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BULGARIA

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 Bulgaria, 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 25 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 Avajon (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. Katarína Mareckova (Slovakia). Mr. Mario Contaldi and Ms. Hongmin Dong 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 Parties included in Annex I to the Convention" a draft version of this report was communicated to the Government of Bulgaria, 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, Bulgaria has submitted the common reporting format (CRF) tables for the year 2002 and a national inventory report (NIR). For 1988 and 1990–2001 only recalculation tables have been submitted (the recalculation tables for 2001 are included in the 2002 CRF). Some aggregated data on gases and sectors for the base year (1988) and 1990–2001 are included in the NIR. 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 2002, the most important GHG in Bulgaria was carbon dioxide (CO_2), contributing 75 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4) – 15 per cent, and nitrous oxide (N_2O) – 10 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed less than 0.01 per cent to the overall GHG emissions in the country but the reporting of these gases is very incomplete. The Energy sector accounted for 77.1 per cent of total national GHG emissions, followed by Industrial Processes

[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.

(7.8 per cent), Waste (7.7 per cent) and Agriculture (7.4 per cent). Total GHG emissions (excluding LUCF) amounted to 62,429 Gg CO_2 equivalent and decreased by 56 per cent from 1988 (the base year) to 2002. The trends for gases and sectors, which are documented in the NIR, show no apparent inconsistencies.

D. Key sources

5. Bulgaria has reported a key source tier 1 analysis, both level and trend assessment, as part of its 2004 submission. The key source analyses performed by the Party and the secretariat[3] produced similar results. The small differences can be explained by different disaggregation levels. The key source analysis is used to structure the NIR and to prioritize sectors but the Party is recommended to use key source analysis more extensively to prioritize the development of the inventory.

E. Main findings

6. Improvements have been made in the 2004 submission compared to the previous submission: the structure of the NIR has been improved; the key source analysis includes a trend assessment; the uncertainty estimates for the uncertainty analysis have been updated; and a list of emission factors (EFs) is included in the NIR. However, the inventory is impaired by the lack of CRF files for the years before 2002. The trend data included in CRF table 10 and the discussion of trends in the NIR show that annual inventories are in fact available. The ERT encourages Bulgaria to give high priority to submitting a complete set of CRF tables for 1988 and 1989–2002 as without having the full set of CRFs available, the review would remain preliminary, in particular with regard to the assessment of time-series consistency and trends. Bulgaria indicated that the 2005 submission would include CRF tables for 1990–2002 and for the base year 1988, which has been recalculated. Still, CRF tables for 1989 will remain to be submitted.

7. The inclusion of detailed lists of EFs has enhanced the transparency of the inventory greatly. A further improvement could be realized by including activity data (AD) and more detailed discussion of methods for all key sources in the NIR.

8. The expert review team (ERT) recommends that the Party develop an inventory improvement plan to prioritize steps to be taken towards producing a more complete and transparent inventory. In responding to the draft of this report Bulgaria informed the ERT that such an inventory improvement plan was developed, which would start to be implemented in 2005. The ERT encourages Bulgaria to annex this plan to the NIR.

F. Cross-cutting topics

Completeness

9. The Party has submitted the CRF for 2002 (including emissions trend estimates for 1988 and 1990–2001 at summary level) and recalculation tables for the years 1988 and 1990–2001. The Party states that CRFs are available since 1998 but they were not reported in 2004. The 2002 inventory reported in the CRF shows good coverage of gases and sources and is almost complete, except for the fluorinated gases (F-gases), for which reporting is very limited (for 2.F Consumption of Halocarbons and SF_6, no estimates of PFCs have been provided, and in the case of HFCs only potential emissions have been provided), and for LUCF categories 5.B Forest and Grassland Conversion, 5.C Abandonment of Managed Lands, and 5.D CO_2 Emissions and Removals from Soils, for which no estimates have been provided ("not estimated " ("NE") is reported). Notation keys are generally used throughout the tables. CRF table 9 shows that, in addition, there are some gaps in most sectors because country-specific data or

[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.

EFs are not available. The Party is encouraged to develop the inventory further to provide emissions data for all sources and gases and to complete the corresponding CRF tables for all years.

