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Report of the individual review of the greenhouse gas inventory of Belgium submitted in 2006*

* In the symbol for this document, 2006 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 in-country review of the 2006 greenhouse gas (GHG) inventory submission of Belgium, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 4–9 June 2007 in Brussels, Belgium, and was conducted by the following team of nominated experts from the roster of experts: generalist – Ms. Kristina Saarinen (Finland); energy – Mr. Simon Eggleston (United Kingdom); industrial processes – Ms. Marisol Bacong (Philippines); agriculture – Mr. Len Brown (New Zealand); land use, land-use change and forestry (LULUCF) – Mr. Emil Cienciala (Czech Republic); waste – Ms. Sirintornthep Towprayoon (Thailand). Mr. Brown and Ms. Towprayoon were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (hereinafter referred to as UNFCCC review guidelines), a draft version of this report was communicated to the Government of Belgium, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Inventory submission and other sources of information

3. In its 2006 submission, Belgium submitted common reporting format (CRF) tables for the years 1990–2004 and a national inventory report (NIR). Prior to the in-country visit, Belgium submitted a revised GHG inventory on 14 March 2007 which was used as the basis for the review by the expert review team (ERT). The Party officially resubmitted its GHG inventory for 1990 and 2004 on 23 July 2007 in response to questions raised by the ERT during the course of the in-country visit. Where needed the ERT also used the previous submission (2005), additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2004, the most important GHG in Belgium was carbon dioxide (CO_2), which contributed 86.4 per cent to total[1] national GHG emissions expressed in CO_2 eq., followed by N_2O, 6.9 per cent, and CH_4, 5.4 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) taken together contributed 1.3 per cent of total GHG emissions in the country. The energy sector accounted for 81.1 per cent of the total GHG emissions followed by industrial processes, 10.1 per cent, agriculture, 7.5 per cent, waste, 1.2 per cent, and solvent and other product use, 0.2 per cent. Total GHG emissions amounted to 146,466.6 Gg CO_2 eq. and increased by 1.3 per cent from 1990 to 2004.

5. Tables 1 and 2 show the GHG emissions by gas and by sector, respectively.

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

Table 1. Greenhouse gas emissions by gas, 1990–2004[a]

GHG emissions	Gg CO_2 eq.								Change BY–2004 (%)
	Base year Convention	1990	1995	2000	2001	2002	2003	2004	
CO_2 (with LULUCF)	117 253.4	117 253.4	122 246.2	122 435.6	121 312.5	120 972.8	125 437.5	125 418.0	7.0
CO_2 (without LULUCF)	118 684.5	118 684.5	123 632.1	123 986.0	124 110.3	123 310.1	127 154.4	126 591.4	6.7
CH_4	11 238.7	11 238.7	10 661.3	9 469.4	8 959.0	8 466.9	8 083.8	7 943.4	–29.3
N_2O	10 831.2	10 831.2	12 997.2	12 589.3	12 412.7	11 886.4	10 805.6	10 092.0	–6.8
HFCs	434.0	434.0	434.0	896.7	1 030.9	1 248.8	1 406.0	1 467.6	238.2
PFCs	1 753.3	1 753.3	2 335.2	360.9	222.6	82.2	208.7	306.2	–82.5
SF_6	1 662.6	1 662.6	2 205.2	108.7	104.7	93.9	75.0	66.0	–96.0

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

[a] Belgium submitted revised estimates for 1990 and 2004 after the review on 23 July 2007. These estimates differ from the Party's GHG inventory submitted in 2006.

Table 2. Greenhouse gas emissions by sector, 1990–2004[a]

Sectors	Gg CO_2 eq.								Change BY–2004 (%)
	Base year Convention	1990	1995	2000	2001	2002	2003	2004	
Energy	112 230.6	112 230.6	116 452.6	116 631.1	117 400.1	115 822.1	119 657.3	118 755.8	5.8
Industrial processes	16 001.4	16 001.4	19 401.1	15 781.9	15 006.9	15 182.5	14 717.5	14 746.9	–7.8
Solvent and other product use	246.1	246.1	240.2	253.4	251.5	250.0	120.1	249.6	1.4
Agriculture	12 639.8	12 639.8	13 127.4	12 430.7	12 287.2	11 966.3	11 486.4	10 999.3	–13.0
LULUCF	–1 431.1	–1 431.1	–1 385.9	–1 550.3	–2 797.7	–2 337.3	–1 716.9	–1 173.4	–18.0
Waste	3 486.3	3 486.3	3 043.7	2 313.9	1 894.5	1 867.4	1 752.2	1 714.8	–50.8
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	143 173.2	143 173.2	150 879.1	145 860.7	144 042.5	142 751.0	146 016.6	145 293.2	1.5
Total (without LULUCF)	144 604.3	144 604.3	152 265.0	147 411.0	146 840.2	145 088.3	147 733.4	146 466.6	1.3

Note: BY = base year; LULUCF = land use, land-use change and forestry; NA = not applicable.

[a] Belgium submitted revised estimates for 1990 and 2004 after the review on 23 July 2007. These estimates differ from the Party's GHG inventory submitted in 2006.

D. Key categories

6. Belgium reported a tier 1, level and trend key category analysis for 2004 as part of its 2006 submission. Belgium did not include the LULUCF sector in the key category analysis. The ERT recommends that Belgium include the LULUCF sector in future key category analyses, and include the key category analysis in the inventory improvement plan at both the regional (i.e. the Flemish region, the Walloon region and the Brussels-Capital region) and the national level.

7. The key category analyses performed by the Party and the secretariat[2] produced different results for 2004. Belgium identified 34 key categories, whereas the secretariat identified 23 categories. The main reasons for the differences are Belgium's exclusion of the LULUCF sector from the analysis, and its use of a greater level of category disaggregation in the key category analysis. Belgium did not supply a key category analysis for 1990. Belgium uses its key category analysis to prioritize improvements in the inventory.

E. Main findings

8. Belgium's 2006 submission shows significant improvements compared to previous submissions. The major comments raised by previous review teams (including recommendations) have been addressed as far as possible. The use of notation keys has contributed to the completeness of Belgium's inventory, even though the use of some of these, particularly in the agriculture and waste sectors, is not yet adequate and will need to be addressed in the next inventory submission. Belgium submitted CRF tables for all the years of the inventory time series (1990–2004), but a number of these tables are not complete (tables 5D, 5E, 5 (II), 7 (key categories), 8(b) (recalculations) and 9 (completeness)).

9. The transparency of the Belgium inventory would be improved by the inclusion of detailed information in the NIR and the CRF on both the regional and the national inventories. The structure of Belgium's NIR is 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 ERT found that the consistency, as defined in the UNFCCC reporting guidelines, of Belgium's national inventory is hampered by differences between regional inventories (e.g. emission factors (EFs)). Belgium is also encouraged to report emissions for all categories where emissions occur in the country.

10. The ERT recommends that the Party develop and implement a quality assurance/quality control (QA/QC) plan prior to its next inventory submission.

