submission and that, in the NIR, it is reported that no further improvements in the LULUCF sector inventory are planned. The ERT recommends that the Party make efforts to further improve its inventory and to reduce the uncertainties in the LULUCF sector.

### **2. Key categories**

#### Forest land remaining forest land – CO<sub>2</sub>

96. The methodology used for estimates of forest land remaining forest land is a tier 2 method with country-specific parameters and is in accordance with the IPCC good practice guidance for LULUCF. The AD were obtained from various forest inventories that covered more than 3,000 sampling plots. The Netherlands reported emissions and removals from biomass and dead organic matter pools. The Netherlands reported “NE” for changes in

carbon stocks in organic and mineral soils. The ERT recommends that the Netherlands estimate and report carbon stock changes in organic and mineral soils in its next annual submission.

#### Land converted to forest land – CO<sub>2</sub>

97. This category includes estimates of the changes in land use from mainly agricultural areas into forest land since 1990 based on a comparison of detailed maps that best represent land use in 1990 and 2004. Changes after 2004 have been obtained by linear extrapolation. The Netherlands reported separately conversion of croplands, grasslands, wetlands, settlements and other lands to forest lands. For the carbon stock changes in living biomass, deadwood and litter the same data and calculations are used as for forest land remaining forest land. The Netherlands reported “NE” for carbon stock changes in dead organic matter and mineral and organic soils pools. For soil carbon stock changes after the land use change the Party has assumed that the average carbon stock in the soil under the new and old land use is the same. The ERT recommends that the Netherlands make the necessary efforts to include carbon stock changes in organic and mineral soils in its next annual submission.

#### Grassland remaining grassland – CO<sub>2</sub>

98. Grassland remaining grassland is the most important source of CO<sub>2</sub> emissions within the sector. The Netherlands used a country-specific tier 2 method that is in accordance with the IPCC good practice guidance for LULUCF. The AD are derived from the land-use maps and the land-use change matrix. For grassland, CO<sub>2</sub> emissions resulting from soil subsidence of peat land by oxidation of peat due to managed drainage are calculated. The CO<sub>2</sub> emissions were calculated based on observations of yearly subsidence rates for various types of peat and available information on the extent of drainage and subsequent soil carbon losses through oxidation for each peat type and drainage level. The ERT recommends that the Party improve the transparency of its reporting by providing more information about the calculation method and the EF in the next annual submission.

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

#### Forest land converted to cropland, grassland, settlements, other land – CO<sub>2</sub>

99. The Netherlands reported “NE” for carbon stock changes in soils for forest land converted to all other land-use categories. The ERT noted that this represents a potential underestimation of emissions because such land-use changes lead to oxidation of carbon in all pools of organic matter. The ERT recommends that the Netherlands include this pool in its next annual submission.

## **F. Waste**

### **1. Sector overview**

100. In 2008, emissions from the waste sector amounted to 5,654.81 Gg CO<sub>2</sub> eq, or 2.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 55.7 per cent. The key drivers for the decrease in emissions are: a decrease in CH<sub>4</sub> emissions from solid waste disposal on land due to a decreasing amount of waste disposed to solid waste disposal sites (SWDS) as a result of a policy aimed at reducing the amount of waste disposed to landfills by raising the landfill tax; and a decrease in CH<sub>4</sub> and N<sub>2</sub>O emissions from wastewater treatment due to technical improvements in wastewater treatment plants. Within the sector, in 2008, 86.6 per cent of the emissions were from solid waste disposal on land,

followed by 11.6 per cent from wastewater handling and 1.8 per cent from the category other, namely from biological treatment of waste.

101. The waster sector inventory is generally complete in terms of gases and categories. The methods and EFs used are in accordance with the IPCC good practice guidance and the Revised 1996 IPCC Guidelines. However, CH<sub>4</sub> emissions from sludge from industrial wastewater handling were reported as “NE” (see para. 109 below).