Transparency

10. The NIR gives a good general overview and presents a detailed discussion of trends. The structure and content of the NIR have been updated according to the recommendations of the 2003 in-country review, but is still not yet fully organized according to the UNFCCC guidelines. Despite these improvements, which are appreciated by the ERT, the sector chapters of the NIR are not fully transparent in that they do not allow the ERT to fully assess the underlying assumptions and the rationale for choices of data and methods. Also, where methods and EFs other than those of the Intergovernmental Panel on Climate Change (IPCC) or EMEP/CORINAIR Emission Inventory Guidebook are used, these should be referenced. The inclusion of AD and more detailed descriptions of the methods used, as well as the inclusion of relevant information on the national energy balance in the annex to the NIR, such as the energy balance sheets, would enhance the transparency of the reporting. The NIR should also state clearly which sources occur in Bulgaria and which do not, and indicate the reasons why some sources are not yet estimated (these reasons are partly provided in CRF table 9, but not in the NIR).

11. The Party states that confidentiality is becoming a problem due to liberalization of the economy and that in future this may become even more serious. The ERT recommends the implementation of a legal framework to allow and improve data availability.

Recalculations and time-series consistency

12. The Party reports recalculations for the whole time series 1988 and 1990–2001. There are some minor changes due to EFs being modified in the Energy and Industrial Processes sectors and a larger change in N_2O emissions in the Agriculture sector (e.g., $Frac_{LEACH}$ has decreased). There are no differences between the recalculations reported by the Party and those calculated by the secretariat. The estimates of total emissions are lower for all years within a range of 1.3–2 per cent. The trend is not greatly affected by the recalculations. A short discussion of the rationale for these recalculations is provided in the NIR. The ERT believes that the latest recalculations are justified but would like to see a more detailed justification for them, that is, why each of the new methods applied in the recalculations is regarded as better than the previous one (e.g., because new research or data have become available, and references to these). The ERT recommends the Party to concentrate on developing methodologies that better reflect the country-specific conditions.

Uncertainties

13. The NIR provides uncertainty estimates for all source categories and gases for both level and trend using the IPCC tier 1 method. For AD and EFs the IPCC default uncertainty estimates are taken, together with expert judgement and values from the United Kingdom. The uncertainty of some EFs has increased considerably compared to the 2003 submission in reflecting the recommendations of the 2003 in-country review. The overall uncertainty is now 14 per cent, compared to 8.6 per cent in the 2003 submission, and the trend uncertainty is now 2.3 per cent compared to 1.9 per cent. The ERT appreciates the Party's efforts in revising its uncertainty estimates and recommends the use of more country-specific information and data for developing the uncertainty estimates.

Verification and quality assurance/quality control approaches

14. The information in the NIR on quality assurance/quality control (QA/QC) procedures is very limited, and no QA/QC plan is available. In response to the Synthesis and Assessment (S&A) report the Party states that the inventory is subject to verification first in the National Statistics Institute (NSI) and second in the process of inventory preparation at the Energy Institute, Sofia, by a QA/QC system certified by ISO 9001. The ERT recommends the development of a formal QA/QC plan as defined by the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*

(hereinafter referred to as the IPCC good practice guidance). It should document the existing procedures and define all the steps to assure the quality of the inventory.

G. Areas for further improvement

Identified by the Party

15. There is no systematic discussion of planned improvements identified by the Party in the NIR. The lack of resources is mentioned as a main problem for the development of the inventory. The proposed inventory improvement plan (see paragraph 8 above) could help in setting a timetable and establishing priorities.

Identified by the ERT

16. The ERT identifies the following cross-cutting issues for improvement as being of highest priority. The Party should:

(a) Provide a full set of CRF tables for the entire time series, covering the years 1988–2001;

(b) Develop an inventory improvement plan;

(c) Improve the transparency of its key sources by including AD and a more detailed discussion of methods in the NIR;

(d) Establish a QA/QC management system.

