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BELGIUM

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2004[1]

I. OVERVIEW

A. Introduction

1. This report covers the desk review of the 2004 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 of the Conference of the Parties. The review took place from 8 to 26 November 2004 and was conducted by the following team of nominated experts from the roster of experts: Generalists – Mr. Paul Filliger (Switzerland) and Ms. Kristina Saarinen (Finland), Energy – Mr. Mario Contaldi (Italy) and Mr. Hugh Saddler (Australia), Industrial Processes – Ms. Karin Kindbom (Sweden) and Ms. Kristine Zommere (Latvia), Agriculture – Mr. Ayite-Lo Ajavon (Togo) and Ms. Hongmin Dong (China), Land-use Change and Forestry (LUCF) – Ms. Dominique Blain (Canada) and Mr. Richard Volz (Switzerland), Waste – Mr. Philip Acquah (Ghana) and Ms. Katarina Mareckova (Slovakia). Ms. Hongmin Dong and Mr. Mario Contaldi were the lead reviewers of this review. The review was coordinated by Ms. Rocio Lichte (UNFCCC secretariat).

2. In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Annex I Parties", 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 2004 submission, Belgium has submitted a complete set of common reporting format (CRF) tables for the years 1990–2002 and a national inventory report (NIR). Where needed the expert review team (ERT) also used previous years' submissions and other information provided during the review process. The full list of materials used during the review is provided in annex 1 to this report.

C. Emission profiles and trends

4. In the year 2004, the most important GHG in Belgium was carbon dioxide (CO_2), contributing 84.2 per cent of total[2] national GHG emissions expressed in CO_2 equivalent, followed by nitrous oxide (N_2O) – 8.6 per cent – and methane (CH_4) – 6.1 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) taken together contributed 1.1 per cent of overall GHG emissions in the country. The Energy sector accounted for 79 per cent of total GHG emissions, followed by Industrial Processes and Solvent Use (10.7 per cent), Agriculture (8.2 per cent) and Waste (2 per cent).

[1] In the symbol for this document, 2004 refers to the year in which the inventory was submitted, and not to the year of publication.
[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LUCF, unless otherwise specified.

Total GHG emissions (excluding CO_2 from LUCF) amounted to 150,311 Gg CO_2 equivalent and increased by 2.1 per cent from 1990 to 2002. The trends for all gases show no apparent inconsistencies.

D. Key sources

5. Belgium has reported a key source tier 1 analysis, both level and trend assessment, as part of its 2004 submission. The key source analysis performed by the Party and the secretariat[3] were carried out at different levels of detail: Belgium's key source analysis with 34 key source categories was more detailed than that of the secretariat (20 categories) and is well adapted to the Party's needs.

E. Main findings

6. In general the NIR and the CRF tables are highly developed and show some improvements since the last submission, for example, the provision of the reference approach. The ERT recommends the Party to work on the completeness of the inventory and to include more detailed descriptions of methods in the NIR to enhance transparency. There are some minor inconsistencies between the CRF tables and the NIR on documentation of references to emission factors (EFs), which the Party has already stated that it will correct for its next NIR.

7. The information in the present inventory is largely split according to the three regions of the country – Brussels, Flanders and Wallonia – and this has an impact on the filling in of the CRF tables, as well as on transparency. The ERT encourages Belgium to continue its efforts to harmonize the reporting from the different regions in the NIR by presenting the data, notation keys and related information in the NIR and the CRF tables in a more complete and consolidated form for the whole country in order to assist the review of its inventory development.

F. Cross-cutting topics

Completeness

8. Belgium has provided inventory data for the years 1990–2002 and included all the required tables except the sectoral background data tables for the fluorinated gases (F-gases) (tables 2(II)C, E and 2(II)F). The coverage of both sources and gases is good and is almost complete, except for the LUCF sector, for which no estimates have been provided for categories 5.B, 5.C and 5.D, and for a number of sub-sources in some sectors. For example, in the Energy sector, even though the energy data have been recalculated, some gaps where "not estimated" ("NE") is reported still exist, mainly in biomass and other fuel data (categories 1.A.1a and b), and further work on completeness is also necessary in Energy tables 1.B.2 and 1.C (the tables are only partly filled in). Data on F-gases are provided for the years 1990–2002 but in the CRFs for the years 1990–1994 some subcategories have not been estimated ("NE" is reported). As regards the LUCF sector, the Party states that a study is going on to estimate CO_2 emissions and removals from soils but the results will not be available before 2005. The ERT recommends that high priority should be given to making the inventory complete.