F. Cross-cutting topics

1. Completeness

11. The Party's 2006 submission covers all years from 1990 to 2004, all sectors and all gases, and includes actual emissions of HFCs, PFCs and SF_6 as well as potential emissions of HFCs and SF_6. However, the ERT identified incomplete CRF tables for individual sectors, for example, industrial processes and LULUCF, and noted that some CRF tables contained neither data nor notation keys. Belgium did not report the following CRF tables: LULUCF CRF tables 5.D, 5.E and 5(II); and

[2] The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

cross-cutting tables table 7 (key category analysis), table 8(b) (recalculation explanations) and table 9 (completeness). The ERT encourages Belgium to provide estimates in its next inventory submission for all categories where emissions occur in the country, even if they are minor, by applying simple but reasonable approaches and using expert judgement where necessary. If this is not possible, then Belgium must use the appropriate notation key and explain the use of the notation key in CRF table 9(a).

12. The structure of the NIR is generally consistent with the UNFCCC reporting guidelines. The ERT encourages Belgium to implement improvements to the structure and organization of the NIR to ensure that it is consistent with the UNFCCC reporting guidelines, such as: a general assessment of the completeness of the inventory; provision of uncertainty and time-series consistency information in the sector sections; category-specific recalculations; and additional information in the NIR with regard to the annexes on the national energy balance, assessment of completeness, and tables 6.1 and 6.2 of 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).

2. Transparency

13. The Party's inventory is generally transparent. Transparency is somewhat hampered by the limited transparency of the information contained in the CRF tables and the NIR. Furthermore, the transparency (and comparability) of the inventory is compromised when regional inventories are aggregated into the national inventory without including regional information in the NIR and the CRF tables. The ERT has identified areas for improvement in the NIR and recommends that Belgium structure the presentation of all sectors according to the UNFCCC reporting guidelines and include regional CRF tables as an annex to the NIR.

14. Transparency in the inventory is limited by a general lack of detailed information in the NIR on both the regional and the national inventory. The ERT was provided with considerable amounts of additional information for all sectors during the in-country visit and the ERT recommends that Belgium include this information in its next NIR. The ERT recommends Belgium to focus specifically on describing and documenting country- and region-specific methodologies, EFs and activity data (AD); and to provide additional background documentation of models and their associated parameters. Including time series of AD, EFs and production data in the annex to the NIR would also increase transparency.

15. Belgium did not submit CRF table 9(a) on the use of notation keys. The ERT noted that notation keys are not always used correctly or consistently, and recommends that Belgium report explanations of its use of notation keys.

3. Recalculations and time-series consistency

16. The institutional arrangements can generally ensure that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance. Recalculations in regional inventories are performed generally in accordance with IPCC good practice guidance. However, the ERT noted that regional inventories are often neither recalculated simultaneously, nor time-series consistent with each other, for example, industrial processes – ceramics (paragraph 49) and parameters for solid waste disposal (paragraph 97). The ERT encourages Belgium to ensure that recalculations are performed simultaneously and consistently across the regions, and that the documentation of recalculations is improved in the NIR by providing regional-level explanations for the recalculation of a category and the effect of the recalculation on the national emission trend and time-series consistency, as well as an assessment of how the recalculation has improved the accuracy and certainty of the emission estimate. The ERT recommends that Belgium introduce a formal process into its national inventory planning (e.g. an inventory improvement plan) to consider, implement and report recalculations in the NIR. The results of this process should be documented in the NIR and in CRF table 8(b).

17. Belgium included several recalculations in the latest submission. The recalculations are reviewed under each sector. The rationale for the recalculations is provided in the NIR and includes methodological improvements, revisions of EFs and AD, and the inclusion of emissions from categories that were not reported previously. The effect of the reported recalculations on the 2003 estimate is to increase estimates of total emissions for 2003 (excluding CO_2 emissions and removals from LULUCF) by 0.1 per cent, while, for the same year, the impact of recalculations at the sector level are: energy, +0.1 per cent; industrial processes, +3.1 per cent; agriculture, –0.6 per cent; LULUCF, –48.9 per cent; and waste, –12.2 per cent.

18. Belgium submitted revised estimates to the ERT for 1990 and 2004 in response to questions raised during the in-country visit. The Party is recommended to recalculate the intermediate years in its next inventory submission in order to ensure time-series consistency.

4. Uncertainties

19. Belgium has provided a tier 1 uncertainty analysis for the entire inventory and for each category (excluding LULUCF). The analysis generally follows the IPCC good practice guidance, but the ERT recommends that the uncertainty analysis be improved by including all source/sink categories; increasing the use of uncertainty estimates developed directly from the analysis of data and reducing the use of expert judgement; using appropriate analytical techniques for combining regional uncertainty data; and improving the reporting of uncertainties in the NIR, including documentation and referencing of expert judgement and the uncertainty tables 6.1 and 6.2 of the IPCC good practice guidance. The uncertainty analysis should be well documented and the results incorporated into the inventory improvement process.

20. Belgium has reported level uncertainty for 2003 and the trend uncertainty for 1990–2003. In earlier submissions Belgium reported an uncertainty analysis for 2001. However, the fluorinated gases (F-gases) were excluded from this analysis. Overall uncertainty has been reduced between the analyses from 8.1 per cent to 7.5 per cent, and the trend for uncertainty from 3.8 per cent to 2.7 per cent. The level of uncertainty for CO_2 has reduced from 3.6 per cent to 1.9 per cent, while that for methane remains the same (24 per cent) and the level of uncertainty for N_2O has increased from 91 per cent to 100 per cent. The increase in N_2O uncertainty was dominated by agricultural soils. The level of uncertainty for F-gases was estimated in 2003 at 27 per cent. The ERT recommends that Belgium include additional documentation in the NIR elaborating on the changes to the levels of uncertainty.

21. The Party does not provide information on how the uncertainty analysis is used to prioritize inventory improvements. Belgium is recommended to include uncertainty analysis in the inventory improvement plan, and to perform the analysis annually.

5. Verification and quality assurance/quality control approaches

22. Belgium has neither elaborated nor implemented a QA/QC plan at the national level. The ERT recommends that Belgium develop a national QA/QC plan in accordance with the IPCC good practice guidance. The ERT commends the efforts of the Flemish region to develop an International Organization for Standardization (ISO) standard 9001 quality management system and considers that the Flemish system will provide a good platform for the national plan. The ERT recommends that the plan define and allocate roles and responsibilities inside the institutional arrangements for QA and QC during inventory planning, preparation and management, while recognizing national circumstances in relation to the compilation of the national inventory. The QA/QC plan should also be linked to a national inventory improvement plan.

23. The NIR provided information on the general QA/QC procedures implemented at the national and the regional levels. During the in-country visit, the ERT was informed that the Belgian Interregional Cell for the Environment (IRCEL-CELINE) applies QC procedures when compiling the national inventory. However, the ERT considers that significant improvement is required implementing and

documenting tier 1 and tier 2 QC procedures. Belgium informed the ERT that IRCEL-CELINE applies QC procedures when compiling the national inventory. However, the ERT considers that significant improvement is required at the national level on implementing general QC procedures (tier 1) as well as source/sink category-specific tier 2 procedures for key categories and for those individual categories in which significant methodological and/or data revisions have occurred. The ERT notes that the results of the procedures should directly feed into the national and regional inventory improvement plans. These recommendations extend to verification of data either reported by companies or from the European Union (EU) emissions trading scheme (ETS).

