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**Report of the individual review of the annual submission of Belgium  
submitted in 2009\***

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

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## I. Overview

### A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Belgium, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 7 to 12 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Michael Strogies (Germany) and Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Simon Wear (New Zealand) and Mr. Glen Whitehead (Australia); industrial processes – Ms. Debra Ottinger (United States of America) and Ms. Birna Hallsdóttir (Iceland); agriculture – Mr. Sergio González (Chile) and Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Peter Stephens (New Zealand) and Mr. Héctor Ginzo (Argentina); and waste – Mr. Hiroyuki Ueda (Japan) and Ms. Juliana Boateng (Ghana). Mr. Strogies and Mr. González were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (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 Belgium, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

### B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in Belgium was carbon dioxide (CO<sub>2</sub>), accounting for 87.2 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by nitrous oxide (N<sub>2</sub>O) (6.2 per cent) and methane (CH<sub>4</sub>) (5.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>), referred to collectively as fluorinated gases (F-gases), accounted for 1.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.2 per cent of the total GHG emissions, followed by industrial processes (10.4 per cent), agriculture (7.3 per cent) and waste (0.4 per cent). Total GHG emissions amounted to 131,300.79 Gg CO<sub>2</sub> eq and decreased by 9.1 per cent between the base year<sup>2</sup> and 2007. Emissions declined by 3.9 per cent between 2006 and 2007.

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

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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. Total greenhouse gas emissions by gas, 1990–2007<sup>a</sup>**

Greenhouse gas	Gg CO <sub>2</sub> eq							Change base year–2007 (%)
	Base year <sup>b</sup>	1990	1995	2000	2005	2006	2007	
CO <sub>2</sub>	118 626.66	118 626.66	123 297.53	123 678.19	123 432.40	119 085.48	114 544.70	–3.4
CH <sub>4</sub>	9 992.59	9 992.59	9 508.28	8 471.99	6 924.93	6 764.91	6 658.04	–33.4
N <sub>2</sub> O	10 775.28	10 775.28	11 670.19	11 525.41	9 840.45	8 933.61	8 079.31	–25.0
HFCs	439.03	439.03	439.03	951.95	1 496.48	1 601.32	1 765.48	302.1
PFCs	2 335.24	1 753.32	2 335.24	360.90	140.97	152.21	172.29	–92.6
SF <sub>6</sub>	2 205.16	1 662.49	2 205.16	111.52	83.85	74.88	80.98	–96.3

<sup>a</sup> “Total greenhouse gas emissions” includes emissions from Annex A sources only (excluding emissions and removals from the land use, land-use change and forestry sector).

<sup>b</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 2. Greenhouse gas emissions by sector, 1990–2007**

Sector	Gg CO <sub>2</sub> eq							Change base year–2007 (%)
	Base year <sup>a</sup>	1990	1995	2000	2005	2006	2007	
Energy	112 543.58	112 543.58	115 970.25	116 308.19	115 215.83	110 902.08	106 670.04	–5.2
Industrial processes	16 841.20	15 716.61	18 730.78	15 185.05	15 163.08	14 427.20	13 657.78	–18.9
Solvent and other product use	246.25	246.25	239.57	252.07	247.41	246.68	246.74	0.2
Agriculture	11 339.95	11 339.95	11 485.46	11 046.93	9 936.06	9 836.19	9 621.48	–15.2
LULUCF	NA	–1 422.19	–1 371.45	–1 531.51	–370.01	–1 060.86	–1 473.48	NA
Waste	3 402.96	3 402.96	3 029.37	2 307.73	1 356.71	1 200.25	1 104.75	–67.5
Other	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	NA	141 827.17	148 083.97	143 568.46	141 549.09	135 551.54	129 827.31	NA
<b>Total (without LULUCF)</b>	144 373.95	143 249.36	149 455.42	145 099.97	141 919.10	136 612.40	131 300.79	–9.1

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

<sup>a</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.

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

5. The 2009 annual inventory submission was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). Belgium also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: the accounting of Kyoto Protocol units, and changes in the national system and in the national registry. The standard electronic format (SEF) tables were submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. Belgium indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.
6. Belgium submitted information on 23 September 2009 on the completeness of the annual inventory submission in response to questions raised by the expert review team (ERT) during the review.
7. 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>
8. During the review, Belgium provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. Where necessary, the ERT also used the previous years' submissions during the review. The full list of materials used during the review is provided in annex I to this report.

#### Completeness of the inventory

9. The inventory covers all sectors and most source and sink categories and GHGs for the period 1990–2007, and is complete in terms of geographical coverage. All CRF tables have been reported for all years, except table 7 (key category analysis) and table 8(b) (recalculation explanations), which were not provided for any years of the time series, although the key category analysis has been provided by the Party in its NIR (see para. 23 below). The ERT recommends that Belgium correct these omissions in its next annual submission.
10. The ERT noted with serious concern the lack of completeness of the part of the inventory on the LULUCF sector (hereinafter referred to as the LULUCF inventory). Belgium has reported as not estimated (“NE”) all land conversions, some carbon pools and all non-CO<sub>2</sub> emissions. The ERT strongly recommends that Belgium ensure that its national system can report all emissions by sources and removals by sinks from the LULUCF sector in its next annual submission.
11. In response to a question raised by the ERT during the review concerning a lack of completeness in the reporting of Annex A emissions, Belgium indicated that it will address the issue in its next annual submission in regard to CH<sub>4</sub> and N<sub>2</sub>O emissions from chemicals – biomass (in the Flemish Region), and that it will also replace the use of notation key “NE” with “NO” (not occurring) for the following categories: railways – gaseous fuels (all GHGs); navigation – gasoline and gaseous fuels (all GHGs); underground mines – recovery/flaring (CH<sub>4</sub>); surface mines – recovery/flaring (CH<sub>4</sub>); other transportation (non-specified (1.A.3.e)) – biomass and other fuels (all GHGs); and other applications using substitutes for ozone-depleting substances (all F-gases). Belgium also indicated that CO<sub>2</sub> and N<sub>2</sub>O emissions from

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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. The SIAR is not publicly available.

other (non-biogenic) (municipal waste burning (6.C.b)) should be reported as included elsewhere, with emissions currently attributed to public electricity and heat production.

12. The ERT recommends that Belgium improve the completeness of its next annual submission, especially for those categories for which emissions are known to occur in the country and for which methodologies for estimating emissions are available in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The ERT also recommends that the Party, when reporting emissions data for the first time for a given category, ensure that the data cover the entire inventory time series, and that the rationale for the choice of methods, emission factors (EFs) and other parameters are clearly explained in the NIR. The ERT welcomes Belgium's intention to readdress the use of notation keys in certain categories, as mentioned in paragraph 11 above.

#### **D. Main findings**

13. The inventory has been prepared generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, and reported generally in line with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). The inventory is not complete with respect to the coverage of categories in the energy and LULUCF sectors (see para. 10 above), and the transparency of the inventory could be improved in regard to documentation of category descriptions, recalculations and methodologies used (see para. 32 below).

14. The Party has used data obtained from the European Union emissions trading scheme (EU ETS) to estimate emissions from the energy and industrial processes sectors (see paras. 60 and 61 below), and to verify emission estimates in the energy sector (see para. 31 below). The NIR contains only limited information on:

- (a) Whether these data have been prepared and incorporated into the inventory in line with the principles of the IPCC good practice guidance;
- (b) Whether these data have been subjected to any quality assurance (QA) and/or verification and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance;
- (c) How time-series consistency has been ensured when using these data in the inventory, and the effect of the use of these data on the trend in emissions.