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

II. ENERGY

A. Sector overview

18. In 2002 the Energy sector accounted for 77.1 per cent of national total GHG emissions. Within the sector eight key sources have been identified under the level assessment. Of these CO_2 from stationary combustion of solid fuels is clearly the largest, accounting for 65.5 per cent of total sectoral emissions and 45.9 per cent of total GHG emissions in Bulgaria. Three other relevant key sources are CO_2 from mobile combustion – road vehicles, CO_2 from stationary combustion – gas, and CO_2 from stationary combustion – oil: they contributed 8.8 per cent, 7.2 per cent and 5.8 per cent, respectively, to total national GHG emissions in 2001. Compared to the base year (1988), energy-related emissions had decreased by 53.8 per cent in 2002, primarily because of reductions in emissions in 1.A.2 Manufacturing Industries and Construction. The decrease in emissions from the Energy sector apparently stopped in 1999–2000, with minor oscillations thereafter.

Completeness

19. The 2002 inventory of the Energy sector reported in the CRF is largely complete and includes estimates for most gases and sources of emissions, as recommended by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines). Emissions not included concern primarily fugitive emissions of CO_2 and N_2O from solid fuels and oil and natural gas as well as CH_4 from solid fuel transformation ("NE" is reported). These emissions are likely to be small; nevertheless the ERT encourages the Party to improve its estimates, with special reference to coal mines and refineries. Emissions of N_2O from various fuels in many combustion subsectors, and of CH_4 from some subsectors, are reported as "not occurring" ("NO"). While they are probably small, they are unlikely to be zero; it would therefore be preferable to report them as "NE". Bulgaria indicated its intention to change the notation keys for part of the N_2O emissions accordingly for its next submission.

20. The NIR includes a discussion of some methodological issues pertinent to the reporting of energy data. The depth to which these issues are addressed is variable. However, the absence of documentation on data sources is a general feature of all the source categories addressed in the NIR. Some specific sources, such as feedstocks and non-energy fuel use, are not considered in the NIR. According to Bulgaria's response during the review these two sources would be addressed in the 2005 NIR.

Transparency

21. Bulgaria has improved the transparency of its national GHG emissions inventory considerably since its last submission. However, there is scope to improve the reporting of the Energy sector by providing better documentation on the actual EFs applied in the preparation of the inventory. In particular, the national EFs used to estimate CO_2 emissions from diesel oil and N_2O emissions from stationary combustion need further clarification (see paragraphs 27 and 29 below)

B. Reference and sectoral approaches

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

22. CRF data are available for only 2002. Instead, in the NIR there is a table with the complete time series for CO_2 emissions from fuel combustion as estimated by the two approaches and an evaluation of the difference between them for each year. There is a sizeable difference, of about 5 per cent, for the period 2000–2002, and for the years before the differences vary from –4 per cent to +7 per cent. The ERT encourages the Party to address this issue further and give more detail in the NIR on the national EFs (value, fuels, key sources) that may possibly explain the difference between the two approaches.

23. For 2002 (the only year for which a reference approach is provided in the CRF) the differences between the CRF data and the International Energy Agency (IEA) energy data are quite small (less than 1 per cent).

International bunker fuels

24. The data on bunkers are similar to those published by IEA but with one significant difference where the allocation of fuels to domestic air transport and international aviation is concerned. Bulgaria explained that it uses a tier 1 methodology and expert estimation as no separate statistical data exist for national and international aviation fuel. The ERT encourages the Party to conduct further work with the aim of harmonizing the reporting of its allocation to different international organizations.

Feedstocks and non-energy use of fuels

25. The coverage for this source in 2002 seems to be fairly comprehensive but, as no additional information is reported either in the NIR or in the CRF documentation box, the ERT was not able to evaluate the completeness of the data, the reliability of the sources of data or the EFs used.

C. Key sources

Stationary combustion: solid fuels – CO_2

26. The NIR states that the country-specific EFs used for this source in Public Electricity and Heat Production (about 80 per cent of emissions from the source) are based on measurements and analytic calculations from a specific site (the power plants at the Maritza East complex). For other sectors, a variety of different EFs are used. An elaboration of the description of the methodology followed and references to any existing documentation should be provided to improve transparency on this matter.