24. The ERT commends Belgium on using emissions data from the EU ETS for verification of emissions from cement and lime production. Such independent assessment of emissions data contributes considerably to the quality of the data. The ERT encourages Belgium to use independent assessments for all data that are not yet covered by such verification, consistent with the IPCC good practice guidance.

6. Follow-up to previous reviews

25. The ERT acknowledges the improvements that have been made to the Party's inventory in response to the recommendations of previous reviews, along with the notable improvements to the consistency of reported emissions data gained from the use of the UNFCCC reporting software (CRF Reporter). The 2006 submission was Belgium's first using the CRF Reporter. Notable improvements were made in the 2006 submission such as recalculations for 1990–2003, and corrections of errors in the inventory time series by the Party that were identified during the migration of emissions data to the CRF Reporter. The ERT considers that a number of important recommendations from the 2003, 2004 and 2005 review reports remain unresolved. These are that the Party should improve transparency in the inventory by including more detailed descriptions of methodology, EFs and AD in the NIR, develop and implement a formal QA/QC management system, harmonize emissions estimation and reporting between the regions, and report CRF table 8(b).

G. Areas for further improvement

1. Identified by the Party

26. The NIR identifies areas for improvement separately for each region, including the consistency of the energy balances, the addition of estimates from some industrial processes and improving methodology and time-series consistency in the LULUCF sector. In its response to the issues raised during the review, Belgium indicated that its work to improve its estimates depends on the resources available.

2. Identified by the ERT

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

(a) Develop a national QA/QC plan in accordance with the IPCC good practice guidance and implement this at both the regional and the national levels of inventory planning, preparation and management;

(b) Establish a centralized archive system;

(c) Implement a formal process for improvements to the national inventory and create a national inventory improvement plan that can be applied at both the regional and the national level, and considers output from QA/QC activities, uncertainty analysis and key category analysis as part of a formal process for improvements to the national inventory;

(d) Coordinate recalculations across the regions and improve reporting of recalculations by reporting any changes in emissions and removals compared with previous inventories,

regardless of their magnitude, and clearly indicate the reasons for the changes using CRF table 8(b). Recalculations should also be clearly explained in the NIR and linked to the inventory improvement plan;

(e) Improve transparency in the inventory by including in the NIR sufficient information to allow expert review of methodologies, region- and country-specific EFs, parameters, and models;

(f) Structure the NIR according to the UNFCCC reporting guidelines;

(g) Harmonize methodologies, EFs and recalculation procedures between regions where there are no scientific or technological reasons to support differences.

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

II. Energy

A. Sector overview

29. In 2004, the energy sector accounted for 81.1 per cent (118,755.8 Gg CO_2 eq.) of the total national GHG emissions. Emissions from this sector have increased by 5.8 per cent between 1990 and 2004. Other sectors was the largest emitting source, contributing 26.6 per cent to total sector emissions, while energy industries, manufacturing industries and construction, transport, and fugitive emissions contributed 25.0 per cent, 24.8 per cent, 23.0 per cent and 0.5 per cent, respectively, to total sector GHG emissions. CO_2 was the dominant gas, contributing 98.2 per cent to total sector emissions, and CH_4 and N_2O contributed 0.6 and 1.2 per cent, respectively.

30. Energy emissions are estimated for each region from "regional energy balances". These balances are compiled from bottom-up information on the consumption of fuels from mandatory returns from individual large plants, as well as from annual reports of electricity and gas consumption by the net managers and suppliers. For certain industrial sectors and the service sector, consumption of petroleum products is estimated by extrapolation of individual company data by using the known total electricity consumption of the sector. National CO_2-emissions are a sum of the three regions. To verify the completeness and accuracy of the data, the regional fuel consumption datasets are compared with national statistics. For solid fuels and petroleum products this is based on data from suppliers while for electricity and natural gas it is based on supplier and net manager data. Work is continuing to fine-tune the national and regional energy balances to make them more complete and comparable. The discussion on the differences between the reference and the sectoral approach is described in chapter 3.3, (discussing the reference approach) of the NIR 2006. However, the ERT considers that a single section discussing the energy data, its compilation, comparisons and validation would increase transparency. The ERT noted that the energy balance for the Flemish region between 1991 and 1993 was not estimated and that fuel consumption is based on the difference between national data and the two other regions. An exception to this regional approach is that CO_2 emissions from road transport are estimated from national data on fuel sales.

31. The CRF tables are complete except for a few categories, such as emissions from coal mining and handling (reported as "NE") and from abandoned coal mines. Mining operations ceased after 1991 and therefore CH_4 emissions should be estimated for 1990. As a result of the in-country visit, Belgium submitted a revised estimate including emissions from coal mines for 1990 and 2004. The ERT commends Belgium for its efforts to increase the completeness of the inventory, as recommended in earlier review reports. The ERT recommends that emissions from abandoned coal mines also be estimated.

32. The energy sector is generally transparent, but transparency is reduced by the limited information contained in the CRF tables and the NIR. It was not possible for the ERT to understand the basis of the implied emission factors (IEFs) using the information provided in the CRF table (the documentation boxes are empty) or the NIR. Significant amounts of fuel, such as coke oven gas and blast furnace gas, are used but no explanatory information is provided. The ERT recommends the Party to adhere to the instructions in the CRF on the reporting of coke oven gas and blast furnace gas, and to report sufficient explanatory information in the next NIR. Transparency in the inventory is also reduced by the regional compilation of the emission estimates. This means that the CRF data do not correspond to the actual data used to estimate the emissions. The ERT recommends Belgium to include tables of individual regional energy consumption as well as a table of national fuel consumption, report fuels and sectors at the level used in the calculations, explain in the NIR the differences identified by a comparison of regional and national fuel consumption data, and provide regional CRF tables as supplementary information in the annex to the NIR.

33. The ERT encourages Belgium to report the correct use of notation keys in the CRF (e.g. the reporting of CH_4 and N_2O emissions from Petroleum Refineries in categories 1.B.2.a and 1.A.1.b). This will improve the transparency of the reporting.

34. Despite encouragement in the previous (2005) review report, fuel-specific EFs for CH_4 and N_2O for many categories differ according to region, in many cases by a factor of over 30. These differences are not based on technical differences, but instead on the methodological choices made by the regional inventory compilers. Given the small scale of the emissions of CH_4 and N_2O in this sector, these inconsistencies will not have a large impact on total national emissions. However, they are not consistent with the IPCC good practice guidance. The ERT commends Belgium on its effort to make emissions of CO_2 consistent across the country and, again as stated in previous review reports, encourages Belgium to extend this work to CH_4 and N_2O. The ERT notes that the development of a national QA/QC plan should address methodological choices and review methods and could thus assist in resolving this issue.