15. The 2009 annual inventory submission is generally of a good quality and shows improvement over the previous annual submission as a result of Belgium's efforts to harmonize its inventory across its regions and to address recommendations made during the previous review. The ERT identified a need for further improvement in the following areas:

- (a) Further centralization at the country level of the coordination of both the quality assurance/quality control (QA/QC) activities and the management and implementation of the inventory improvement plan, including the responsibility for establishing and setting priorities to improve the inventory;

- (b) Coverage of categories, carbon pools and GHGs in the LULUCF sector (see para. 10 above and para. 79 below);
- (c) Further improved transparency of the NIR by provision of more category-specific information, such as discussions of emission trends or a comparison of approaches used in the different regions of the country to estimate emissions (see para. 32 (a) below).

16. Belgium has submitted, in part, on a voluntary basis, the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with section I of the annex to decision 15/CMP.1. The Party did not submit information on activities under Article 3, paragraph 3, of the Kyoto Protocol, or information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. It has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1.

17. Belgium has reported no changes in its national system since the previous annual submission, and the system continues to perform its required functions as set out in the annex to decision 19/CMP.1. However, the ERT identified a significant issue that will need to be addressed by the Party in preparation for its 2010 annual submission, which is to comprise information on activities under Article 3, paragraph 3, of the Kyoto Protocol (see para. 10 above and para 79 below). This significant issue relates to the lack of completeness of the LULUCF inventory, which corresponds directly to the inventory for LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol.

18. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). Belgium has reported that some changes have been made to its national registry since the previous annual submission (see para. 105 below).

19. Belgium has structured its reporting following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.<sup>4</sup>

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

### **1. Overview**

20. The ERT concluded that the national system and its institutional arrangements continued to perform their required functions.

21. As described in the NIR, the inventory system established in Belgium reflects the federal structure of the country. The annual inventory is an aggregation of three inventories compiled for the Flemish, Walloon and Brussels-Capital Regions. For each region a different institution manages the annual submission, namely the Department on Air, Environment and Communication of the Flemish Environment Agency, the Walloon Agency for Air and Climate, and Brussels Environment (formerly known as the Brussels Institute for Management of the Environment). Overall responsibility for the quality and cross-cutting aspects of the Belgian inventory rests with the Working Group on Emissions of the Coordination Committee for International Environment Policy (CCIEP). CCIEP is responsible for all technical aspects of the inventory submission through the Interregional Cell for the Environment

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<sup>4</sup> <[http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/reporting\\_requirements/application/pdf/annotated\\_nir\\_outline.pdf](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf)>.



(IRCEL-CELINE), which is designated as the single national entity, including the choice of methodologies, EFs, uncertainty analysis and implementation of QA/QC procedures. IRCEL-CELINE compiles the aggregate Belgian inventory and is responsible for performing the key category analysis, providing descriptions of emission trends and archiving. The present ERT reiterates a recommendation of the previous ERT that Belgium strive to harmonize methods and EFs used across the three regions, and ensure that the NIR provides sufficient documentation on and explanation for the cases where harmonization is not possible.

## 2. Inventory planning

22. The NIR contains information on the allocation of responsibilities within Belgium's national system for inventory planning. This information has not changed since the review of Belgium's initial report under the Kyoto Protocol and includes descriptions of the timeline to compile its annual submission, data sources and the approval and submission procedures. The ERT recommends that Belgium further centralize the coordination of both the QA/QC activities and the management and implementation of the inventory improvement plan, including the responsibility for establishing and setting priorities to improve the inventory.

## 3. Inventory preparation

### Key categories

23. Belgium has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2009 submission, in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The key category analysis performed by the Party and that performed by the secretariat<sup>5</sup> produced similar results. However, some differences in the levels of aggregation used by Belgium and the secretariat led to some slight differences in the ranking of categories. In the 2009 annual submission, fugitive emissions (2.E.2) – F-gases and manure management – N<sub>2</sub>O are no longer identified as key categories by the Party in contrast to in the previous annual submission.

24. The ERT noted that the NIR does not provide detailed information on how the key category analysis is used to prioritize improvements to the inventory submission. The present ERT reiterates the recommendation of the previous ERT that Belgium include information in its next annual submission on how it uses the key category analysis (along with the uncertainty analysis) to prioritize inventory improvements.

### Uncertainties

25. Belgium has prepared and reported in the NIR a tier 1 uncertainty analysis in accordance with the IPCC good practice guidance. Belgium has reported an overall uncertainty for the inventory submission of 7.6 per cent, and a trend uncertainty of 2.8 per cent for the period 1990–2007. These results are similar to those reported in the previous annual submission. The ERT noticed that Belgium has continued to use 1995 as the base year for F-gases in the trend analysis for the period 1990–2007, and recommends that Belgium consider using data for 1990 instead, in line with the IPCC good practice guidance.

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<sup>5</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 IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

26. The ERT reiterates the recommendation made in paragraph 24 above that Belgium provide in its next annual submission information on how the uncertainty analysis (along with the key category analysis) is used to prioritize improvements to the inventory submission.

#### Recalculations and time-series consistency

27. Recalculations have been performed in accordance with the IPCC good practice guidance and reported generally in line with the UNFCCC reporting guidelines. The ERT noted that the recalculations were undertaken to take into account: efforts by the Party to harmonize the EFs used across the country's regions (for the energy and agriculture sectors); corrections or revisions to activity data (AD), EFs or other parameters (for the energy, industrial processes, solvent and other product use and agriculture sectors); and use of data from the EU ETS (for the industrial processes sector).

28. The Belgian inventory is generally time-series consistent, with exception to the use of EU ETS data for the later years of the inventory time series for a number of categories in the energy and industrial processes sectors. The Party has not explained in the NIR how it ensured time-series consistency when using data obtained from the EU ETS. The ERT recommends that Belgium provide information in the NIR on the use of EU ETS data, as outlined in paragraph 14 above.

29. The major changes, and the magnitude of the impact, include decreases in the estimates of total GHG emissions of 0.06 and 0.53 per cent for the base year and 1990, respectively, and an increase of 0.05 per cent in that estimate for 2006. The rationale for these recalculations is documented in the NIR, but not at all in CRF table 8(b). The present ERT reiterates the recommendation of the previous ERT that Belgium include more detailed information in the NIR on the rationale for each recalculation, how the recalculation has affected the emission trend and how Belgium has ensured time-series consistency, and that it include in CRF table 8(b) explanations of each recalculation undertaken.

#### Verification and quality assurance/quality control approaches

30. Belgium has described in the NIR its QA/QC plan, summarizing the procedures in place to ensure the quality of its inventory submission. However, the ERT identified a lack of transparency in the information in the NIR (and in the document links contained therein) concerning how the Party's QA/QC plan is linked to its inventory improvement plan, and also how the implementation of the QA/QC plan has improved the quality of its inventory. The ERT recommends that Belgium provide more detailed descriptions in its next annual submission of the implemented QA/QC procedures and how they are used to ensure the quality of the inventory.