102. No recalculations have been performed for the sector since the previous annual submission. The ERT notes that the Netherlands has a well-developed inventory for the waste sector; several studies have been completed to further improve the accuracy of the country-specific EFs used in calculations. Two studies are still ongoing and the results are expected later in 2010. The QA/QC procedures were used comprehensively for all categories. Sector-specific planned improvements have been reported in the NIR, such as the inclusion of soil carbon fraction in the estimation of CH<sub>4</sub> emissions from SWDS and the incorporation of the emission estimates from the application of compost to land. Uncertainties have been estimated for all categories by using a tier 1 uncertainty analysis every year and a tier 2 uncertainty analysis every five years.

## 2. Key categories

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

103. CH<sub>4</sub> emissions from solid waste disposal on land decreased during the period 1990–2008, due to the increased amount of waste recovered, recycled or incinerated and a decrease in the amount of solid waste disposed of in landfills. The Netherlands used a tier 2 IPCC First Order Decay method for estimating CH<sub>4</sub> emissions from SWDS. The Party’s reporting of the AD used for the amount of waste was transparent. The country-specific parameters for degradable organic carbon (DOC), fraction of DOC dissimilated (DOC<sub>f</sub>), and methane generation rate constant (k) were introduced to improve the accuracy of the model and all parameters used were reported transparently.

104. The DOC content of the waste decreased by 45.8 per cent during the period 1990–2008, due to improved recycling and a decreasing amount of organic waste disposed of in landfills. The documentation of the composition of waste disposed of in landfills was not fully transparent. In response to a question raised by the ERT during the review, the Netherlands provided additional information on the trend in DOC. The ERT noted that the DOC content has decreased, in particular, in household waste, which is consistent with the information in the monitoring protocol regarding policies to reduce the disposal of biodegradable waste in landfills. As this information is necessary to understand the reason for the decreasing trend of CH<sub>4</sub> emissions, the ERT reiterates the recommendation of the previous review report that the Netherlands include in the NIR of its next annual submission additional information on issues that have an impact on the time series of waste composition (in particular waste type and DOC values).

105. The ERT noted an inconsistency in the reporting of the level of decrease in CH<sub>4</sub> emissions from solid waste disposal on land between 1990 and 2008. In the NIR, the Netherlands reported a decrease of 56 per cent (page 111) and of 55 per cent (page 113). According to the calculation made by the ERT, the decrease was 59.2 per cent, which corresponds to the value reported in CRF table 10. To improve the consistency of reporting the ERT recommends that the Netherlands revise and update corresponding values in the NIR of its next annual submission.

106. The ERT notes that the Netherlands is conducting an ambitious study on composition of soils in landfills and on possibility of estimating emissions from organic soil carbon. The ERT welcomes this new research and recommends that the Netherlands

follow the IPCC good practice guidance in estimating and reporting the results, paying specific attention to the correct allocation of emissions.

#### Wastewater handling – N<sub>2</sub>O

107. N<sub>2</sub>O emissions from wastewater handling was identified as a key category, and a tier 2 methodology was used for the estimation of emissions with country-specific parameters and EFs. The method is in accordance with the IPCC good practice guidance. N<sub>2</sub>O emissions from wastewater handling decreased by 1.5 per cent during the period 1990–2008, due to two counteracting trends: the improved biological breakdown of N compounds in urban wastewater treatment plants led to a gradual increase of N<sub>2</sub>O emissions; however, this improved N removal resulted in lower effluent loads and a subsequent decrease in N<sub>2</sub>O emissions from human sewage due to disposal of effluent into waterways.

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

#### Wastewater handling – CH<sub>4</sub>

108. CH<sub>4</sub> emissions from wastewater handling decreased by 31.7 per cent during the period 1990–2008, mainly due to the introduction of a new sludge stabilization system in one of the largest wastewater treatment plants. The system had been installed in 1990 but operation of the plant was optimized in the subsequent years, and therefore CH<sub>4</sub> emissions began to decrease from 1994 onwards. The amount of wastewater and sludge treated did not change significantly over time. Therefore, the inter-annual changes in CH<sub>4</sub> emissions can be explained by the varying fractions of CH<sub>4</sub> used for energy purposes or flared instead of vented.