35. The recalculations reported by the Party in its 2006 submission, especially for 2003, include a significant improvement in the harmonization of the CO_2 EFs across all regions; improvements to the iron and steel sector in the Wallonia region based on improved fuel data; use of a consistent EF for the entire time series to estimate N_2O emissions from manufacturing industries and construction in the Walloon region; use of a new model to estimate Flemish regional shipping emissions; use of improved information on coke production and on the transmission and distribution of natural gas in the Flemish region; as well as other small improvements and corrections of errors. The ERT commends Belgium on implementing these improvements.

B. Reference and sectoral approaches

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

36. The reference approach and the sectoral approach differed by 2.8 per cent in the year 2004. The main reasons for this difference provided by Belgium relate to the non-energy use of fuels and the use of default data in the reference approach. The sectoral estimates are based on regional energy datasets while the reference approach is based on national information and this adds to the discrepancy. The ERT encourages the use of country-specific EFs in the reference approach, which would reduce the difference between the two estimates.

37. The total of apparent consumption in the CRF corresponds to that reported to the International Energy Agency (IEA) within 0.8 per cent in 2004 and within less than 3 per cent for all years. No systematic bias is evident.

38. Belgium has made improvements to its reporting of emissions from international and domestic aviation since the 2003 in-country review. However, aviation bunker fuels are treated differently in the

regions. In the Flemish region, all kerosene used in air transport is assigned to the bunker fuels while all gasoline for air transport is allocated to domestic air transport. A default IPCC EF for CO_2 is used to calculate the emissions. CH_4 and N_2O emissions from air transport are calculated for the landing and take-off (LTO) cycle. In the Walloon region, data from airports is used to distinguish between national and international flights: 58 per cent and 88 per cent of LTOs are assumed to be domestic flights in 1990 and 2004, respectively. The ERT recommends that annual data are used to reflect changes since 1990. There is no airport in the Brussels-Capital region. The Flemish region is increasing its efforts to collect data from each Flemish regional airport to facilitate better allocation of emissions in this region. The ERT encourages Belgium to complete this work for its next inventory submission.

39. International shipping is relevant only to the Flemish region. Emission estimates are based on fuel delivery data from the federal energy balance and regional statistics on freight kilometres.

C. Feedstocks and non-energy use of fuels

40. Belgium has reported the allocation of feedstocks and non-energy use of fuels in accordance with the *Revised 1996 IPCC Guidelines on national greenhouse gas inventories* (hereinafter referred to as the Revised 1996 IPCC guidelines) and the IPCC Good practice guidance. The energy sector emissions are based on fuel consumed.

D. Key categories

1. Stationary combustion: all fuels – CO_2

41. Emissions are estimated separately by each region and are based on a combination of reporting from large plants and category fuel use. Large plants are obliged to submit information to the regional authorities, including on fuel consumption and emissions. CO_2 emissions are estimated based on the carbon content of each fuel as specified by the plant operators. Where not all plants in a category are covered, the total fuel consumption from reporting plants is subtracted from the total fuel consumption for that category. Regional and default EFs are used for the remaining fuel consumption. This approach can lead to good emission estimates, but without a high quality and well documented QA/QC plan this cannot be demonstrated. A QA/QC plan should cover QA/QC requirements on the plant operators that report, how the plant-specific carbon contents are developed, and the checks on the data submitted. Where the coverage of plant reporting changes there should be a review of how consistent the estimates are with those of previous years. This should also form part of the QA/QC plan. The ERT recommends the development and implementation of a QA/QC plan covering QC on the AD, the carbon contents supplied by plants, the number of plants reporting in each sector and the proportion of the sector they account for, and the range of reported fuel carbon contents in the NIR.

2. Road transportation – CO_2

42. Road transport CO_2 emissions are based on national fuel sales and IPCC default EFs. Emissions are checked against statistics on the vehicle kilometres driven in each region. This is in line with recommendations in the 2003 in-country review. Belgium is encouraged to review the EF.

3. Road transportation – N_2O

43. N_2O emissions from road transport amount to 0.1 per cent of the national total CO_2 eq. emissions, but it is a key category due to its increasing trend from 1990 to 2004. N_2O and CH_4 emissions are estimated from data on vehicle kilometres driven. Different models are used in the different regions: COPERT in the Walloon and Brussels-Capital regions and MIMOSA in the Flemish region. The two models are based on the same EFs and match the vehicle kilometre data in the regions. The ERT was informed that version I of the COPERT model was used for 1990 in the Walloon region and the more recent version III was used for the later years in the time series. As a result of the in-country visit, Belgium submitted a revised estimate using the COPERT III model in the Wallonia region for 1990 and

2004. The ERT recommends that the latest version of the model be used for the entire time series, consistent with the IPCC good practice guidance on time-series consistency.

E. Non-key categories

1. Natural Gas (1.B.2.b) – CH_4

44. As is noted in the previous (2005) review, emissions from the distribution of natural gas are now calculated using an improved methodology based on the lengths of different types of pipes. Emission rates for the different pipes are based on measurements and the composition of the gas. The estimates of transmission have been updated using additional data from the gas supply company Fluxys. As is noted in the 2005 review, Belgium misallocated combustion emissions into this category and these combustion emissions are now reported in the correct category. Documenting the specific EFs and parameters used to estimate emissions of CH_4 and CO_2 would improve transparency.

2. Manufacture of solid fuels and other energy industries – CH_4, N_2O

45. The NIR reported that there were differences between the approaches used by the regions to estimate emissions from coke ovens. For CH_4, the NIR states that the Walloon region uses EFs from the EMEP/CORINAIR guidebook. In the Flemish region, emissions are based on measurements made in 2001, 2002 and 2004. Estimates for earlier years are derived from these measurements. However, these emissions are all reported in the solid fuel transformation category because these are thought to arise mainly from leakage from the coke ovens. For N_2O in the Walloon region, EFs from the EMEP/CORINAIR guidebook are again used while in the Flemish region the NIR states that "contacts with the relevant industry in Flanders indicate that no emissions of N_2O occur in this sector". It is very unlikely that N_2O emissions occur in the Walloon region but not the Flemish region. No justification for the different approaches used was provided beyond the differing methodological choices in the regions. As a result of the in-country visit, Belgium submitted a revised estimate using consistent EFs in all three regions for 1990 and 2004. The ERT recommends that emissions of N_2O and CH_4 from fuel combustion and CH_4 leakage from coke ovens in all regions are estimated using a consistent approach for the intermediate years in the time series, possibly reflecting real and documented regional differences, and that combustion emissions are reported in the category manufacture of solid fuels and other energy industries, and fugitive emissions are reported in the category solid fuel transformation.

III. Industrial processes and solvent and other product use

A. Sector overview

46. In 2004, total GHG emissions from the industrial processes sector amounted to 14,746.9 Gg CO2 eq., accounting for 10.1 per cent of total national GHG emissions. Emissions have decreased by 13.9 per cent between 1990 and 2004, driven partly by a significant reduction of 93.1 per cent in F-gas emissions from the production of halocarbons and SF_6, and partly by a decrease in emissions from metal production of 14.7 per cent. CO_2 was the dominant gas emitted in 2004, contributing 64.4 per cent to total sector emissions, while N_20, F-gases and CH_4 contributed 23.0 per cent, 12.1 per cent and 0.4 per cent, respectively. HFCs contributed 10 per cent to total sector emissions in 2004. The chemical industry was the largest emitting category in 2004, contributing 38.9 per cent to the sectoral total, followed by mineral products, metal production, and consumption of halocarbons and SF_6 which contributed 37.4, 11.3 and 10.4 per cent, respectively. Solvents and other product use, a relatively minor source, accounted for just 0.2 per cent of total national GHG emissions.