31. The ERT noted that data from the EU ETS are used to verify emission estimates in parts of the inventory. The Flemish Region uses EU ETS data to verify emission estimates in the energy sector, and the Walloon Region uses EU ETS data for emission estimates in the energy industries and manufacturing industries and construction subsectors. The NIR also mentions a "fallback approach" for the estimation of emissions from iron and steel in the Walloon Region, whereby the difference between the fuel consumption figures reported in the national energy statistics and those obtained from the EU ETS is used to estimate the remaining emissions from this category. However, the NIR does not provide information on whether these data have been subjected to any QA and/or verification and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance. The ERT recommends that the Party include this information in its next annual submission. Also, the ERT recommends that Belgium explore opportunities to verify emission estimates in other categories, particularly where verified direct measurement data may be available under the EU ETS.

### Transparency

32. Belgium's 2009 annual submission is generally transparent and is a marked improvement on previous annual submissions. However, the ERT has identified areas for further improvement of transparency, including:

- (a) Improved discussion of emission trends in chapter 2 of the NIR by providing information on the impact on emission trends of different measures taken in the country's three regions (e.g. in the waste sector), and also the provision in the sector chapters of the NIR of category-specific descriptions of these measures and their impact on emission trends;
- (b) Improved documentation of recalculations, including the provision of explanations and documentation of the rationale behind each recalculation;
- (c) Description and comparison of different methods used in the country's three regions for identical categories, such as the fuel split for national and international transportation;
- (d) Improved category descriptions at the beginning of each section in the NIR, including discussions of emission trends;
- (e) Provision of information in the NIR on the use of EU ETS data, as outlined by the ERT in paragraph 14 above.

#### 4. Inventory management

33. Belgium's archiving system remains decentralized, being split between the regions and the single national entity (IRCEL-CELINE). The regions archive information on methodologies, AD and EFs used to compile the regional inventories, with IRCEL-CELINE archiving only the CRF tables of the regional and aggregate Belgian submissions. The present ERT reiterates an encouragement of the previous ERT that Belgium establish a centralized archiving system at IRCEL-CELINE.

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

34. The present ERT noted improvements in the 2009 annual submission made in response to recommendations of the previous ERT. These include:

- (a) Inclusion of the LULUCF sector in the uncertainty analysis;
- (b) Further harmonization of the selection of methods and EFs across the three regions of the country;
- (c) Improved completeness and transparency of the CRF tables through the use of appropriate notation keys;
- (d) Improved coordination of the inventory preparation process.

35. However, the present ERT concluded that not all recommendations of the previous ERT have been addressed, including those in relation to:

- (a) Information on how the key category analysis and uncertainty analysis are used to prioritize improvements to Belgium's inventory;
- (b) More detailed information in the NIR on the rationale for recalculations, and on how recalculations have affected emission trends and how Belgium has ensured time-series consistency when using data obtained from the EU ETS;

- (c) Establishment of a centralized archiving system in Belgium to improve the transparency of the inventory;
- (d) Improved category descriptions in the NIR, and better information on regional-level methods and EFs and clearer explanation of the rationale for their selection;
- (e) Complete coverage of LULUCF activities, carbon pools and GHGs under the Convention, and taking steps to ensure that the national system can identify areas of land use and land-use change subject to activities under Article 3, paragraph 3, of the Kyoto Protocol;
- (f) The public availability on the interface of the national registry of the information referred to in paragraphs 46–48 of the annex to decision 13/CMP.1.

## **G. Areas for further improvement**

### **1. Identified by the Party**

36. The 2009 NIR identifies the following areas for improvement:

- (a) Recalculations in several areas (e.g. CO<sub>2</sub> from cement and lime production in the Walloon Region, and CH<sub>4</sub> from the glass industries to harmonize the approach applied in the Walloon Region with the approach applied in the Flemish Region);
- (b) Revision of the model used in the Flemish Region to calculate ammonia emissions from the categories direct soil emissions and indirect emissions in the agriculture sector, paying particular attention to the emissions from manure management, the determination of the uncertainty of these emissions and the identification of the type of mineral fertilizer and its application;
- (c) Further harmonization of EFs, methods and AD used in the different regions.

### **2. Identified by the expert review team**

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

- (a) To ensure that the national system has the capacity to identify areas of land use and land-use change under Article 3, paragraph 3, of the Kyoto Protocol pursuant to decision 16/CMP.1, and to provide emission estimates for all carbon pools and all GHGs in the LULUCF sector;
- (b) To provide information in the NIR on the use of EU ETS data, as outlined by the ERT in paragraph 14 above;
- (c) To provide more precise descriptions of those methodologies that differ from equivalent IPCC methodologies and also those that differ between the country's regions;

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

## II. Energy

### A. Sector overview

39. The energy sector is the main sector in the GHG inventory of Belgium. In 2007, emissions from the energy sector amounted to 106,670.04 Gg CO<sub>2</sub> eq, or 81.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 5.2 per cent. The fall in emissions is mainly attributable to a reduction in emissions from manufacturing industries and construction and energy industries, which is partially offset by an increase in emissions from transport. Within the sector, 25.3 per cent of the emissions were from energy industries, followed by 25.0 per cent from the category other sectors, 24.8 per cent from manufacturing industries and construction, 24.3 per cent from transport and 0.1 per cent from the category other. The remaining 0.5 per cent were fugitive emissions from fuels.

40. The reporting of the energy sector is generally complete in terms of categories. Emission estimates have in general been prepared and reported in accordance with the IPCC good practice guidance. However, the ERT identified potential underestimations of emissions from iron and steel (N<sub>2</sub>O) and chemicals (biomass – CH<sub>4</sub> and N<sub>2</sub>O) in the latest reporting year. The ERT recommends that Belgium address this in its next annual submission. The ERT commends Belgium for the effort it has made to further harmonize AD, EFs and other parameters used between its regions, and for improvements with regard to the completeness of CRF tables and the use of notation keys. However, the structure of the energy sector chapter of the NIR is not in line with the UNFCCC reporting guidelines, in that it does not provide a section on sector-specific QA/QC activities. The ERT recommends that the Party structure the NIR of its next annual submission in accordance with the outline set out in the UNFCCC reporting guidelines.

41. Belgium has performed several recalculations for this sector in response to recommendations of the previous ERT, to reflect newly harmonized AD, EFs and other parameters, and also as part of its general inventory improvements. The effect of the recalculations is an overall decrease of 0.2 per cent (193.21 Gg CO<sub>2</sub> eq) in the emission estimates for 1990 and an overall increase of 0.04 per cent (41.51 Gg CO<sub>2</sub> eq) in the estimates for 2006. The resulting time series is consistent. Explanations for the recalculations are not provided in CRF table 8(b), nor are all recalculations mentioned in the NIR (e.g. the recalculation for the category agriculture/forestry/fisheries). The ERT recommends that Belgium improve the transparency of recalculations by ensuring that the NIR and CRF table 8(b) are complete, providing the explanation for and rationale behind each recalculation undertaken.

42. Belgium has used data reported under the EU ETS for some parts of the energy sector inventory. However, the NIR does not provide information on the use of EU ETS data, as outlined in paragraph 14 above.

43. The present ERT reiterates recommendations of the previous ERT that Belgium continue to improve the transparency of the energy sector inventory, including by providing improved category descriptions in the NIR, giving more information on regional-level methods and EFs used and explaining why certain methods and/or EFs are not harmonized across the country's regions. It also recommends that the Party consider providing information in its next annual submission that explains the trends in AD, implied emission factors (IEFs) and/or emissions over the inventory time series.