9. In the CRF tables not all the cells contain data or notation keys, leaving unexplained data gaps. This was also identified in the previous submissions. The Party explained that the cells are left empty because data for all regions were not available by the time of inventory submission. The ERT suggests that Belgium should use the notation key "NE" if emission estimates are not provided or "not applicable" ("NA") for activity data (AD) or related information for these same cases, instead of leaving the cells empty.

[3] The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

Transparency

10. The NIR is well developed and in general follows the UNFCCC reporting guidelines. It provides descriptions of the institutional arrangements in preparation of the inventory, quality assurance/quality control (QA/QC) and verification, key sources and emission trends. Information on methods and data sources used is also provided in the NIR. However, the ERT encourages Belgium to include in the NIR more detailed descriptions of the methodologies used and the rationales for choices of the methods and data, as well as the underlying assumptions, to further improve transparency, mainly for the key sources.

11. It is recommended that Belgium make its reporting more transparent by harmonizing the inventory and the descriptions of the methodologies and applying them comprehensively over the whole country. The ERT noted that regional and national working groups have been set up since January 2003 for developing a programme for implementation 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) for different sectors in order to reduce uncertainties and any inconsistencies between the regional inventories, facilitate the harmonization process, and improve the national inventory.

12. There is no information about confidentiality issues in the NIR. However, the AD for ammonia production are confidential, as indicated in table 2(I).A-Gs1.

Recalculations and time-series consistency

13. The ERT noted that recalculations reported by the Party of the time series 1990–2001 had been undertaken to take into account methodological changes, the harmonization of allocation and/or methods between the regions, and access to new data sources. The effect of the recalculations for the base year (1990) (as reported in the CRF tables) is an increase by 0.9 per cent in CO_2 equivalent emissions excluding LUCF and 0.7 per cent including LUCF. The major changes include: (a) in the Energy sector: improvements to the AD, EFs and methods for several subcategories in the three regional inventories, and some for the inventory for the whole country; (b) in the Industrial Processes sector: improvement of EFs and methodologies as well as the inclusion of new sources for the F-gases; (c) in the Solvent and Other Product Use sector: the inclusion of emissions from N_2O use for all regions; (d) in the Agriculture sector: the completing of the sectoral background tables, the updating of the EFs for swine, and the inclusion of N_2O from sludge spreading; (e) in the LUCF sector: revision of conversion factors, wood densities, mean annual growth and the methodology for estimating annual harvest; and (f) in the Waste sector: the inclusion of degradable organic carbon (DOC) for solid waste disposal sites (SWDS) and waste incineration for Brussels. The correction of the allocation of utilities for the whole time series has produced a more consistent level and trend key source analysis.

14. The NIR indicates that the inventory for 2002 is estimated on a temporary basis. Belgium should explain why it is temporary, what this means exactly and what kind of revisions are to be expected.

15. There was a difference between the information on recalculations provided by the secretariat and the information provided by the Party with regard to CO_2 emissions (including LUCF) in 2001, which the Party indicated that it will resolve by correcting CRF table 8 in its next submission.

Uncertainties

16. Belgium has not provided quantitative uncertainty estimates for any sector. In response to the findings of the 2004 synthesis and assessment (S&A) report, it replied that a first uncertainty assessment will be provided in the next submission. Belgium indicated that it would implement this under the programme to integrate the IPCC good practice guidance into the regional and national inventories. The 2004 NIR indicates that the regional uncertainty estimations would be completed before the harmonization at the national level in the improvement plan. The uncertainty analysis for Belgium is of special importance as the inventory consists of a compilation of three different regional inventories, which also suggests that somewhat different methodologies are applied in the preparation of the

inventories. The ERT encourages Belgium to collect the information needed and to carry out the uncertainty analysis at the regional and national level.

Verification and quality assurance/quality control approaches

17. Independent audits of the GHG inventories of the regions and the national inventory started in 2002 and the results for all three regions became available in 2003. The purpose of these audits is to analyse the difficulties encountered while compiling the regional and national emissions inventories in order to improve the quality and completeness of the Belgian national inventory. In Flanders, the procedures for preparing the regional energy balance are part of a system that is certified according to ISO 9001. In Wallonia, the inventory is prepared by the Air Cell, which is part of the General Directorate for Natural Resources and Environment, and the latter has now obtained its Eco-Management and Audit Scheme (EMAS) certification. ISO 9001 certification is also anticipated. No information on the QA/QC system in place in the Brussels region is provided in the NIR. As the Belgian inventory is compiled from three independent regional inventories, a comprehensive QA/QC system is very important. The ERT encourages Belgium to complete the QA/QC procedures and to develop a formal QA/QC plan according to the IPCC good practice guidance. The NIR currently does not provide any information on source-specific QA/QC or verification for any sector. (In addition, the NIR should give some information on archiving and documentation.)