47. The inventory for the industrial processes and the solvent and other product use sectors is complete for all the years in the entire time series, all categories and all gases. However, the ERT noted that the NIR and the CRF tables are not consistent in reporting the AD of glass production and ceramic production under other (2.A.7), and caprolactam and other non-specified chemicals under other (2.B.5).

The ERT noted that there had been no significant improvements in completeness since the previous (2005) submission. The ERT encourages Belgium to report both potential emissions and the ratio of potential to actual emissions for F-gases. The CRF reports limestone and dolomite use as "not occurring" ("NO") and soda ash production as "not estimated" ("NE"), but the NIR indicates that both are used for glass production.

48. Transparency in the industrial processes sector is limited by a lack of information in the NIR. In particular, the NIR does not contain sufficient detail to compare regional circumstances, for instance, the methodologies used for estimating emissions from ammonia production and iron and steel production. This includes detailed information on changes in EFs due to the composition of the raw materials used (e.g. the presence of non-carbonate sources in cement kilns) and a move to using plant-specific emissions data instead of an EF reported by an industry association or from the Revised 1996 IPCC Guidelines or the IPCC good practice guidance. Although the NIR indicates that Belgium uses methods from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, it is not clear in the NIR how the reported emissions were derived.

49. Recalculations reported by Belgium are due to additional sources such as reporting ceramic production in the Walloon region, corrections to AD and EFs, and methodological improvements. Belgium recalculated CH_4 emissions from sinter production for 2001 and 2004 while reporting notation keys for the other years in the time series. The basis for recalculating emissions for these years is not clearly explained in either CRF table 8(b) or the NIR. Nor is the time-series consistency of the monitoring and reporting methods described in the NIR. Belgium is encouraged to describe clearly the basis for the recalculations.

B. Key categories

1. Cement production – CO_2

50. Belgium reported that emissions were estimated using a tier 2 methodology, but the information provided in the NIR is not sufficient for expert review. During the in-country visit, Belgium provided the ERT with plant-specific data (based on measurements) to confirm that a tier 2 method had been applied for the years 2002 to 2004. Data were provided on the amount of cement kiln dust recycled, the lime (CaO) and magnesium oxide (MgO) content of the CKD, and the amounts of non-carbonate sources of calcium (Ca) and magnesium (Mg) fed into the kiln. The ERT recommends that Belgium consider including this information as an annex to the NIR. Because of a lack of plant-specific data for all the years of the time series, the cement operators in Belgium recommended the use of plant-specific 2002 EFs to estimate CO_2 emissions from 1990 to 2001, but the reason for this approach was not elaborated in the NIR. Belgium is recommended to check the consistency of the selected EFs for 1990 to 2001 with all the other years of the time series. Source-specific verification is regularly conducted for the EU ETS, but no other QC activities are conducted.

51. Belgium informed the ERT during the in country visit that one cement plant did not report the amount of CKD recycled for the years 2001, 2002 and 2003. The ERT recommends the Party to recalculate emissions from 2001 to 2003 to account for this quantity of CKD.

2. Lime production – CO_2

52. The methodology used to estimate emissions is in accordance with the IPCC good practice guidance. Lime and dolomite lime producers have provided plant-specific production figures and EFs for the different types of lime produced. Category-specific verification is regularly undertaken using data from the EU ETS, but no source-specific QC activities are conducted.

3. Ammonia production – CO_2

53. CO_2 emissions from ammonia production amounted to 1,265.2 Gg, and contributed 8.6 per cent to total sector emissions. Emissions increased by 82.4 per cent between 1990 and 2004, and this category has been identified as a key category by both level and trend assessments. The Party indicated in the CRF that ammonia AD is confidential.

54. The ERT recommends that Belgium correct an error in the combined reporting of process and energy emissions between 1990 and 2004 in the Flemish region, and process emissions only between 2002 and 2004 in the Walloon region. The ERT also recommends that the Walloon and Flemish regions use a consistent method for estimating CO_2 emissions from ammonia production. In response to questions raised by the ERT during the course of the review, the Flemish region stated that CO_2 emissions reported between 1990 and 2004 include only process emissions. The Walloon region reported process emissions only from 2002 to 2004 and the emissions from energy use are reported in the category chemicals (1A2c). Belgium did not submit a revised estimate for this category in response to the ERT's questions. Belgium is recommended to explain in its next inventory submission why CO_2 emissions are not estimated consistently across the regions, in the context of the allocation of process and energy emissions which will then be subject to expert review, and to conduct QC checks on reported AD and on EFs reported by plants to the chemical federation (FEDICHEM).

4. Nitric acid production – N_2O

55. During the in-country visit, Belgium provided plant-specific AD and EFs for all years in the time series. The EF of 8 kg N_2O per tonne nitric acid used from 1990 to 1995 in the Walloon region and from 1990 to 2002 in the Flemish region is within the range of default EFs reported in Table 3.8 of the IPCC good practice guidance. However, Belgium is recommended to report on its nitric acid plant technology in the NIR to support Belgium's reported EF and to allow comparison with IPCC good practice guidance EFs. The ERT also recommends Belgium to document variations in AD, the N_2O EF and production data across the regions, discuss the assumption that selective catalytic reactors reduce N_2O emissions, and document the N_2O destruction factor of the catalyst used in the Flemish region.

5. Other (chemical industry) – CO_2

56. Belgium is recommended to report in the CRF AD for each chemical industry that is clustered under 'other non-specified', and to provide in the NIR a description of each industry as well as descriptions of the methodology and EFs used. Belgium is also recommended to identify those chemical industries reported under "other non-specified" that report CO_2 emissions from flaring and to report these emissions instead under waste incineration, as required by the IPCC Good practice guidance.

6. Iron and steel production – CO_2

57. It is not clear from the NIR how the tier 2 method was applied, how process emissions were derived for each plant, and how these emissions were separated from emissions related to energy use. The ERT recommends Belgium to provide a clear description in the NIR of the tier 2 method applied, and to include information on each parameter used to estimate emissions, the number of plants producing iron and steel and a description of their processes, the mass of reducing agent in pig iron production as well as the mass of carbon in the ore, pig iron and steel, and the EFs for reducing agents and electric arc furnaces.

58. The ERT encourages Belgium to include in the NIR the results of an appraisal of the QA/QC checks applied to data from *in situ* monitoring by iron and steel production operators, and to ensure that QA/QC checks are used to verify that the tier 2 method is in accordance with the IPCC Good practice guidance.

59. The NIR indicated that one sinter plant reported CO_2 emissions in 2003. The emissions were not reported in the 2006 NIR because of a lack of data for other years. The ERT recommends Belgium to report a complete time series of emissions from all sinter operations.