### B. Reference and sectoral approaches

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

44. In 2007, the difference in CO<sub>2</sub> emissions estimated using the reference approach and the sectoral approach is 1.1 per cent. This difference varies from –4.1 to 4.0 per cent over the time series; however, it has been relatively low since 2003. Potential reasons for the difference are explained in the NIR.

45. Data reported by the Party on apparent fuel consumption were comparable with corresponding data from the International Energy Agency, with less than 1 per cent difference observed for all years of the time series except 1993 and 1995.

46. The ERT identified an inconsistency in the CRF tables between the reference and the sectoral approach for the year 2006 in the reporting of natural gas production. The ERT recommends that Belgium address this inconsistency and report thereon in its next annual submission.

## 2. International bunker fuels

47. In response to recommendations of the previous ERT, Belgium has recalculated the estimated emissions from domestic and international aviation to correct an incorrect allocation of fuel in the Walloon Region, where all jet kerosene is allocated to aviation gasoline for the years 1995–2006. In addition, the Walloon Region recalculated the estimated emissions from international aviation to rectify an error in the AD for 2006.

48. Belgium uses region-specific approaches to differentiate between fuel use for domestic and international aviation and marine activities. In response to a question raised by the ERT during the review, Belgium clarified the approaches used in each region. The approaches used at the regional level are in line with the IPCC good practice guidance. The ERT recommends that the Party include this information in its next annual submission. It also recommends that Belgium apply the same approach in the three regions of the country to differentiate between fuel use for domestic and international activities.

## 3. Feedstocks and non-energy use of fuels

49. The completeness of the CRF table for feedstocks and non-energy use of fuels has improved since the last annual inventory submission, owing to the increased use of notation keys.

### **C. Key categories**

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

50. The methodologies, AD and EFs used by Belgium for its inventory are in line with the IPCC good practice guidance for all fuels.

51. In response to questions raised by the ERT during the review, Belgium confirmed that the estimates of emissions from the agriculture/forestry/fisheries category have been recalculated for all years of the inventory time series to reflect a change in the coverage of fishery activities in the Flemish Region. The ERT found that the recalculated emission estimates account only for emissions from fishing within the Belgian territorial sea. This is not consistent with the IPCC good practice guidance, which states that, by definition, all fuel supplied to commercial fishing activities in the reporting country is to be considered domestic, regardless of where the fishing occurs. Furthermore, this recalculation was not mentioned in the NIR or CRF table 8(b). The ERT recommends that Belgium revise the estimates of emissions from agriculture/forestry/fisheries in its next annual submission, in order to ensure the completeness of the inventory and consistency with the IPCC good practice guidance, and that the Party clearly document the results in the NIR and CRF table 8(b).

### **D. Non-key categories**

#### Other (mobile (1.A.5.b)): liquid fuels – CO<sub>2</sub>

52. In response to a question from the ERT during the review, Belgium confirmed that the emission estimates reported for military transport are correct; however, Belgium indicated in its response that it

had identified an error in the reported AD for the Flemish Region for 2007 that did not affect the overall emission estimate. The ERT recommends that the Party correct this error in its next annual submission.

### **III. Industrial processes and solvent and other product use**

#### **A. Sector overview**

53. In 2007, emissions from the industrial processes sector amounted to 13,657.78 Gg CO<sub>2</sub> eq, or 10.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 246.74 Gg CO<sub>2</sub> eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 18.9 per cent in the industrial processes sector, and increased by 0.2 per cent in the solvent and other product use sector. The fall in emissions in the industrial processes sector is mainly attributable to a decrease in the production of HFCs and to a lesser extent a decrease in activity in the iron and steel industry. This downward trend is partly offset by increased activity in the chemical industry. Within the industrial processes sector, 41.0 per cent of the emissions were from mineral products, followed by 33.3 per cent from chemical industry, 13.6 per cent from consumption of halocarbons and SF<sub>6</sub>, 10.9 per cent from metal production and 1.3 per cent from production of halocarbons and SF<sub>6</sub>.

54. The reporting of the industrial processes sector is generally complete in terms of categories and years, and, in the main, emission estimates have been prepared and reported in accordance with the IPCC good practice guidance. However, Belgium has not reported emissions from asphalt roofing or used notation keys (or reported emissions data) for hydrochlorofluorocarbon (HCFC)-22 production in CRF table 2(II), making it unclear whether the emissions occur. In response to a question raised by the ERT during the review, Belgium confirmed that no production of HCFC-22 occurred in the period 1990–2007. The ERT encourages Belgium to explore the possibility of reporting emissions from asphalt roofing and to use the correct notation key for the reporting of production of HCFC-22 in its next annual submission.

55. In general, Belgium's methods for estimating emissions from consumption of F-gases appear to be appropriate and consistent with the Revised 1996 IPCC Guidelines and elaborated by the IPCC good practice guidance, although a lack of transparency in the information provided in the NIR sometimes makes this determination difficult. In some cases Belgium appears to be underestimating emissions. The Party does not estimate emissions from disposal of domestic refrigeration equipment, for example, although these emissions are typically the dominant form of lifetime emissions from these products. In addition, Belgium's emissions from electrical equipment are about six times lower than its emissions from double-glazed windows, which is very unusual. Per capita, Belgium's emissions from electrical equipment are about 10 times lower than those of other European countries. This suggests that Belgium's AD or EFs for this category are incorrect, but it is difficult to ascertain because neither are available in the CRF tables or the NIR. The ERT recommends that Belgium estimate emissions from disposal of domestic refrigeration equipment in its next annual submission and urges it to re-examine its AD and EFs for electrical equipment.

56. The inventory includes estimates of actual and potential emissions of F-gases. In the NIR, Belgium states that it calculates the potential emissions as consumption of the gas minus the amount recovered. This may underestimate potential emissions, because consumption, if defined as production plus imports minus exports, should automatically account for recovery and recycling of the gas. In addition, the NIR does not sufficiently explain whether and how Belgium uses data on potential emissions to estimate or check its estimates of actual emissions, for motor-vehicle air conditioners, for example. Belgium reports fugitive emissions from production of perfluorobutane, perfluoropentane and perfluorohexane in table 2(II)s1, but it reports production of these chemicals as "NO" in table 2(II)s2 – this inconsistency is not explained in the NIR.

57. The ERT commends the inclusion of more detail on the method used to estimate emissions from refrigeration and air-conditioning equipment. Belgium is encouraged to improve the reporting further by providing the AD and EFs used to estimate emissions of HFC-32, HFC-125, HFC-143a, HFC-152a and SF<sub>6</sub> from refrigeration and air-conditioning equipment, foam blowing and electrical equipment, as applicable.

58. The ERT noted that the transparency of the part of the inventory on the industrial processes and solvent and other product use sectors could be further improved. The ERT recommends that Belgium:

- (a) Provide more detailed, quantitative information on the methods, EFs and AD used to estimate emissions from several categories (e.g. ammonia production and electrical equipment), and clarify whether these estimates are made at the national, regional or company level;
- (b) Improve the reporting on the use of EU ETS data in the industrial processes sector (see para. 14 (a) above);
- (c) Provide category descriptions at the beginning of each section in the NIR, including emission trends (see para. 32 (a) above), especially for the categories ammonia production, nitric acid production and production and consumption of F-gases, and the total number of industrial plants involved;
- (d) Report in the NIR emissions from limestone and dolomite use separately under the category limestone and dolomite use.