Mobile combustion: road vehicles – CO_2

27. Emissions from this source are estimated by means of an IPCC tier 2 method. It is not clear from the NIR (section 3.4.2) in which cases the EFs used are only country-specific and in which they are a combination of country-specific, default and CORINAIR factors. The combination of EFs by vehicle

type and age should apply to CH_4 and N_2O emissions only. At the same time, in response to the S&A report Bulgaria stated that the EF for diesel is country-specific and that it will be revised. A clearer description is needed and the diesel CO_2 EF should be updated and properly documented in Bulgaria's next submission. Bulgaria informed the ERT that for the 2005 submission a revision of the data from diesel motors was undertaken.

Stationary combustion: gas – CO_2

28. A tier 2 methodology is used for this source, with a country-specific EF that is derived from the average carbon content of the imported Russian gas which is used in Bulgaria. The value is very close to the default IPCC value.

Stationary combustion: solid fuels – N_2O

29. A high, country-specific EF for N_2O emissions from combustion of domestic lignite is used, but the NIR provides no information on the derivation of this EF. More information should be provided.

Fugitive emissions: oil and natural gas – CH_4

30. Emissions are estimated using the IPCC tier 1 method, employing IPCC default EFs relating to the former USSR and Eastern Europe. The EF is fairly constant across the years, although it is known that the gas transmission network is being updated. Moreover, Bulgaria (NIR page 39) has used the default EF for natural gas, which according to the IPCC methodology applies to the whole production, processing, transmission and distribution chain. The use of this EF will thus overestimate emissions from transmission and distribution, given that most natural gas used in Bulgaria is imported by pipeline, and production and processing occurs only to a small extent. The description of this key source in the NIR needs to be backed up by the appropriate documentation and Bulgaria should investigate whether a tier 2 method can be adopted for this activity, including the estimation of natural gas leakage from pipelines. Bulgaria informed the ERT that for the 2005 submission the estimates for fugitive CH_4 emissions from oil and natural gas systems have been revised using emission factors from the IPCC good practice guidance.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

31. The Industrial Processes sector accounted for 7.3 per cent of total national GHG emissions in the base year (1988) and 7.8 per cent in 2002. The emissions over time show large inter-annual variations due to changes in activity, but have shown an overall decrease from 1988 to 2002. Most gases and sources of emissions are covered in the inventory, except for 2.A.2 Limestone and Dolomite Use, 2.A.5 Asphalt Roofing, actual emissions of HFCs and actual and potential emissions of PFCs. Only production-related emissions are covered for 2.A.4 Soda Ash Production and Use. Actual emissions of SF_6 are only partly covered (only emissions from electrical equipment are covered). No estimates of emissions of CO_2 or N_2O are reported from Solvent and other product use.

32. Key sources identified by the secretariat and by Bulgaria are CO_2 emissions from steel production, N_2O emissions from nitric acid production, CO_2 emissions from cement production and CO_2 emissions from lime production. The methodologies used for estimating emissions from cement production seem, as far can be judged, to be in line with the IPCC good practice guidance. The methodology for estimating emissions from steel production seems not to be in line with the IPCC good practice guidance, while the methodologies for nitric acid production and lime production cannot be judged from the information provided.

33. The reporting is not sufficiently transparent to allow the ERT fully to understand and assess the appropriateness of the methodologies and EFs used. It is recommended that Bulgaria increase the transparency of its reporting by submitting CRFs for all years, providing more detailed explanations and descriptions in the NIR, and further exploring the possibility of obtaining non-confidential AD.

34. For several processes default EFs from IPCC or CORINAIR are used or have been adapted to national conditions. Since default EFs in the IPCC Guidelines are often given for specific technologies, and process technologies in Bulgaria are not described in the NIR, the ERT was not able to assess the appropriateness of the EFs given in appendix III of the NIR. It would increase transparency if these EFs were justified in the NIR. In responding to the draft of this report Bulgaria indicated its intention to address some of the most relevant technologies in its 2005 submission.

35. Recalculations have been carried out in response to the previous review for 1988 and 1990–2001 for perfluoroethane (C_2F_6) from aluminium production and for CO_2 from glass production. The calculation of PFC emissions from aluminium production is now, as far can be judged, in accordance with the IPCC good practice guidance. However, no explanations are provided in the NIR.