G. Areas for further improvement

Identified by the Party

18. The NIR identifies several areas for further improvement of the inventory. The ERT was impressed by the detailed lists of planned improvements in most sectoral chapters. The most important may be the improvements of the energy balance for the regions, the harmonization of methodologies between the regions, and the improvements in the Agriculture and LUCF sectors. The ERT recommends Belgium to set priorities and to develop a time-schedule for the realization of these improvements.

Identified by the ERT

19. The ERT identified the following cross-cutting issues as most important for further improvement. The Party should:

(a) Improve the completeness of the inventory by estimating the missing sources;

(b) Provide quantified uncertainty estimates on the regional and the national level;

(c) Provide more precise descriptions of methodologies used where these differ from those described in the IPCC Guidelines or good practice guidance;

(d) Improve transparency by including more detailed documentation of the methods in the NIR;

(e) Create a QA/QC management system;

(f) Extend the use of the notation keys in the CRF.

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

II. ENERGY

A. Sector overview

21. In 2002, the Energy sector accounted for 79.0 per cent of Belgium's total GHG emissions. During the period 1990–2002 emissions from the sector increased by 6.1 per cent. Within the sector,

12 key sources have been identified under the level assessment and 14 according to the trend assessment, together covering about 75 per cent of total emissions.

Completeness

22. All significant emission sources are included in the inventory, but a few sub-sources of CO_2, CH_4 and N_2O under fugitive emissions from the Oil and Natural Gas category and CH_4 and N_2O from marine bunker fuels are still not estimated ("NE" is reported).

Transparency

23. The methodology used to estimate emissions is country-specific, and the regional AD, EFs and methodologies are mostly well described in the NIR. Energy data are collected by energy balances, plant-specific data from large sources (mainly industry) and surveys of fuel consumption for the Transport subsectors. A specific national circumstance is the division of Belgium into three regions, each of which uses its own data sources, local surveys and, in some cases, methodologies to estimate emissions. The national inventory is the sum of three detailed estimates and, considering the size of Belgium, this makes the sectoral approach of this inventory a bottom–up exercise, starting from point source data for most of the stationary sources. A national commission, recently set up, is in charge of ensuring consistency between the different data sources, the regional inventories and the national energy balance.

Areas for further improvements identified by the Party

24. The ERT acknowledged that Belgium has indicated that it will implement a large number (36 in total) of minor improvements in its next submission in response to the findings of the 2004 S&A report. They cover issues such as inconsistencies in reporting, methodological issues, omissions and transcription errors, and relate to both key and non-key sources.

Areas for further improvements identified by ERT

25. The ERT noted that other items identified in the 2004 S&A report also have the potential to improve the emissions estimates significantly with reference to the transparency and consistency of the inventory. In particular the ERT encourages the Party also to address in its future submissions other issues identified as part of the S&A and in the present report, for example: some data gaps; differences between the data reported to UNFCCC (in the CRF) and those reported to the International Energy Agency (IEA) for civil aviation; some inter-annual variations in the IEFs for solid, liquid and gas fuels under the Agriculture/Forestry/Fisheries subcategories of 1.A.4 Other Sectors; and the current lack of estimates for some of the oil and natural gas sub-sources, as well non-CO_2 emissions from marine bunker fuels.

B. Reference and sectoral approaches

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

26. In the 2004 submission, for the first time, the reference approach tables have been included for all years of the time series. For most years the differences between the two CO_2 emissions estimates lie between 2 and 6 per cent. The Belgian authorities are aware of these significant differences for some years and are working to improve the comparability of the two approaches and to reduce those differences, particularly for the most recent inventory years.

Comparison with international statistics

27. The differences between apparent energy consumptions reported in the CRF (reference approach) and the IEA data appear to be rather small. According to the 2004 NIR those differences mainly arise from the use of different conversion factors; data sources are the same for both sets of reporting (federal energy statistics).

International bunker fuels

28. The Party has provided sectoral background data for international bunkers for the first time in the 2004 submission, for most of the inventory years. However, only CO_2 emissions have been estimated. The ERT encourages Belgium to improve the estimation of other GHGs in its future submissions. The NIR explains clearly the methodology used to distinguish between domestic and international bunkers.