7. Production of halocarbons and SF_6 – other (F-Gases)

60. Emissions of F-gases from the production of halocarbons and SF_6were mainly due to fugitive and non-fugitive emissions from an electro-fluorination plant. Emissions were calculated using mass balance in combination with actual measurements. EFs are calculated for each source of emission, namely batch processes, reactors and process steps. The use of annual plant-specific AD and EFs is in accordance with the IPCC good practice guidance.

8. Consumption of halocarbons and SF_6 – HFCs

61. No improvement of the methodology has been reported in the 2006 submission. The ERT acknowledges that the necessary improvements required to meet IPCC Good practice guidance are constrained by the availability and quality of import statistics, production and sales data, equipment inventories and consumption data to estimate both actual and potential emissions. Belgium is encouraged to document the data and the methodology issues in its next inventory submission, and is recommended to improve the quality of the data required to implement a methodology that is in accordance with the IPCC Good practice guidance.

C. Non-key categories

1. Other (glass production) – CO_2

62. In 2004, CO_2 emissions from glass production (2.A.7) amounted to 259.7 Gg. The NIR states that part of these emissions is attributed to enamel production. A CO_2 EF for enamel production of 650 kg CO_2 per tonne of enamel produced is used for the entire time-series. This EF was obtained from an enamel company in the Flemish region, and based on the EU Best Available Techniques (BAT) Reference Documents (BREF). However, during the in-country visit, the Party informed the ERT that the enamel company reported an EF of 71.12 kg CO_2 per tonne of enamel produced for the years 2001 to 2005. This average EF is based on plant measurements. As a result of the in-country visit, Belgium submitted a revised estimate for 1990 to 2000 using the plant-specific EF of 71.12 kg CO_2 per tonne of enamel produced.

63. Belgium revised and resubmitted to the ERT the 1990 to 2002 emission estimate of one glass plant in the Flemish region due to a revision of the average EF from 125 kg CO_2 per tonne of glass to 300 kg CO_2 per tonne of glass in 1990 to 2002 based on measurements carried out for 2001 to 2005. The Party indicated that the new EF is applicable for the entire time series because no changes in the process have occurred since 1990.

2. Other (non-energy use) – CO_2

64. CO_2 emissions from non-energy use of fuel are reported under category 2G. However, CO_2 is only emitted when the products or their by-products are used in other industrial processes (e.g. chemical industries (other) (2B5)) and/or when they are burned or destroyed to meet regulatory requirements (e.g. non methane volatile organic compounds (NMVOCs) from solvents and other product use). In response to questions raised by the ERT, Belgium removed its CO_2 estimates for this category from its submission of revised estimates for 1990 and 2004.

IV. Agriculture

A. Sector overview

65. In 2004, total emissions from the agriculture sector amounted to 10,999.3 Gg CO_2 eq., accounting for 7.5 per cent of total national GHG emissions. Emissions decreased by 13.0 per cent between 1990 (1,640.5 Gg CO_2 eq.) and 2004, due to decreases in CH_4 emissions from enteric fermentation, and in CH_4 and N_2O emissions from manure management and agricultural soils. The drivers for the decrease were the occurrence of bovine spongiform encephalitis; concern over dioxin contamination and the subsidized reduction of cattle numbers in the Flemish region.

66. The reporting of emissions from agriculture is generally complete. Rice cultivation, prescribed burning of savannahs and field burning of agricultural residues do not occur in Belgium and the appropriate notation key "not occurring" ("NO") is used. Uncertainties have been quantified using expert judgment and IPCC defaults.

67. The ERT considers that transparency in the agriculture inventory is generally inhibited by the lack of documentation in the NIR. The ERT encourages Belgium to include in an annex to the NIR information on the different landscapes and agricultural systems in each region (e.g. the agricultural system in the Flemish region is more intensive and similar to that in the Netherlands and the Walloon system is more extensive and similar to that in France), summaries of the supporting scientific studies used in the Walloon region and summaries of the inputs, outputs and calculations used in the models in the Flemish region. Information on these studies and models is critical to gaining an understanding of the Belgian agricultural inventory and to any subsequent expert review.

68. The ERT was informed that time constraints on the compilation of the agriculture inventory resulted in an emphasis on reported emissions rather than AD or derived parameters. Errors in the AD cause misleading IEFs and hinder comparability with other Parties. The ERT recommends Belgium to improve QC procedures in order to minimize errors in the inventory.

69. Belgium recalculated several agricultural categories in the 2006 submission. The recalculations are documented in the NIR and include revision of the nitrogen excretion factors for 1996–2004 to reflect reduced nitrogen content in feed, and correcting an allocation mistake in 2002 and 2003 where emissions were wrongly reported under "daily spread" instead of "pasture range and paddocks". Other recalculations have affected the entire time series, including removing CH_4 emissions from wetlands and unmanaged surface waters; recalculation of removals from forest, grassland and agricultural soils; correction of livestock AD; and revision of area calculations and EFs for histosols.

B. Key categories

1. Enteric fermentation – CH_4

70. Cattle are the most significant subcategory in enteric fermentation, accounting for 93.7 per cent of enteric fermentation emissions. The remaining 6.3 per cent is comprised of emissions from swine (5.1 per cent), sheep (0.66 percent), horses (0.34 per cent) and goats (0.12 per cent). Emissions from cattle in the Flemish region are calculated using the IPCC default EF of 100 kg CH_4/hd/yr for all years in the time series. The Walloon region also uses the IPCC default EF for cattle for 1990 but increases the EF to 110 kg CH_4/hd/yr in 2004 to reflect increases in milk production. To be consistent with the IPCC good practice guidance, the ERT recommends that Belgium implement a tier 2 methodology for emissions from enteric fermentation in cattle .

71. The reported IEF for sheep is 8.3 kg CH_4/hd/yr compared to the IPCC default value of 8 kg CH_4/hd/yr. During the in-country visit, Belgium informed the ERT that the higher EF was driven by

sheep in the Walloon region, where 3 categories of sheep are used for emissions estimation. The ERT recommends that Belgium include this additional supporting material in the NIR.

2. Manure management – CH_4

72. Emissions from swine manure accounted for 59.3 per cent of manure management emissions in this category, with cattle manure accounting for 35.0 per cent. Other animal categories accounted for the remaining 5.7 per cent. A tier 2 methodology is used in the Flemish region. In response to the 2005 centralized review report, Belgium has included additional information on the tier 2 model in the NIR. The NIR also contains additional supporting information for the Walloon region.

73. The NIR reports that data on the allocation of animals to AWMS are not collected annually given the slow pace of change. However, given the importance of such allocations, the ERT recommends that Belgium regularly review the appropriateness of the allocation of animals to AWMS as a source-specific tier 2 QA/QC procedure. CRF table 4.B(a)s2 should also be completed for all species.

74. The IEF for sheep is the highest of all reporting Parties and seven times the IPCC default for a cool climate. During the in-country visit, the ERT identified that the high IEF was derived from the tier 2 model used in the Flemish region and attributed to the fact that 20 per cent of sheep are on a liquid manure management system with a methane conversion factor (MCF) of 39 per cent. The ERT verified the model and confirmed that the liquid AWMS makes the high IEF appropriate. The ERT appreciated that as a result of discussions during the in-country visit, the Flemish region revised the MCF for cattle on pasture from 10 per cent to the IPCC good practice guidance value of 1 per cent.