109. The Netherlands reported CH<sub>4</sub> emissions from sludge from industrial wastewater handling as “NE”. In response to a question raised by the ERT during the review, the Netherlands explained that, in case of anaerobic industrial wastewater treatment, the emissions from sludge treatment are included in the emissions from anaerobic industrial wastewater handling. Therefore, the ERT considers that the correct notation key in the case of sludge from anaerobic wastewater treatment would be “IE”. The Netherlands further explained that there are two industrial wastewater treatment plants in the Netherlands which make use of anaerobic sludge digestion systems, the emissions of which are negligible. The ERT noted that, according to the Revised 1996 IPCC Guidelines, CH<sub>4</sub> emissions from sludge treatment largely depend on the type of wastewater. The ERT further noted, from decision tree 5.4 in the the IPCC good practice guidance, that it is good practice to identify the top three or four industries with the largest potential for CH<sub>4</sub> emissions from wastewater. The ERT understands from the response of the Netherlands that the aerobic wastewater treatment plants are not among the main CH<sub>4</sub> emitting industries, and concludes on that basis that the Netherlands follows good practice in estimating its emissions from industrial wastewater. The ERT recommends that the Party consider estimating emissions from all industrial wastewater treatment plants. The ERT also strongly recommends that the Party improve the transparency of reporting in the NIR and CRF tables in its next annual submission by listing the types of industries with wastewater treatment plants in CRF table 6.B and by describing in the NIR the types of wastewater and sludge treatment applied in each industry. Furthermore, the ERT recommends that the Party reconsider and revise, if applicable, its use of “NE” in CRF table 6.B.

110. The estimation of emissions from industrial wastewater from potential industrial activities was not documented transparently in the NIR. In response to a question raised by the ERT during the review, the Netherlands explained that the chemical oxygen demand (COD) influent load for each anaerobic wastewater treatment plant is estimated on the basis of the well-known design capacity (expressed in kg COD/day) of the wastewater treatment

plant. To improve the transparency of reporting, the ERT encourages the Netherlands to include this information in the NIR of its next annual submission.

#### Other (waste) – CH<sub>4</sub> and N<sub>2</sub>O

111. Emissions from the biological treatment of waste have increased rapidly in the period 1990–2008. The time series of AD was not reported in the NIR, but was provided in response to a question raised by the ERT during the review. To improve the transparency of reporting the ERT encourages the Party to include the time series of AD in the NIR of its next annual submission.

112. The NIR states that there is an ongoing study on the emissions from the application of compost to land. The ERT welcomes the new research results and recommends that the Netherlands follow the IPCC good practice guidance in reporting the emissions, paying specific attention to correct allocation of emissions.

### **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

113. The Netherlands reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol generally in line with the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1. The Party has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol.

114. 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.

115. The Netherlands reported carbon stock changes as “NE” in the litter, deadwood and soil organic carbon pools for afforestation and reforestation activities and in soil organic carbon pool for deforestation activities in areas subject to Article 3, paragraph 3, of the Kyoto Protocol. The ERT noted that the Netherlands did not provide sufficient verifiable information demonstrating that these pools were not net sources of emissions. In response to a question raised by the ERT during the review, the Netherlands provided additional information which demonstrates that the litter and deadwood pools were not a net source of emissions for afforestation and reforestation activities. However, the Netherlands did not provide additional information to demonstrate that soils under afforestation and reforestation activities and soils under deforestation activities are not a net source of emissions.