59. The internal consistency of the inventory for the industrial processes sector could also be improved. Different methods are used to estimate emissions for numerous categories in the Flemish and Walloon Regions, which leads to the use of different EFs for the same activity. The ERT recommends that Belgium explore ways in which it can develop consistent higher-tier methods and EFs across the three regions, and clearly document the justification for any regional differences in a given method or EF.

60. EU ETS data are used by the Party for estimating emissions from a number of activities (e.g. iron and steel production); however, the NIR does not provide information on how the Party ensures time-series consistency when using these data (see paras 62 and 63 below). The ERT recommends that Belgium provide explanations in the NIR of its next annual submission as to how time-series consistency is maintained when it uses EU ETS data to estimate emissions from categories in this sector.

61. The ERT noted from the NIR that Belgium plans to recalculate the estimates of CO<sub>2</sub> emissions from cement and lime production in the Walloon Region to improve time-series consistency, and to recalculate the estimation of CH<sub>4</sub> from the glass industry in the same region, using methodologies applied for the Flemish Region.

## **B. Key categories**

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

62. The method used to estimate emissions from iron and steel production is not sufficiently described in the NIR. In the Walloon Region, emissions data for 2005 onwards are obtained from information reported to the EU ETS. Before 2005, a tier 2 method was used. This might affect time-series consistency. In the Flemish Region, a complete carbon balance from the region's biggest iron and steel production company in combination with energy and process data from other companies is used. This could affect the comparability of the emission estimates between the two regions. The ERT



recommends that Belgium provide more detail in the NIR of its next annual submission on methods, AD and EFs, and a discussion of the time-series consistency of the emission estimates.

## 2. Ammonia production – CO<sub>2</sub>

63. CO<sub>2</sub> emissions from ammonia production are estimated using two plant-specific methods from the two ammonia plants involved. The ERT noted that these methods were once similar but have both since changed over time. For the Flemish plant, the NIR states that emission estimates are “obtained as a result of the yearly surveys carried out by the chemical federation”, but it is not clear whether what is surveyed is the CH<sub>4</sub> feedstock consumed or the CO<sub>2</sub> emissions. Some reference is made to the recapture of part of the plant’s CO<sub>2</sub> emissions, but the share recaptured and whether or not it is ultimately emitted elsewhere is not discussed (nor is it provided in CRF table 2(I)). The method used by the Walloon plant to estimate emissions since 2005 is not explained at all in the NIR. Consequently, it is unclear whether the process emissions that are recaptured and sent to other plants continue to be counted as part of this plant’s emissions. The ERT concluded that the recent variability of Belgium’s IEF for ammonia production could be attributed to the inconsistent accounting of these recaptured emissions over time. It recommends that Belgium clarify in the NIR of its next annual submission, for each plant and for each period during which a different method is used, the method used to estimate the generation of process-related CO<sub>2</sub>, the method used to account for any recapture of the CO<sub>2</sub> generated, and where those recaptured emissions, if ultimately emitted, are accounted for. The ERT considered that it is not sufficient to note that emissions are reported by the plant under the EU ETS.

## IV. Agriculture

### A. Sector overview

64. In 2007, emissions from the agriculture sector amounted to 9,621.48 Gg CO<sub>2</sub> eq, or 7.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 15.2 per cent. The key drivers for the fall in emissions are a decrease in livestock numbers over the time series, a shift from dairy cattle to brood cattle in the country, and smaller quantities of nitrogen from mineral fertilizer being applied to soil. Within the sector, 38.4 per cent of the emissions were from agricultural soils, followed by 37.1 per cent from enteric fermentation and 24.5 per cent from manure management. CH<sub>4</sub> is the dominant GHG, accounting for 53.4 per cent of the sectoral emissions, while N<sub>2</sub>O accounted for the remaining 46.6 per cent.

65. The ERT found the 2009 annual submission to be complete for the agriculture sector in terms of categories and years. However, several parameters are missing in the CRF tables for 2007 (e.g. average gross intake, milk yield, daily excretion of volatile solids, nitrogen excretion rates, and Frac<sub>GASF</sub>, Frac<sub>GASM</sub> and Frac<sub>GRAZ</sub>, among other fractions). In response to a question raised by the ERT on this issue during the review, Belgium provided the missing data. The ERT also found that the 2009 annual submission was not always internally consistent (e.g. inconsistent nitrogen excretion rates between CRF tables 4.B(b) and 4.D). The ERT recommends that Belgium ensure that its next annual submission is complete and internally consistent with regard to the agriculture sector.

66. The agriculture section of the inventory has been improved since the 2008 annual submission. In particular, the ERT commends the efforts made by the Party to continue to harmonize the estimation methodologies used between the regions. However, the transparency of the reporting still needs to be improved, such as in relation to the non-English language of important documents contained in the annex to the NIR. The ERT recommends that Belgium make efforts, as far as possible, to translate such information into English for its next annual submission, especially information that would improve the transparency of this part of the inventory (e.g. a summary of the methodologies used).

67. Belgium has reported recalculations undertaken in response to recommendations of the previous ERT to harmonize the estimation methods used between regions and also as part of its inventory improvements. Recalculated estimates are provided for all years of the inventory time series and are time-series consistent. With regard to its efforts to harmonize methodologies, Belgium has recalculated estimates of emissions from enteric fermentation – default IPCC EFs for goats, horses and sheep were revised to harmonize the EF between the Walloon Region and the Flemish Region – and from manure management – harmonizing between the regions the tier 2 method for cattle. Other recalculations are reported by the Party, including in the Flemish Region as a result of the use of a tier 2 method to estimate emissions from swine and the use of revised methane conversion factors for non-key animal categories. The ERT noted that Belgium did not report on a revision recommended by the previous ERT with regard to N<sub>2</sub>O emissions from pasture, range and paddock in the Walloon Region. Belgium indicated during the review that this work is planned for its next annual submission.

68. With regard to inventory improvements, estimates from the Flemish Region have been recalculated to reflect corrections applied since 1996 to the model used to calculate ammonia emissions. Improvements were also made to the Walloon Region's inventory, including revision of the figure for milk production to rectify a mistake identified in the data from 2003 and correction of the double-counting of the CH<sub>4</sub> emissions that in the previous submission were included under both agricultural soils and manure management, with these emissions now allocated to the latter activity.

69. The net effect of the recalculations reported by the Party was a 0.9 per cent increase in the sectoral emission estimates for 1990, and a 0.8 per cent increase in the sectoral emission estimates for 2006.

70. In response to a question raised by the ERT concerning animal manure applied to soils, Belgium explained that it has manure action plans and that it has a system to account for the export and import of manure, which is used to identify manure that is applied to soils in the country. It also provided the following information on the export and import of manure:

“The Flemish Land Agency (more specifically the Manure Bank) inventories all manure transports in Flanders (this is between Flemish farmers, transport to manure processing industry, export to e.g. France or the Netherlands). Export of the excess manure produced in Flanders to the Walloon Region is forbidden. Excess manure from one farmer can be exported to a neighbouring farmer or to a farmer in France or the Netherlands where it can be applied to land or, as in most cases, manure can or must be transported to a manure processing company.”