75. The ERT noted that the MCF given for swine is 0.2 per cent. However, the weighted MCF from the model used in the Flemish region is 0.36 per cent. During the in-country visit, the ERT confirmed that the 0.2 per cent value was for 1990 and had not been updated for 2004. The ERT recommends Belgium to ensure that the MCF is consistent with the latest data on AWMS.

3. Manure management – N_2O

76. The ERT noted that N_2O from manure management is discussed under agricultural soils rather than under manure management and recommends Belgium to correct this in the NIR.

77. N_2O emissions are calculated using an IPCC tier 1 methodology and annual country-specific nitrogen excretion (Nex) values for dairy and non-dairy cattle, sheep and swine. Regional models are used to build the emissions inventory. The Nex factors for the Flemish region are from the Manure Bank of the Flemish Land Agency. Nitrogen excretion is decreasing over time due to the reduced nutrient content in the feed. In the Walloon region, Nex values were determined for the implementation of the CE Nitrates Directive 91/676, and adjusted to include atmospheric emissions. During the in-country visit, the ERT was provided with additional documentation that supported the Nex values. The ERT recommends that a summary of the relevant tables from the additional documentation be included in the NIR.

4. Direct emissions from agricultural soils – N_2O

78. In 2004, the major sources of direct emissions of N_2O from agricultural soils were animal manure applied to soil (43.9 per cent), nitrogenous fertilizer (40.1 per cent) and crop residue (15.1 per cent). The NIR states that the IPCC default EF of 0.0125 kg N_2O-N/kg N has been used to estimate direct N_2O emissions from synthetic fertilizers, animal waste applied to soil and crop residues. However, the CRF reports an IEF from crop residues of 0.0002 kg N_2O-N/kg N. This discrepancy was highlighted in the 2005 centralized review report. During the visit, the ERT confirmed that the IPCC default EF of 0.0125 kg N_2O-N/kg N was used. The ERT was informed by Belgium that the discrepancy in the CRF was caused by the Flemish region reporting the unit of kg N_2O-N/kg for dry biomass instead

of crop residue for the entire time-series. Belgium informed the ERT that this error had no impact on the N_2O emission estimates and that it has been corrected in the 2007 submission.

79. In response to the 2005 centralized review, Belgium has updated the EF for emissions from histosol cultivation to 8 kg N_2O-N/ha.

5. Indirect emissions from agricultural soils – N_2O

80. In 2004, indirect emissions of N_2O from agricultural soils were comprised of emissions from leaching and run-off (74.8 per cent) and atmospheric deposition (25.5 per cent). There is an error in CRF table 4.Ds2 where the fractional parameters reported are offset by one row. During the in-country visit, the ERT queried each parameter and was provided with additional supporting material and models to support each value.

81. The values reported for FracGASF and FracGASM are different from the IPCC default values of 10 per cent and 20 per cent, respectively. In the Walloon region, an average FracGASF of 2.3 per cent is based on the default values recommended by IIASA for different types of fertilizers. In the Flemish region the weighted average for NH_3 and NO volatilization is 4.4 per cent. For FracGASM, the Flemish region uses the IPCC default value of 20 per cent and the Walloon region uses a weighted average value based on different AWMS for liquid and solid manure, and grazing.

C. Non-key categories

Other (emissions originating from coniferous, deciduous and market gardening) – N_2O

82. The CRF reports 0.72Gg of N_2O emissions in 2004 from coniferous trees, deciduous trees and market gardening in CRF table 4. During the visit, the Party confirmed that the reported emissions from coniferous and deciduous trees were thought to be from forests and should be removed from the agriculture sector, and that the emissions from market gardening are an indicative EF and already counted under fertilization. The ERT appreciated the Party's submission of a revised estimate for 1990 and 2004 and its removal of the N_2O emissions under the coniferous, deciduous and market gardening category.

V. Land use, land-use change and forestry

A. Sector overview

83. The land use, land-use change and forestry sector in Belgium represented a net sink of emissions for the entire time series 1990 to 2004. In 2004, the LULUCF sector was a net sink of 1,173.4 Gg CO_2 eq., which offset 0.8 per cent of the total national GHG emissions. There has been no particular trend observed in the emissions quantified for the LULUCF sector over the reporting period.

84. Belgium reported CO_2 emissions by sources and removals by sinks for three land-use categories: forest land, cropland and grassland. Emissions of CH_4 and N_2O were reported as not occurring ("NO"). Belgium did not estimate emissions or removals from land-use change.

85. A land use and land-use change matrix was not submitted by Belgium. The ERT identified that the representation of land areas is not consistent across the inventory time series, and that a system to support the identification of land areas does not exist. This prevents both the detection of land-use change by categories and the quantification of associated emissions and removals. The ERT recommends that Belgium establish a system that enables the Party to identify, on a consistent basis, land use and land use change.

86. The Party mostly uses the tier 2 and tier 3 methods in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas*

Inventories for Land use, land-use change and forestry (hereinafter referred to as the IPCC good practice guidance for LULUCF) and country-specific EFs. Belgium uses biomass and soil data obtained from national and/or regional sampling programmes. The applied methods are strongly supported by research and a series of analytical country-specific studies has been published in peer-reviewed journals.

87. The ERT encourages Belgium to consider using terminology consistent with the IPCC Good practice guidance for LULUCF in its reporting of this sector in the NIR.

88. The ERT commends Belgium on its efforts to improve reporting of this sector since the 2005 submission. The ERT noted the inclusion of an advanced assessment of soil carbon stock changes, as well as reporting of the cropland and grassland categories.

B. Key categories

1. Forest land remaining forest land – CO_2

89. This category is the most important category in the LULUCF sector, identified as a key category in the secretariat's analysis of both level (1990 and 2004) and trend assessment. The estimated sink is dominated by changes to the biomass carbon stock. The tier 3 methodology suffers from time-series inconsistency because two methodologies have been applied, the carbon stock change method (for 1990 to 2000) based on NFI data, and the EFOBEL model (for 2001–2004). The Party informed the ERT that a recalculation of the entire time series will be undertaken on receipt of new NFI data that is due in 2008.

90. The ERT noted that the areas reported in the CRF for this category included only managed forests. Belgium informed the ERT that forest not used for productive purposes is classified as unmanaged. This distinction is also reflected in the national forest inventory, which applies different methodologies for managed and unmanaged forest areas. However, consistent area representation requires the reporting of land areas for both managed and unmanaged forest land. This issue also explains the difference in forest land areas reported to the United Nations Food and Agriculture Organization under the Convention.

91. The ERT concludes that the approaches used for the assessment of changes in biomass and soil carbon pools are in line with the IPCC Good practice guidance for LULUCF. The EFs and parameters used are largely country-specific, and are substantiated by local research and analysis. However, the ERT encourages Belgium to provide the key model parameters in the next inventory submission.

2. Grassland remaining grassland – CO_2

92. The Party used a tier 2 method to estimate carbon stock changes from this category. The ERT noted that the method does not differentiate between mineral and organic soils, and concludes that only mineral soils have been used to derive carbon stock change. The ERT recommends that areas of mineral and organic soils are characterized and used to estimate emissions from this category in line with the IPCC Good practice guidance for LULUCF.