116. In response to the list of potential problems and further questions raised by the ERT, the Netherlands submitted the document “Mineral and organic soil emissions and sinks

related to afforestation, reforestation and deforestation, status of ongoing work". As described in the document, ongoing research in the Netherlands estimates carbon stock changes from the mineral and organic soils in areas subject to afforestation and reforestation and deforestation activities. The document demonstrates that the soil organic carbon pools in areas subject to afforestation/reforestation and deforestation activities are a net source of emissions. The Netherlands explained that the preliminary research results were not included in the revised CRF tables, because the research results had not been peer-reviewed at the time. The Party also indicated that it will include the final results of the research in its next annual submission, i.e. emission estimates for the soil organic carbon pools in areas subject to afforestation/reforestation and deforestation activities, including a recalculation of emissions for the KP-LULUCF activities for 2008.

117. The ERT considers the explanation provided by the Netherlands as sufficient for the purposes of this review. As the Netherlands has chosen to account for these activities at the end of the first commitment period, the omission of reporting of emission estimates for the soil organic carbon pools in areas subject to afforestation/reforestation and deforestation activities in the 2010 annual submission does not have consequences in terms of accounting under Article 3, paragraph 3, of the Kyoto Protocol. However, the ERT recommends that the Netherlands finalize the ongoing research and include the information provided and estimates of emissions and removals from the soil organic carbon pools in areas subject to afforestation/reforestation and deforestation activities in its next annual submission, including the missing emissions for 2008.

118. N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland were reported as "NE". The NIR states that a research study is ongoing in the Netherlands to estimate the emissions and the results are expected to be included in the next annual submission. The ERT recommends that the Netherlands provide estimations for this category in its next annual submission.

119. Controlled burning is reported as "NO" but CO<sub>2</sub> and non-CO<sub>2</sub> emissions from wildfires were reported as "NE" due to the absence of fire monitoring since 1996. Although wildfire statistics indicated that forest fires rarely occurred in the two decades before 1996 (after 1996 this information is absent), the ERT recommends that the Netherlands provide estimations for this category in its next annual submission.

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

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

120. The Netherlands reported afforestation and reforestation activities separately for different lands (grassland, cropland, land with trees outside forests, wetland, settlement and other lands) converted to forest land. The methodologies used to calculate carbon stock changes due to afforestation and reforestation activities are consistent with those used under the Convention for estimating carbon stock changes on different lands converted to forest land and based on country-specific tier 2 methodology.

121. The carbon stock changes due to changes in biomass were attributed to above- and below-ground biomass using one average value derived from the plots of 0–20 years old. Carbon stock changes in the deadwood, litter, mineral and organic soils pools are reported as "NE". In response to a question raised by the ERT during the review, the Netherlands provided additional information demonstrating that the litter and deadwood pools not accounted for were not net sources of emissions. In response to the list of potential problems and further questions raised by the ERT, the Netherlands informed the ERT that estimates of carbon stock changes in organic and mineral soils will be included in its next annual submission (see para. 116 above).

*Deforestation – CO<sub>2</sub>*

122. The methodologies used to calculate carbon stock changes due to deforestation activities are consistent with those used under the Convention for estimating forest land converted to cropland, grassland, wetland, settlement and other land according to the tier 2 methodology. The estimates of carbon stock changes in biomass were differentiated into above- and below-ground biomass using data available from a simple country-specific model. All emissions were attributed to the year of deforestation, and no emissions were reported for any other years. The Netherlands reported carbon stock changes in the deadwood and litter pools for deforestation activities. However, carbon stock changes in organic and mineral soils were not reported in the 2010 annual submission, but will be reported in the next annual submission (see para. 116 above).

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

123. 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.<sup>10</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

124. 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. Information reported by the Party on records of any discrepancies was found to be consistent with information provided to the secretariat by the ITL. The Party has reported on corrective actions to reduce discrepancies between the national registry and the ITL, with a view to minimizing operator errors and ensuring efficient exchange of data with other registry systems, including the ITL.

National registry

125. 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 meet the requirements set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. The national registry has fulfilled all requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1.

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<sup>10</sup> The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.