Feedstock and non-energy use of fuels

29. For the reference approach Belgium uses the national energy balance and the fraction of carbon stored recommended by the IPCC Guidelines. However, the NIR indicates that those estimates of fractions of carbon stored are not appropriate to the national circumstances. At the beginning of 2003 a study started in the Flanders region (where the large Belgian petrochemical industry is mostly concentrated) to further develop a more country-specific methodology to calculate the emissions resulting from the non-energy use of fuels and feedstock. The results of this study will be included in the next submission.

C. Key sources

30. Belgium identified 11 key sources in the Energy sector for the level assessment, contributing 76.2 per cent of total national GHG emissions. According to the key source analysis in the NIR, CO_2 from stationary combustion (subcategories of Residential and Public Electricity and Heat Production) and CO_2 from mobile combustion – road vehicles are the main key sources for level assessment, each contributing between 14 per cent and 16 per cent of emissions. The same sources, including manufacture of solid fuels and other energy industries and non-ferrous metals, are also key sources on the trend assessment.

Road transportation – CO_2

31. A major improvement in Belgium's 2004 submission is that CO_2 emissions from road transport are now calculated on the basis of the fuel sold in Belgium instead of estimates of fuel used in the country.

Manufacturing industries and construction – N_2O

32. N_2O emissions are now reported according to the various sub-sources (1.A.2.a–1.A.2.f), which is an improvement on previous submissions.

D. Non-key sources

Fugitive emissions: oil, natural gas and other sources

33. In the 2004 submission, for the first time, CH_4 fugitive emissions from oil and gas operations and CO_2 fugitive emissions from solid fuel transformation are estimated. CO_2 fugitive emissions from oil operations are reported as "not occurring" ("NO").

Road transportation – CH_4 and N_2O

34. The methodologies used to estimate emissions of CH_4 and N_2O have been harmonized between the three regions of Belgium.

Other transportation

35. CH_4 and N_2O emissions from combustion in other transportation (pipelines) (under category 1.A.3) are reported in the 2004 submission.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

36. In 2002, the Industrial Processes sector accounted for 10.5 per cent of total GHG emissions in Belgium; the Solvent and Other Product Use sector accounted for 0.2 per cent. Emissions from the Industrial Processes sector dropped by 2.7 per cent between 1990 and 2002.

37. The CRF includes estimates of emissions from the Industrial Processes sector of most sources and all gases. The notation keys are widely used, but there are still sources for which the entries are unclear. The Industrial Processes chapter in the NIR has been improved by adding information from the regions together, but the NIR is still not fully in line with the UNFCCC structure for the sector.

38. Transparency has been improved since the notation keys have been used more extensively, in response to earlier reviews. However, the reporting is still not sufficiently transparent, since several background tables, namely those related to the F-gases, have not been completed, and where methods, AD, EFs and completeness are concerned the NIR is still not detailed enough to enable a full understanding. The ERT recommends that Belgium include more detailed information in the NIR and the CRF concerning these issues.

39. In general, as far as can be judged, the methodologies used are in line with the IPCC good practice guidance. The EFs and AD used are sometimes inconsistent across the regions and the corresponding CRF table Summary 3 (Methods and EFs used) has not been filled in. However, efforts have been made in this submission to harmonize methods between the regions. The ERT recommends that the Party continue to work on harmonizing methods across the regions and on including additional background information in the NIR.

40. According to the NIR, emissions of CO_2 from important sources in the Industrial Processes sector have been recalculated for this submission, thus giving consistent time series and consistency between the regions. A full time series is reported for consumption of HFCs, PFCs and SF_6: data for the period 1990–1994, previously not reported, are explained in the NIR to have been roughly estimated as equal to reported emissions in 1995. In 1995 more than 90 per cent of the emissions of F-gases came from production of halocarbons, which implies that this is the most important source for F-gases also in the early 1990s.

B. Key sources

Cement production – CO_2

41. Only limited information is provided in the NIR and it is therefore impossible to judge the quality and completeness of the estimates. The Party clarified that the production figures reported refer to clinker production, but this is not clear either from the NIR or from the CRF tables. The time series has been recalculated and the IEF is in line with those reported by other countries. The ERT recommends Belgium to include detailed background information on its AD and justifications for the plant-specific EFs in the NIR.

Lime production – CO_2

42. Belgium uses plant-specific data, which is in line with the IPCC good practice guidance. The time series has been recalculated. Large inter-annual variations in the CO_2 IEF over the time series were explained by the Party as being due to the fact that two out of six plants also produce dolomite (lime (CaO) + magnesium oxide (MgO)), with different decarbonization factors. According to the Party, the variation in lime and dolomite production explains the differences in the implied emission factors (IEFs) over time. To increase the transparency of the inventory, the ERT recommends Belgium to provide time series of AD for lime/dolomite in the NIR, as well as the basis for the preparation of the plant-specific EFs.