C. Non-key categories

Cropland remaining cropland – CO_2

93. A tier 2 method has been used by the Party to estimate carbon stock changes from this category, however, the ERT recommends that areas of mineral and organic soils are characterized and used to estimate emissions from this category in line with the IPCC Good practice guidance for LULUCF.

VI. Waste

A. Sector overview

94. In 2004 , emissions from the waste sector amounted to 1,714.8 Gg CO_2 eq., contributing 1.2 per cent to total GHG emissions. Emissions from this sector declined by 50.8 per cent between 1990 and 2004. The decrease is due to reduced CH_4 emissions from solid waste disposal sites (SWDS), partly driven by increased CH_4 recovery in the latter years of the time series. SWDS were the largest emitting category in 2004, contributing 49.5 per cent to total sector emissions. Waste incineration and wastewater handling contributed 26.3 and 23.4 per cent of sector emissions, respectively. CH_4 contributed 58.1 per cent to total sectoral emissions in 2004, and CO_2 and N_2O contributed 25.7 and 16.2 per cent, respectively

95. The CRF tables are generally complete. The ERT noted that notation keys are not reported for unmanaged solid waste disposal sites and domestic wastewater handling. Belgium is encouraged to improve reporting of notation keys in the NIR and CRF tables (particularly table 9(a)) in its next inventory submission. Belgium is also recommended to improve the transparency of the inventory by including a summary of additional information provided to the ERT during the in-country visit in its next inventory submission. This information would include: the historical waste composition data used to support its calculation of the fraction of degradable organic carbon (DOC_f) in solid waste disposal; information on the recovery of CH_4 emissions from industrial treatment for *in situ* use; and the characteristics of compost production and the amount of waste composted by each region.

96. Recalculations reported in the 2006 submission include reducing the EF for compost from 20 kg CH_4/tonne to 2.4 kg CH_4/tonne of compost. This revision is based on the introduction of monitoring results obtained from the Netherlands.

B. Key categories

Solid waste disposal site – CH_4

97. Two first-order decay (FOD) models are used and each is modified according to region-specific circumstances. The parameter bases of the models are not consistent between the regions. The Flemish region uses a multiphase model for a 'permitted landfill' with three different biodegradable rates (k) and an FOD model with a single k value of 0.1/year for landfill where waste disposal no longer occurs. The Walloon region uses a common FOD model for all landfills. During the in-country visit, the ERT was informed that the fraction of degradable organic carbon (DOCf) used in the Flemish and Walloon regions was 0.77, based on historical waste composition data for which lignin is included. The ERT encourages Belgium to harmonize the parameters between regions where there is no scientific or technical justification to support different parameters.

98. Belgium is recommended to correct the error in the 2004 CRF on the amount of waste in landfill, and to improve documentation in the NIR on gas recovery data.

C. Non-key categories

1. Wastewater handling – CH_4

99. Belgium submitted revised emission estimates for municipal wastewater treatment plants in response to questions raised by the ERT during the in-country visit. This revision was recommended by the ERT in order to harmonize the regional EFs used for septic tanks.

2. Incineration – CO_2

100. The ERT identified an inconsistency between the Flemish and Walloon regions in the reporting of CO_2 emissions from flaring activity associated with the chemical industry. The Walloon region reported CO_2 emissions from flaring under waste incineration, while the Flemish region reported these emissions under other non-specified emissions from the chemical industry in the industrial processes sector. The ERT recommends that Belgium report these emissions under waste incineration in accordance with the IPCC Good practice guidance.

3. Other – composting – CH_4

101. Belgium is commended for revising the composting CH_4 EF from 20 to 2.4 kg/tonne of compost. This revision is based on the introduction of monitoring results obtained from the Netherlands.

102. Belgium is encouraged to improve transparency in this sector of the NIR by including information on the characteristics of compost production and the amount of waste composted by each region.

VII. Conclusions and recommendations

103. Belgium has made significant improvements since last year's submission, in response to recommendations made by the 2005 centralized review and other improvements identified by the Party. The improvements include: significant efforts to harmonize EFs in the energy sector; improvements to AD across all sectors; and re-allocation of emissions between the agriculture and the LULUCF sectors. The ERT commends Belgium on its efforts to improve the estimates in the inventory.

104. Belgium has submitted a generally complete set of CRF tables for the years 1990–2004 which includes most of the tables required and data on all relevant gases and categories. During the course of the review, Belgium submitted revised estimates for 1990 and 2004 in response to overestimates and underestimates of GHG emissions identified by the ERT. The ERT concludes that Belgium's GHG inventory is generally accurate, as defined in the UNFCCC reporting guidelines, and is largely consistent with the IPCC Guidelines and the IPCC good practice guidance. The inventory is complete in terms of geographical coverage.

105. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Belgium's GHG inventory submission, including recommendations relating to the accuracy of emission estimates. Many of the recommendations were implemented during the review process. The key recommendations[3] are that Belgium:

- Develop a national QA/QC plan in accordance with the IPCC good practice guidance and implement this at the regional and the national levels of inventory planning, preparation and management;
- Make all archived inventory information accessible by collecting and gathering it at a single location;
- Develop an inventory improvement plan that can be applied at the regional and the national levels and that takes account of outputs from QA/QC activities, uncertainty analyses and key category analyses as part of a formal process to improve the national inventory;
- Coordinate recalculations across the regions and improve reporting of recalculations by reporting any changes in emissions and removals compared with previous inventories, regardless of their magnitude, and clearly indicates the reasons for the changes using CRF table 8(b). Recalculations should also be clearly explained in the NIR and linked to the inventory improvement plan;

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

- Improve the transparency of the inventory by:

    (a) Structuring the presentation of all sectors in the NIR according to the UNFCCC reporting guidelines for national inventories;

    (b) Providing improved documentation on the methodologies, EFs and AD used in all sectors;

    (c) Including in future NIRs elements of the extensive documentation that is already available;

    (d) Consider including regional CRF tables in the annex to the NIR;

    (e) Improving the completeness of the CRF tables.

- Improve the uncertainty analysis by routinely reassessing uncertainty, obtaining more estimates based on real data, using analytical techniques to combine regional uncertainties with the national uncertainty assessments and, where expert judgement is the only source of information, documenting the use of expert judgement following the IPCC good practice guidance.

- Increase efforts to harmonize EFs and methodologies between regions where there is no scientific, technical or physical basis for the use of different EFs or methodologies.

- Allocate sufficient resources to QA/QC activities and in general to inventory planning, preparation and management at the national and the regional levels.

Annex

Documents and information used during the review

A. Reference documents

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Etienne Hannon (Federal Public Service Health, Food Chain Safety and Environment), Mr. André Guns (DGRNE); Ms. Miet D'heer (VMM) ; Ms. Isabelle Higuet (DGRNE); Ms. Marianne Squilbin (IBGE-BIM); Ms. Inge Van Vynckt, (VMM); Bas van Wesemael and Dr. Dominique Perrin (FSAGX), including additional material on the methodology and assumptions used.

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