The present ERT reiterates the recommendation of the previous ERT that the Party provide improved documentation, in the NIR of its next annual submission, to aid understanding of whether CH<sub>4</sub> and N<sub>2</sub>O emissions from manure that is either imported from, or exported to, other countries are included in the estimate of total GHG emissions. For this undertaking, Belgium may explore providing in the NIR a diagram that outlines the flow of animal manure, including manure that is either exported or imported, from its generation, transport, storage and application to soil, and the CH<sub>4</sub> and N<sub>2</sub>O emissions associated with each flow, clearly identifying what emissions from each flow are included in the estimate of total GHG emissions.

71. The NIR outlines a number of improvements planned for the agriculture section of the inventory, including: taking into account the results from the revision of the model used to calculate the emissions of ammonia (in the Flemish Region); the harmonization of the tier 2 methodology used to estimate emissions from management of swine manure (in the Walloon Region); and verification of estimated N<sub>2</sub>O emissions from agricultural soils, particularly regarding the accounting of nitrogen lost as ammonia in the current estimation model.

## **B. Key categories**

### **1. Enteric fermentation – CH<sub>4</sub>**

72. In 2007, CH<sub>4</sub> emissions from enteric fermentation accounted for 2.7 per cent of total GHG emissions and had decreased by 13.5 per cent since the base year. A tier 2 approach is used to estimate emissions for cattle in the Flemish and Walloon Regions, in line with the IPCC good practice guidance. The differences in AD (e.g. animal categorization) and EFs between the two regions are explained, and where applicable descriptions are provided of methods and/or EFs that have been harmonized between the regions, in the NIR.

73. For the other animal categories (sheep, goats, swine, horses, and mules and asses), a tier 1 approach was used by the Party to estimate emissions. The ERT noted that Belgium has harmonized the use of EFs from the Revised 1996 IPCC Guidelines across the regions, following a recommendation made by the previous ERT.

### **2. Manure management – CH<sub>4</sub>**

74. In 2007, CH<sub>4</sub> emissions from manure management accounted for 1.2 per cent of total GHG emissions and had decreased by 8.3 per cent since the base year. Following a recommendation of the previous ERT, a tier 2 methodology is now used to estimate emissions for both cattle and swine in the Flemish Region and for cattle in the Walloon Region. However, the Walloon Region elected not to use a tier 2 estimation method for swine. In response to a question raised by the ERT during the review on this issue, the Walloon Region explained that it does not use a tier 2 estimation method for swine as it is not a key category, and that the EF used in the current methodology is close to the IPCC default value (3.0 kg CH<sub>4</sub>/head). Nevertheless, since the tier 2 EF estimated for the Flemish Region (9.96 kg CH<sub>4</sub>/head) is more than four times higher than the Walloon Region's value (2.47 kg CH<sub>4</sub>/head), the ERT recommends that Belgium apply a tier 2 approach to estimate emissions for swine throughout the country its next annual submission.

75. The ERT found that different methodologies are being used in the country's different regions to estimate emissions for non-key categories. The ERT recommends that Belgium harmonize the use of estimation methodologies across the regions its next annual submission, regardless of whether a category is key or non-key, by taking into account the differences that exist in the EFs (e.g. for swine).

### **3. Indirect emissions – N<sub>2</sub>O**

76. In 2007, indirect emissions of N<sub>2</sub>O accounted for 0.6 per cent of total GHG emissions and had decreased by 27.1 per cent since the base year. The value for nitrogen excretion on pasture, range and paddock reported in CRF table 4.B(b) continues to differ from the value reported in CRF table 4.D. The ERT recommends that this information be checked and corrected if necessary in the next annual submission.

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

### **A. Sector overview**

77. In 2007, net removals from the LULUCF sector amounted to 1,473.48 Gg CO<sub>2</sub> eq. Since the base year, net removals have increased by 3.6 per cent.

78. In general, the LULUCF inventory has been prepared and reported in accordance with the IPCC good practice guidance for LULUCF. However, Belgium has only reported CO<sub>2</sub> emissions and removals from changes in carbon stock in forest land remaining forest land, cropland remaining cropland, and

grassland remaining grassland. In addition, Belgium has not reported changes in carbon stocks for all carbon pools or reported emissions of non-CO<sub>2</sub> gases.

79. The ERT noted that Belgium was unable to report emissions by sources and removals by sinks for all mandatory land-use categories and land conversions. The ERT identified a number of issues relating to the ability of the Party's national system to ensure that land areas subject to LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol are identifiable, pursuant to paragraph 20 of the annex to decision 16/CMP.1. The ERT noted with concern that if the Party does not develop a methodology to identify and collect data on areas of land use and areas of land-use change and an ability to estimate carbon stock changes on an annual basis (as outlined in paragraphs 5–9 of the annex to decision 15/CMP.1), Belgium will face major problems with regard to the reporting of LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol, the reporting of which will become mandatory as from the annual submission due by 15 April 2010. The ERT reiterates the recommendations of the previous ERT that the Party report a complete inventory that covers all mandatory land-use categories and land conversions, carbon pools and GHGs, and also address issues relating to the national system being able to identify areas of land use and areas of land-use change subject to LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol, and report thereon in its 2010 annual submission. The ERT also recommends that the Party in its 2010 annual submission provide verifiable information that demonstrates that carbon pools reported as "NE" were not a net source of GHGs, in accordance with paragraph 6 (e) of the annex to decision 15/CMP.1.

80. In response to a question raised by the ERT, Belgium indicated that it is looking for an agency that could assist it to meet its obligations with respect to the reporting of emissions and removals from LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol. Belgium added that such an agency has not yet been identified and that discussions are currently being held with relevant universities. Belgium explained to the ERT that, specifically, this agency would: respond to the recommendations given by ERTs for improving the LULUCF inventory; evaluate existing data; identify any data gaps (in AD, EFs and/or model parameters); develop methodologies for use by Belgium to calculate emissions and removals in a transparent manner and to complete the CRF tables for annual submissions; and estimate uncertainties of estimates. The ERT strongly recommends that the Party establish a formal arrangement with a suitable agency as soon as possible so that Belgium can meet its inventory and reporting obligations under the Kyoto Protocol in time for the annual submission in 2010.

81. Certain inconsistencies in the AD time series can be identified. For example, the sum of the areas for all reported land uses is reported as 1,975 kha in 1992 but 1,992 kha in 1994. This issue has been noted in previous review reports, and the ERT recommends that the Party ensure that in its next annual submission the total area of all land uses reported equals the area of Belgium and is the same throughout the time series.

82. Belgium has not described any QA/QC procedures for this sector. The ERT recommends that QA/QC procedures be put in place in time for the next annual submission.

83. The Party has not undertaken any recalculations of estimates in the LULUCF sector for its 2009 annual submission.

84. In response to questions raised by the ERT, Belgium indicated that it intends to make a number of improvements to the LULUCF inventory from 2010. These include: where applicable, reporting land-use changes (i.e. land conversions); harmonizing methodologies for reporting of emissions by sources and removals by sinks, taking into account recommendations made by ERTs; ensuring that the data required to meet obligations under the Kyoto Protocol are collected and that the reporting under the Convention and the Kyoto Protocol is undertaken in a consistent manner; and determining uncertainties associated with emissions and removals. The ERT welcomes these planned improvements and

recommends that Belgium implement them in its next annual submission to ensure that the estimates of emissions and removals from the LULUCF sector are prepared in accordance with the IPCC good practice guidance for LULUCF.