Ammonia production – CO_2

43. Recalculations have been done to make the time series consistent and adapt to similar methods for Flanders and Wallonia. The AD and EFs are reported as confidential, although the NIR states that calculations are based on natural gas as feedstock using the default IPCC CO_2 EF for natural gas. As outlined in the NIR, CO_2 emissions increased by 134 per cent between 1990 and 2002 (amounting to 1,819 Gg in 2002). It is recommended that Belgium increase the transparency of its reporting by giving more background information on ammonia production in next year's NIR.

Nitric acid production – N_2O

44. Different EFs are used in the Flanders and Wallonia regions, but not enough information is available in the NIR to enable the ERT to assess what these differences might be due to. Both are within the range for default factors given in IPCC good practice guidance (table 3.8). The ERT encourages Belgium to provide information on plant-specific production processes and emissions control technology in the NIR.

Iron and steel production – CO_2

45. The use of plant-specific data is in line with the IPCC good practice guidance. Time series have been recalculated as a result of discussions with industry representatives. The reporting is not transparently described in the NIR, especially in relation to the allocation of CH_4 and N_2O emissions between the Energy and Industrial Processes sectors. In the NIR the EF for CO_2 is presented for the Wallonia region but not for Flanders. The ERT encourages Belgium to eliminate the inconsistency in the allocation of CH_4 and N_2O emissions in its future submissions.

2.G Other – CO_2

46. CO_2 emissions reported under category 2.G Other increased by 49 per cent between 1990 and 2002 (emissions reported for 2002 are the same as for 2001). The trend fluctuates. Belgium indicates in the NIR that the inventory methodology for feedstock and non-energy use will be improved and should be taken into account in the 2005 submission.

C. Non-key sources

Other mineral products – CO_2

47. The trend of CO_2 IEF values for glass production shows large inter-annual fluctuations. Belgium indicates in the NIR that it plans to investigate the estimation of emissions from the glass industry. The ERT recommends that the estimates for this source be revised in next year's inventory submission.

Production of halocarbons and SF_6 – PFCs, SF_6

48. The Party has included a new source (an electrochemical synthesis plant) for the entire time series for 1990–2002 in this submission. This source was previously not reported. A decrease in emissions in recent years is properly explained in the NIR.

49. There are inconsistencies in the reporting between tables 2(I) and 2(II). Actual emissions of PFCs are reported only in table 2(I) but not in table 2(II) for 2001 and 2002.

Solvent and other product use – CO_2

50. N_2O emissions from anaesthesia are now reported for all three regions. Belgium indicated that it has not yet estimated CO_2 emissions from this sector as discussions are still going on about which factor to use to convert emissions of non-methane volatile organic compounds (NMVOCs) into CO_2.

IV. AGRICULTURE

A. Sector overview

51. Belgium has provided inventory data for the years 1990–2002 which show a significant improvement compared to the previous submissions. CH_4 emissions from enteric fermentation, manure management and agricultural soils, as well as N_2O from manure management and agricultural soils, are reported. Some agricultural categories such as rice cultivation, prescribed burning of savannahs and field burning of agricultural residues do not occur in Belgium.

52. Belgium's GHG emissions from the Agriculture sector in 2002 are estimated to be 12,317 Gg CO_2 equivalent, or 8.2 per cent of total national GHG emissions. Emissions from the sector decreased by 10 per cent between 1990 and 2002. CH_4 emissions from enteric fermentation, direct N_2O emissions from agricultural soils, and N_2O emissions from animal production were key sources in 2002, accounting for 68.7 per cent of emissions from the sector and 6.6 per cent of total national emissions.

53. In its 2004 submission, Belgium has submitted all the CRF tables for the Agriculture sector for the years 1990–2002, and national sectoral background tables are now included. Recalculation tables have also been submitted: recalculations have been carried out for CH_4 and N_2O emissions from agricultural soils. The Agriculture chapter of the NIR provides information on AD on animal populations, crops and methods. QA/QC procedures and planned improvements are also described in the NIR; however, no information on region-specific or country-specific EFs is provided. Belgium is encouraged to include adequate summaries of all the regional EFs in its future submissions in the interests of transparency and comparability.