126. The Netherlands has reported on corrective actions to improve the availability of public information, which was identified as necessary in the previous review report. The ERT commends the Party for addressing these problems in its 2010 annual submission.

#### Calculation of the commitment period reserve

127. The Netherlands has reported its commitment period reserve in its 2010 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (901,135,927 t CO<sub>2</sub> eq) as it is based on the assigned amount and not on the most recently reviewed inventory. The ERT agrees with this figure.

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

128. The Netherlands provided information on the following changes to its national system in its 2010 annual submission: the coordination of the emission registration project, including compilation of the inventory, was performed by the PBL until 1 January 2010. As of 1 January 2010, coordination has been assigned to the RIVM. Processes, protocols and methods for the preparation of the inventories remain unchanged. Many experts from the PBL have also shifted to the RIVM. In response to a question raised by the ERT during the review, the Netherlands further explained the current roles of the PBL and the RIVM as part of the national system. Another minor change reported by the Party concerned the renaming of the single national entity, from SenterNovem to the NL Agency. The ERT concluded that the national system continues to be in accordance with the requirements of national systems set out in decision 19/CMP.1.

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

129. The Netherlands reported on changes to its national registry in chapter 14 of the NIR. The Party described changes to the database and capacity of its national registry. In 2009, two registry software version updates were implemented, which incorporated changes that increased the capacity of the national registry. The Netherlands also reported that the software update resulted in an improvement in data integrity.

130. The Netherlands provided to the ERT the information from its national registry that substantiated or clarified the information reported in its 2010 annual submission. The ERT noted that the Party has implemented all the recommendations of the previous review report. The ERT concluded 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 the relevant decisions of the Conference of the Parties serving as the meeting of the Parties (CMP) to the Kyoto Protocol.

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

131. In its 2010 annual submission, the Netherlands reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as required by chapter I.H of the annex to decision 15/CMP.1. The information is considered complete and transparent.

132. In chapter 15 of the NIR, the Netherlands reported on how it strives to minimize adverse impacts through adaptation policies: by contributing to international negotiations on the adaptation fund; by using the Kyoto Protocol mechanisms; by reducing market imperfections; and by strengthening the capacity of developing countries. For example, the Government of the Netherlands initiated a project on the sustainable production of biomass

which developed the indicators and criteria to measure the Netherlands' contribution to improving sustainability of biomass and biofuel production in developing countries.

### III. Conclusions and recommendations

133. The Netherlands submitted its 2010 annual inventory submission on 14 April 2010; it contains a complete set of CRF tables. The Netherlands submitted the NIR on 15 April 2010 and resubmitted it on 7 May 2010. 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, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. This is in line with decision 15/CMP.1. In response to the list of potential problems and further questions raised by the ERT, the Netherlands officially submitted the revised CRF tables on 14 October 2010; and it submitted additional information on inventory and non-inventory elements of the annual submission relating to the KP-LULUCF reporting on 22 October 2010. The additional information relating to the KP-LULUCF reporting was resubmitted on 11 November 2010.

134. The ERT concludes that the inventory submission of the Netherlands has been prepared and reported in accordance with the UNFCCC reporting guidelines. The annual submission is generally complete in terms of categories and is complete in terms of gases, geographical coverage, years and sectors. In the 2010 annual submission, the Netherlands reported as "NE" emissions from the activities that occur in the country and for which the methodologies and EFs are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, such as: fugitive emissions of CO<sub>2</sub> and CH<sub>4</sub> from transport (oil). In response to the list of potential problems and further questions raised by the ERT during the review, the Netherlands provided the missing emission estimates for these categories. The Netherlands also reported CH<sub>4</sub> emissions from sludge from industrial wastewater handling as "NE". In response to a question raised by the ERT during the review, the Party provided additional information justifying the use of "NE". However, the ERT considers that the correct notation key would be included elsewhere ("IE").

135. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported generally in accordance with decision 15/CMP.1.