## **B. Key categories**

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

85. Belgium has used two methods to determine carbon stock change in forests. One method involves a linear interpolation for the period 1990–2000 and the other involves using a mechanistic model for the period 2001–2007. The ERT noted that net carbon stock change (removals) in this category remained relatively constant up to the year 2000 (approximately 3,000 Gg CO<sub>2</sub>/year) but that there was a sharp rise in the year 2001 (to 4,500 Gg CO<sub>2</sub>/year). In response to a question raised by the previous ERT, the Party indicated that this time-series inconsistency was a result of the different methodologies that were used to calculate carbon stock change, and the Party indicated that it intended to recalculate the entire time series after new data from the National Forest Inventory were received. This recalculation has not been undertaken in the 2009 annual submission. The ERT recommends that Belgium incorporate the latest data from the National Forest Inventory into its LULUCF inventory, harmonize the two methods used to calculate emissions by sources and removals by sinks, and recalculate the whole time series for its next annual submission.

86. The reporting of the models used for estimating carbon in biomass and in soils in forests is not transparent in the NIR. However, the derivation of wood densities and biomass expansion factors for the 10 most common tree species in the country has been described in a transparent manner. The ERT reiterates recommendations made in previous review reports that in its next annual submission Belgium include more detail on the key model parameters and assumptions used. Further, Belgium could also include in the NIR a validation of model performance by providing errors in calculating volume estimates for the dominant tree species (established by considering area and total carbon stock) as a means to improve documentation and understanding of the models used.

87. The Party states in the NIR that to estimate the area of forest plots that are on the edge or border of a plantation, the “plot centre is moved toward the inside of the plantation” so that the whole plot is covered by forest. The Party states in the NIR that this does not introduce a bias. The explanation that the ERT received from the Party on this issue, including on whether this sampling procedure leads to an overestimation of forest area, was not sufficient to show whether a bias was introduced or forest area and carbon stock were overestimated. The ERT recommends that the Party provide a more detailed explanation of whether there is a bias in the sampling approach used and whether forest area is overestimated, in its next annual submission.

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

88. The Party reports that there was a decrease in the area of grassland from 578 kha in 1990 to 480 kha in 1994 (equivalent to an average of 20,000 ha/year) and then there was a steady increase. This trend is more pronounced in the Flemish Region than in the Walloon Region. This issue has been noted by previous ERTs and the present ERT recommends that Belgium explain these trends and provide information in the NIR and CRF tables of its next annual submission on the conversion of grassland to other land uses that occurred during the inventory time series.

89. The mineral soil EFs for grassland in the Flemish and Walloon Regions are different. The ERT recommends that the Party explain in its next annual submission why there are different EFs for these two regions.

### C. Non-key categories

#### Cropland remaining cropland – CO<sub>2</sub>

90. In the NIR, the Party reports that the majority of crops are harvested on an annual basis and the Party assumes the carbon stock in living biomass to be steady. The ERT recommends that data be provided to support this assumption in its next annual submission.

## VI. Waste

### A. Sector overview

91. In 2007, emissions from the waste sector amounted to 1,104.75 Gg CO<sub>2</sub> eq, or 0.8 per cent of total GHG emissions. Since the base year, emissions have decreased by 67.5 per cent. The key driver for the fall in emissions is the reduction in CH<sub>4</sub> emissions from solid waste disposal sites, partly driven by increased CH<sub>4</sub> recovery in the later years of the time series. Within the sector, 52.6 per cent of emissions were from solid waste disposal on land, followed by 35.8 per cent from wastewater handling, 7.7 per cent from waste incineration and 3.9 per cent from the category other (compost production (6.D)).

92. The ERT found the CRF tables for the waste sector to be generally complete. However, the ERT noted a lack of completeness with regard to the use of notation keys in CRF tables 6.A.C and 6.B. The ERT recommends that Belgium ensure that its CRF tables are complete and that the appropriate notation key is used when no data are available. The ERT identified an inconsistency between the NIR and the CRF tables with regard to the value for per capita protein consumption used for estimating emissions from human sewage.

93. The ERT found that the transparency of the reported AD and EFs in the waste sector could be improved if the Party reported information in line with the outline set out in the UNFCCC reporting guidelines, including information on QA/QC, time-series consistency and uncertainty. The ERT recommends that the Party address this issue in its next annual submission. The ERT also recommends that Belgium continue its efforts to harmonize the parameters used (e.g. fraction of degradable organic carbon (DOC) and mean degradation coefficient (k) value) across the regions in the country.

### B. Key categories

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

94. Three first-order decay (FOD) models are used in Belgium to estimate CH<sub>4</sub> emissions from solid waste disposal on land. Two FOD models are used in the Flemish Region, namely a common FOD model that considers residential and industrial waste separately, and a multiphase FOD model that considers mainly domestic waste, comprising household waste, rough waste (i.e. urban waste collected by council cleaning services) and industrial waste of similar composition to household waste. The Walloon Region uses a common FOD model that considers both municipal and industrial waste separately. The FOD model used in the Flemish Region uses a k value of 0.1/year that is calculated from a TNO study on three landfill sites, whereas three biodegradation rates are used for the multiphase FOD model. The common FOD model used in the Walloon Region assumes a k value of 0.1/year, and a value of 0.77 for the fraction of DOC. The ERT recommends that Belgium explore the possibility of listing the parameters from each FOD model used in a single table in the NIR of its next annual submission to improve transparency and understanding of the differences in the use of the FOD models between regions.

### C. Non-key categories

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

95. CH<sub>4</sub> emissions from industrial wastewater handling are reported as “NE”. The Party states in the NIR that the following two sources of CH<sub>4</sub> emissions are taken into account: municipal wastewater treatment plants and septic tanks. CH<sub>4</sub> emissions from septic tanks are estimated using the IPCC tier 1 method in the Walloon Region and the Flemish Region. The Party also states that CH<sub>4</sub> produced by anaerobic digestion is recovered and used for energy purposes. The ERT encourages the Party to document in a transparent manner, in the NIR of its next annual submission, emissions from industrial wastewater handling and emissions from municipal wastewater treatment plants.

#### 2. Waste incineration – CO<sub>2</sub> and N<sub>2</sub>O

96. Each of the country’s regions estimates CO<sub>2</sub> emissions from waste incineration and applies its own specific methodology based on available AD in line with the IPCC good practice guidance. In the Flemish Region emissions from flaring activities in the chemical industry are reported in the industrial processes sector under the category other (2.B.5), whereas the Walloon Region reports these emissions under waste incineration. The present ERT reiterates the recommendation of the previous ERT that Belgium ensure that its reporting of waste incineration activities is consistent between regions, in regard to the sector in which the emissions are reported, in its next annual submission.

97. The ERT noted that in the NIR the N<sub>2</sub>O EF reported for domestic waste incineration is 60 g N<sub>2</sub>O/t waste. No explanation of this choice of EF is documented in the NIR. The ERT recommends that the Party report transparently on the rationale for the selection of this EF in its next annual submission.

#### 3. Other (compost production) – CH<sub>4</sub>

98. CH<sub>4</sub> emissions from compost production are estimated using AD from the country’s different regions combined with an EF used by the Netherlands of 2.4 kg CH<sub>4</sub>/t compost. The AD for compost are not provided in the NIR. The ERT encourages the Party to provide in the NIR of its next annual submission AD on compost production for each region.