54. The ERT noted real improvements in the NIR and encourages Belgium to continue its efforts to improve both the NIR and the CRF of its submissions. In response to a recommendation in the draft of this report to also estimate emissions from agricultural activities in the Brussels region for reasons of completeness and transparency, Belgium explained that agricultural activities on the Brussels territory are extremely limited compared to the other two regions in Belgium (agricultural area or livestock numbers never exceed 0.02 per cent of the respective national total) and have therefore been considered to be negligible.

B. Key sources

55. According to the NIR, all the key sources of this sector remained stable or have been reduced, except CH_4 emissions from swine, which increased by 8.2 per cent.

56. Belgium has provided responses to the issues raised in the previous review stages, as well as providing additional information, in the 2004 NIR. For CH_4, the EFs are adapted from studies conducted by the Institut National de la Recherche Agronomique (INRA) in France, where agricultural practices are comparable to those in Wallonia. For the Flanders region, a Manure Action Plan (MAP), which provides for the processing of surplus manure (based on the Nitrate Directive), is available. A study is currently being carried out by the Flemish Institute for Technological Research (Vito). For swine, the EFs will be further analysed and may be corrected in future if necessary. The ERT encourages Belgium to update and harmonize the EFs used in the estimations.

Manure management

57. CH_4 emissions from manure management decreased by 0.9 per cent from 1990 to 2002. This represented the lowest decrease of all reporting countries.

58. CH_4 emissions from manure management in Flanders are estimated using the tier 2 method integrating country-specific data. The integrator formula takes into account the fact that the weight of cattle over the whole lifetime is not the same as the slaughter weight. However, the NIR does not provide the region-specific EFs.

59. The study carried out by the Flemish Institute for Technological Research (Vito) indicates that CH_4 emissions during manure processing are negligible. Further studies are being undertaken to estimate N_2O losses during manure processing. The EFs for the Wallonia region are close to the IPCC default values. The ERT encourages Belgium to revise and harmonize the EFs used in the estimations and provide region-specific EFs and background data in its NIR.

Enteric fermentation – CH_4

60. According to the NIR, CH_4 emissions from enteric fermentation in domestic livestock decreased steadily during the period 1990–2002 by nearly 7.3 per cent. Dairy cattle emissions decreased by 10.9 per cent, while the corresponding IEF increased by 4.8 per cent. Non-dairy cattle emissions decreased by 4.8 per cent, but the IEF did not change over time.

61. Although different methodologies are applied in Flanders and Wallonia, Belgium has applied country-specific EFs to estimate CH_4 emissions for all livestock categories. The ERT recommends that Belgium make the necessary efforts to apply comparable methodologies to estimate emissions in the subcategories in all regions and follow the recommendations of the IPCC good practice guidance in estimating this key source.

Direct emissions from agricultural soils

62. Although efforts have been made to improve the inventory in the Agriculture sector, CH_4 and N_2O emissions from agriculture have been estimated using different methodologies. The ERT recommends that Belgium make the necessary efforts to apply comparable methodologies to estimate emissions in the subcategories and follow the recommendations of the IPCC good practice guidance in estimating this key source.

C. Non-key sources

63. Belgium has provided very little information on non-key sources in its 2004 NIR. The ERT recommends that Belgium make the necessary efforts to provide analysis of non-key sources for its next submission as they could become key sources.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

64. In 2002, the LUCF sector was a net sink of 1 per cent of Belgium's CO_2 equivalent emissions. Net sectoral removals declined by 4 per cent from 1990 to 2002. Belgium reports estimates of CO_2 emissions and removals from category 5.A Changes in Forest and Other Woody Biomass Stocks for all years. For all other categories of the LUCF sector, namely 5.B, 5.C and 5.D, no estimates are provided ("NE" is reported in table 5). However, the estimates for category 5.A only cover the forests in Wallonia. Belgium expressed its intention to include the whole forested area in its next submission. Tables 5.B, 5.C and 5.D have been completed using only the notation keys. Table 7 incorrectly reports that partial estimates are reported for categories 5.B and 5.C. Table 5 provides some estimates of CH_4 and N_2O emissions under 5.E without any further specification; these emissions were allocated to forest and grassland conversion in the previous inventory. No background information is provided on these emissions. According to the 2003 review report these emissions were from forested area in Flanders.

B. Sinks and source categories

5.A Changes in forest and other woody biomass stocks

65. Belgium has used a country-specific method to estimate the carbon balance of the forests. According to the 2003 review report, growth rates are derived from tree ring data. Expansion factors and growth rates are reported for the main tree species but no references are provided. The NIR states that a number of changes have been made in estimating annual harvest and conversion factors, but does not

provide further explanations on the new methodology or a quantitative comparison with previous methods. It is not clear whether all the revisions are included in the recalculation.