136. The ERT concludes that the 2010 annual submission of the Netherlands has been prepared and reported in accordance with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

137. Netherlands has provided supplementary information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, in its NIR and CRF tables according to the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1. The Netherlands has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. In its 2010 annual submission, the Netherlands reported as "NE" carbon stock changes in the litter, deadwood and soil organic carbon pools for afforestation and reforestation activities; and in soil organic carbon pool for deforestation activities in areas subject to Article 3, paragraph 3, of the Kyoto Protocol. In response to a question raised by the ERT during the review, the Party provided additional information which demonstrates that the litter and deadwood pools were not a net source of emissions for afforestation and reforestation activities. However, the Netherlands did not provide additional information that demonstrates that soils under afforestation and reforestation activities and soils under deforestation activities are not a net source of emissions. In response to the list of potential

problems and further questions raised by the ERT, the Party provided preliminary research results which demonstrated that soil organic carbon pools in areas subject to afforestation and reforestation, and deforestation activities are a net source of emissions.

138. 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.

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

140. 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.

141. The Netherlands has reported the information requested in 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 2010 annual submission. The information is complete and transparent.

142. In the course of the review, the ERT formulated a number of recommendations relating to transparency, completeness and consistency of the 2010 annual submission. The key recommendations are that the Netherlands:

(a) Include more information from the monitoring protocols in the NIR regarding methodologies, EFs, AD, uncertainties and QA/QC procedures to improve the transparency of reporting; and improve the consistency of information reported in different chapters of the NIR, between the NIR and the monitoring protocols, between the CRF tables and between the NIR and the CRF tables;

(b) Fully implement the results of the Ecofys study regarding uncertainties and QA/QC procedures and report the results in the NIR;

(c) Include in the NIR a more detailed description of archived information;

(d) Provide more information that supports and explains the trends of emissions for categories for which the AD and/or EF are confidential;

(e) Finalize the ongoing research and include the estimates of emissions and removals from soil organic carbon pools in areas subject to afforestation and reforestation and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol, including the missing emissions for 2008 in its next annual submission.

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

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

## Annex I

### Documents and information used during the review

#### A. Reference documents

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

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

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

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

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

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

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

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

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

Status report for the Netherlands 2010. Available at  
<<http://unfccc.int/resource/docs/2008/asr/nld.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <<http://unfccc.int/resource/webdocs/sai/2010.pdf>>.

FCCC/ARR/2009/NLD. Report of the individual review of the greenhouse gas inventory of the Netherlands submitted in 2009. Available at  
<<http://unfccc.int/resource/docs/2009/arr/NLD.pdf>>.

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

**B. Additional information provided by the Party**

Responses to questions during the review were received from Mr. Harry Vreuls (NL Agency), including additional material on the methodology and assumptions used. The following documents<sup>1</sup> were also provided by the Netherlands:

Zijlema, P. 2010. *Explanation of differences between CO<sub>2</sub> emissions in EU ETS and other reports for the purpose of NIR 2010* (NL Agency);

Reuermann, P. and Fredericks, B. 2002. *Charcoal production with reduced emissions* (Biomass technology group).

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

## Annex II

### Acronyms and abbreviations

AD	activity data
C	confidential
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COD	chemical oxygen demand
CRF	common reporting format
DOC	degradable organic carbon
DOC <sub>f</sub>	fraction of degradable organic carbon dissimilated
EF	emission factor
ERT	expert review team
EU-ETS	European Union emission trading scheme
FAO	Food and Agriculture Organisation of the United Nations
F-gas	fluorinated gas
Gg	gigagram
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
m <sup>3</sup>	cubic metre
Mt	million tonnes
N	nitrogen
NA	not applicable
NE	not estimated
NO	not occurring
N <sub>2</sub> O	nitrous oxide
NIR	national inventory report
QA/QC	quality assurance/quality control
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SIAR	standard independent assessment report
SWDS	solid waste disposal site
UNFCCC	United Nations Framework Convention on Climate Change
VOC	volatile organic compound