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

### A. Information on Kyoto Protocol units

#### 1. Standard electronic format and reports from the national registry

99. Belgium has reported information on its accounting of Kyoto Protocol units in the appropriate SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF tables and their comparison report.<sup>6</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterates the main findings contained in the SIAR.

100. The reported information on the total quantities and transactions of Kyoto Protocol units is complete and has been submitted in accordance with decision 14/CMP.1 and section I.E of the annex to decision 15/CMP.1. This information is consistent with that contained in the national registry and with

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<sup>6</sup> The SEF table comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in Belgium’s SEF tables with corresponding records contained in the ITL.

the records of the international transaction log (ITL) and the clean development mechanism registry, and meets the requirements set out in paragraph 88 (a) to (j) of the annex to decision 22/CMP.1.

101. The transactions of ERUs, CERs, AAUs, RMUs, ICERs and tCERs initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

## 2. National registry

102. 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 also took note of the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1, and continues to adhere to the technical standards for data exchange elaborated in accordance with decisions 16/CP.10 and 12/CMP.1. Also, the national registry has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. The ERT reiterates the recommendation made in the SIAR that Belgium enhance the availability of the public information referred to in paragraphs 46–48 of the annex to decision 13/CMP.1, and that it report in its next annual submission on any changes to that public information made since the 2009 annual submission.

## 3. Calculation of the commitment period reserve

103. Belgium has reported its commitment period reserve in its 2009 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (606,595,975 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.

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

104. Belgium has reported no change in its national system since the previous annual submission. The ERT concluded that Belgium's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

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

105. Belgium has reported changes to the contact information of the registry system administrator. Further, and in response to a recommendation made in the previous review report,<sup>7</sup> Belgium has reported on changes in its national registry that occurred in 2008. The changes include moving the national registry from the Brussels Data Centre to Berlin in January 2008 and changing from the Seringas software to the Community Registry software in February 2008. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1.

## **VIII. Conclusions and recommendations**

106. Belgium made its annual submission on 15 April 2009. The Party indicated that it is its voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the

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<sup>7</sup> FCCC/ARR/2008/BEL.



Kyoto Protocol (information on the accounting of Kyoto Protocol units and changes in the national system and the national registry). This is in line with decision 15/CMP.1.

107. The ERT concluded that the inventory submission of Belgium has been prepared and reported generally in accordance with the UNFCCC reporting guidelines. The inventory submission is generally complete. The Party submitted a largely complete set of CRF tables for the years 1990–2007 and an NIR; these are complete in terms of geographical coverage, years and sectors and generally complete in terms of categories and gases. The ERT concluded that the completeness of the inventory submission could be improved in terms of coverage of categories, notably categories in the energy, industrial processes and LULUCF sectors that are currently reported as “NE” and for which a methodology to estimate emissions is available in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF.

108. The inventory submission includes EU ETS data that are used in the compilation of estimates of emissions from the energy and industrial processes sectors. However, the ERT concluded that the transparency of information provided on the use of these data is insufficient with regard to the following: (a) whether these data have been prepared and incorporated into the inventory submission in line with the IPCC good practice guidance; (b) whether these data have been subjected to any QA and/or verification and, if so, how these procedures relate to corresponding QA and/or verification procedures set out in the IPCC good practice guidance; and (c) how the Party has ensured time-series consistency when using these data, and the impact of using EU ETS data on emission trends.

109. The information submitted on a voluntary basis in accordance with Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Belgium has not reported on a voluntary basis information on LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol, or information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

110. The inventory has been prepared generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT noted several improvements made to the reporting since the previous annual submission that have improved the transparency of the inventory.

111. The ERT concluded that Belgium currently does not have the capacity to identify areas of land use or areas of land-use change, as required by paragraph 20 of the annex to decision 16/CMP.1, or the capacity to report on LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol in accordance with paragraphs 5 to 9 of the annex to decision 15/CMP.1.

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

113. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1, but the ERT identified a potential issue with regard to the identification of areas of land use and areas of land-use change, as indicated in paragraph 111 above.

114. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the CMP. The ERT recommends that the Party improve the availability of the public information referred to in paragraphs 46–48 of the annex to decision 13/CMP.1.

115. In the course of the review, the ERT formulated a number of recommendations<sup>8</sup> relating to the completeness of the annual submission and the transparency of information presented in the annual submission. The key recommendations are that Belgium:

- (a) Further centralize at the country level the coordination of both the QA/QC activities and the management and implementation of the inventory improvement plan, including the responsibility for establishing and setting priorities to improve the inventory;
- (b) Ensure reporting of LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol is complete and in accordance with the annex to decision 16/CMP.1, especially paragraph 20 of this annex, and reported in line with the annex to decision 15/CMP.1 with respect to coverage of land-use categories, land conversions, carbon pools and GHGs;
- (c) Improve transparency in the NIR by providing more information related to categories, such as discussions of emission trends and a comparison of methods used in the different regions of the country;
- (d) Improve documentation of recalculations, including providing explanations and documentation of the rationale for each recalculation;
- (e) Provide information on whether EU ETS data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance, whether these data have been subjected to any QA and/or verification and, if so, how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance, how the Party has ensured time-series consistency when using these data, and the impact of using EU ETS data on emission trends;
- (f) Improve documentation of category descriptions at the beginning of each section in the NIR, including a discussion of emission trends.

## **IX. Questions of implementation**

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

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<sup>8</sup> For a complete list of recommendations, the relevant chapters of this report should be consulted.

Annex I

**Documents and information used during the review**

**A. Reference documents**

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

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

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

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

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

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

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

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

Status report for Belgium 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/bel.pdf>>.

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

FCCC/ARR/2008/BEL. Report of the individual review of the greenhouse gas inventories of Belgium submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/bel.pdf>>.

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

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

Responses to questions during the review were received from Mr. André Guns (Walloon Agency for Air and Climate), including additional material on the methodology and assumptions used. These responses were prepared in cooperation with colleagues from the country's three regions, namely Ms. Miet D'heer and Ms. Inge Van Vynckt (Flemish Region), Mr. Laurent Bodarwé (Brussels-Capital Region) and Ms. Isabelle Higuët (Walloon Region).

Annex II**Acronyms and abbreviations**

AAU	assigned amount unit	IPCC	Intergovernmental Panel on Climate Change
AD	activity data	ITL	international transaction log
CH <sub>4</sub>	methane	kg	kilogram
CO <sub>2</sub>	carbon dioxide	kha	kilohectare (1 kha = 10,000 square metres)
CO <sub>2</sub> eq	carbon dioxide equivalent	LULUCF	land use, land-use change and forestry
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	N <sub>2</sub> O	nitrous oxide
CRF	common reporting format	NA	not applicable
DOC	degradable organic carbon	NE	not estimated
EF	emission factor	NIR	national inventory report
ERT	expert review team	NO	not occurring
F-gas	fluorinated gas	PFCs	perfluorocarbons
FOD	first-order decay	QA/QC	quality assurance/quality control
Gg	gigagram	SEF	standard electronic format
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	SF <sub>6</sub>	sulphur hexafluoride
ha	hectare	SIAR	standard independent assessment report
HCFC	hydrochlorofluorocarbon	t	tonne
HFCs	hydrofluorocarbons	UNFCCC	United Nations Framework Convention on Climate Change
IEF	implied emission factor		

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