66. As explained in the documentation box and in the NIR, the estimates only cover the forests of Wallonia. These amount to 80 per cent of the forested area in the country. Data on the forests in Flanders are currently being processed and Belgium is making an effort to include the results in its next submission. A few inconsistencies in the reporting were noted. CRF table 5.A reports net CO_2 removals of 1,814 Gg CO_2 in 2002, while the NIR reports the same figure (1,814 Gg CO_2) for 2001, and a slightly lower one (1,807 Gg CO_2) for 2002. In table 5.A, the average annual growth rate is reported as 0.0 for 2002, whereas no information is provided for 2001 (the cell is left blank). The NIR provides revised conversion factors and growth rates for the main species but no explanation for the rationale behind the revision. A new methodology for estimating annual harvest has also been applied, in which volume harvested is calculated by subtracting a statistical estimate of standing carbon stocks in wood, obtained from inventory measurements, from expected carbon stocks in wood based on annual increments. For both changes a reference is made to a publication from 2000. It is not clear whether the results of this publication have only been incorporated in the 2002 submission, or whether some more recent results are behind the new methodology. The growth rates are high, particularly for evergreen species. Belgium claims that they are based on the Wallonia forest inventory.

5.B Forest and grassland conversion and 5.C Abandonment of managed lands

67. The Party indicates that decay of above-ground biomass in temperate forests and on grassland is not estimated but assumed to be negligible. On- and off-site burning are reported as not occurring. According to the 2003 review report, there is no significant land-use change in Wallonia but in Flanders the forested area decreased in the period 1990–2000. It is unclear whether land-use change is indeed negligible or whether Flanders is not yet included in table 5.B. Abandonment of managed lands is reported as not estimated but assumed to be negligible.

5.D Emissions and removals from soils

68. As indicated in the documentation box, these emissions and removals are not estimated for the time being. A study on this issue is in process and Belgium has stated that it intends to include the results in its 2006 submission. The ERT welcomes the effort made by the Party.

Recommendations

69. The ERT encourages Belgium to describe the methodological approach in detail, including all references in the NIR, and to explain the modifications made to the procedures and the rationale behind these changes. A more thorough description of the species composition of the forests and of how forest inventory data are combined with country-specific growth rates and conversion factors to yield estimates of carbon stocks, or growth for broadleaved and coniferous forests, would improve transparency. The ERT recommends that the Party check whether the growth rates in the forests of Flanders are the same as those of the forests in Wallonia.

VI. WASTE

A. Sector overview

70. In 2002, the Waste sector accounted for 2.0 per cent of total national GHG emissions; in 1990 the figure was 2.1 per cent. Emissions decreased by 20.0 per cent over the period 1990–2002. Three sub-sources were identified as key sources in the sector: 6.C CO_2 Emissions from Waste Incineration (46 per cent of emissions from the sector), 6.A.1 CH_4 Emissions from Managed Solid Waste Disposal on Land (36 per cent of emissions from the sector), and 6.D Other – CH_4 emissions from composting (11 per cent of emissions from the sector). The decreasing trend of emissions from the sector has been driven by legislation on increased waste incineration (favouring incineration and composing instead of landfilling), the composting of organic fractions, and CH_4 capture for flaring/energy use. This has led to a significant reduction in CH_4 emissions from solid waste disposal by about 58 per cent since 1990. On

the other hand, CO_2 emissions from waste incineration (a key source by both level and trend assessment) have increased significantly by about 53 per in 2002 compared with 1990, as a result of these legislations.

71. The inventory is practically complete in terms of gases, sources and years covered. CH_4 and N_2O emissions from industrial waste-water handling are not estimated because it is not considered to be a significant source.

72. The methodologies used are generally country-specific, IPCC default and EMEP/CORINAIR.

73. The ERT noted the ongoing efforts to introduce methodological changes and harmonize the allocation of waste emissions and/or methods. These have led to the recalculation of some source categories for the entire time series in the 2004 submission. The ERT encourages Belgium to complete the aggregation of regional AD and EFs under the new national system to make it possible to report national AD and to calculate IEFs in the sectoral background tables 6.A, 6.B and 6.C in accordance with the UNFCCC reporting guidelines.

74. The lists of references and documentation on methodologies and country-specific EFs provided in the 2003 and 2004 NIRs indicate that AD and EFs exist at the regional levels. Belgium is therefore encouraged to include adequate summaries of all the regional AD, EFs and methodologies and the aggregated data in its future submissions in order to improve the transparency and comparability of the inventory. The ERT did, however, note the considerable improvement in the tier 2 reporting of 6.A.1 Solid Waste Disposal on Land in the 2004 NIR.

B. Key sources

6.C Waste incineration – CO_2

75. The information provided in the documentation that is referenced in the NIR indicates that EFs and AD for various waste types for incineration exist but are not reported in the 2004 NIR. Disaggregation of AD by waste type and aggregate EFs and AD are not reported in table 6.C. Belgium is considering addressing the issues under the programme to integrate the IPCC good practice guidance into the regional and national inventories.

76. The biogenic and non-biogenic fractions[4] of waste incinerated are not reported in table 6.C because of lack of data from one region. The NIR indicates that the data are being refined as part of the regional improvement plan, which will also ensure the reporting of biogenic CO_2 emissions as memo items.

6.A.1. Solid waste disposal on land – CH_4

77. Belgium uses country-specific models based on the first-order decay (FOD) methodology. The 2004 NIR provides adequate information on the method. However, the ERT noted that relevant additional data[5] should be provided in the NIR to improve the transparency and comparability of the inventory.

78. The changing composition of waste which is the result of the implementation of the various regional waste management plans and legislation is reflected in the DOC estimates reported in the NIR for different periods. Belgium is, however, encouraged to use waste survey data instead of the current

[4] The Brussels region reports direct emissions from non-biogenic sources estimated at 47 per cent, and Wallonia estimates the biogenic fraction as 15 per cent.

[5] These should include population data, total municipal solid waste (MSW) generated, fraction of MSW disposed to landfill, incineration, and composting, as well as fractions of CH_4 recovered for energy and/or flaring at the national level. The latter is essential if CO_2 emissions from CH_4 flaring and CH_4 utilization for energy are to be reported separately as memo items and under the Energy sector (1.A.1), respectively, in accordance with the IPCC good practice guidance, although annual surveys are conducted to collect AD.

method of linear interpolation in order to be consistent with the IPCC good practice guidance tier 2 method, since the source is identified as a key source.

6.D Other (composting) – CH_4

79. Under this source Belgium reports emissions from composting, which are identified as a key source by the trend assessment. The emissions increased by 460 per cent from 1990 to 2002 due to a mandatory moratorium on landfilling of organic wastes in favour of composting.

C. Non-key sources

6.B Waste-water handling – CH_4 and N_2O

80. CH_4 and N_2O emissions from 6.B.2 Domestic and Commercial Waste-water Handling are estimated based on EMEP/CORINAIR but the methods are not adequately summarized in the NIR. The Party should provide a summary of the methodological choices, particularly the underlying assumptions at regional and country level.

81. CH_4 emissions from agricultural application of sludge have been removed from the sector to avoid double counting.

82. The IPCC default method is employed for N_2O emissions from human waste for two regions. It is therefore possible that the estimates reported do not cover the entire country; this may explain the low per capita emissions compared to those reported by other Parties. The NIR reports estimation by Wallonia and Flanders only. The Party should clarify whether or not the Brussels region is included in the estimate. If it is not, in the interests of completeness of the inventory, in the absence of a region-specific approach the ERT encourages the use of the default method for the Brussels region.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2003 and 2004 Inventory submissions of Belgium. 2004 submission including a set of CRF tables for 1990–2002 and an NIR.

UNFCCC secretariat (2004). "Report of the individual review of the greenhouse gas inventory of Belgium submitted in the year 2003 (In-country review)". FCCC/WEB/IRI(2)/2003/BEL (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/belrep03.pdf>.)

UNFCCC secretariat. "2004 Status report for Belgium" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/bel04.pdf>).

UNFCCC secretariat. "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004. Part I": FCCC/WEB/SAI/2004 (available on the secretariat web site <http://unfccc.int/resource/webdocs/sai/2004.pdf>) and Part II – the section on *Belgium* (unpublished).

UNFCCC secretariat. Review findings for Belgium (unpublished).

Belgium's comments on the draft "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004" (unpublished).

UNFCCC secretariat. "Handbook for review of national GHG inventories." Draft 2004 (unpublished).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", "Part II: UNFCCC reporting guidelines on national communications" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/1999/7 (available on the secretariat web site <http://unfccc.int/resource/docs/cop5/07.pdf>).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/2002/8 (available on the secretariat web site <http://unfccc.int/resource/docs/cop8/08.pdf>).

UNFCCC secretariat. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gp/english>).

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>).

B. Additional materials

No additional information or materials were requested by the ERT during this review.

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