36. Large changes in CO_2 emissions between 2001 and 2002 are mentioned for a few sources in the NIR, but not further explained. These are a 34 per cent decrease of emissions from ferroalloys production, a 31 per cent increase from aluminium production and an 11 per cent increase from calcium carbide production. Bulgaria explained in responding to the draft of this report that these changes in emissions resulting from changes in production volumes are due to the restructuring of some sectors of the industry. The ERT encourages Bulgaria to increase transparency in reporting by including such explanations in the NIR.

B. Key sources

Cement production – CO_2

37. Bulgaria uses a tier 2 methodology, according to the IPCC good practice guidance, and the EF of 0.52 t CO_2/t clinker is appropriate. It seems from the NIR that cement production data are available and converted into quantities of clinker (given that data for clinker import and export are confidential). The method used to arrive at clinker production is not described in the NIR. Furthermore, in CRF table Summary 3, the IPCC default is given for 2.A Mineral Products. It is recommended that the method of converting cement production data into clinker data be described more transparently in the NIR.

Iron and steel production – CO_2

38. Presently a national method is used which is not transparently described in the NIR. In the 2003 review report it was stated that the method used is a constant weighted EF for the two key steel production processes, which does not take annual fluctuations in production between the two processes into account. Since the Bulgarian implied emission factor (IEF) differs substantially from those of other countries, it is recommended that Bulgaria improve the quality of its estimates by implementing the IPCC good practice guidance methodology and EFs.

Lime production – CO_2

39. Bulgaria has used the AD reported by the national statistics and adopted EFs from the IPCC Guidelines for quicklime production. Nevertheless the information provided in the NIR is limited and there is no information as to whether dolomitic quicklime or hydraulic lime is produced in the country. Bulgaria is recommended to provide more information on lime production in its NIR in future.

C. Non-key sources

Ammonia production – CO_2

40. The IEF for CO_2 emissions from ammonia production is low compared to the IPCC default and the IEFs reported by most other countries. The NIR states that a country-specific method is used and that the Bulgarian EF differs significantly from the IPCC default. In response to the S&A report Bulgaria stated that only process emissions are taken into account. This, however, does not explain the low EF, since the IPCC default EF covers process emissions only. It is recommended that the country-specific method and EF be justified and described in more detail in the NIR.

Mineral products, other – CO_2

41. Emissions of CO_2 from desulphurization have been introduced in the inventory.

Aluminium production – PFCs

42. Estimates of emissions of C_2F_6 have been recalculated with a modified EF for the whole time series, as noted in CRF table 8b. There is no further explanation in the NIR, but apparently this has been done in response to the 2003 in-country review, when the previous IEF for C_2F_6 was pointed out to be very low.

Solvent and other product use

43. Emissions of non-methane volatile organic compounds (NMVOCs) are estimated, but the time series is not consistent, as noted in the NIR. More sources are included from 1999 onwards.

IV. AGRICULTURE

A. Sector overview

44. In 2002 estimated emissions from the Agriculture sector in Bulgaria amounted to 4,640 Gg CO_2 equivalent, or 7.4 per cent of total national GHG emissions. Compared to the base year (1988), emissions from the sector had decreased by 53.8 per cent, primarily because of a reduction in animal populations. 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. These three key sources accounted for 68.7 per cent of total emissions from the sector and 6.6 per cent of total national GHG emissions.

45. In its 2004 submission Bulgaria has submitted all the CRF tables for 2002 for the Agriculture sector. The Agriculture chapter of the NIR provides only limited information on methods and EFs and no information on AD.

46. Recalculations have been carried out for N_2O emissions from agricultural soils, resulting in a reduction of 24.9 per cent in the estimates of N_2O emissions from agricultural soils in 1988.

47. The ERT recommends that Bulgaria provide more information about its AD and its choice of methodology in order to improve the transparency of its NIR in future. Bulgaria indicated that more AD would be provided its next NIR.

B. Key sources

Enteric fermentation in domestic livestock – CH_4

48. The NIR states that CH_4 emissions from enteric fermentation increased by nearly 11 per cent between 2001 and 2002 because of an increase in the animal population. This is the first time CH_4 emissions appear to have increased following a 13-year decrease. The population data reported in the CRF for most types of ruminant animal (cattle, goats, sheep, buffalo) for the year 2002 are slightly higher than the population data published by the Food and Agriculture Organization of the United Nations (FAO). However, for the inventory year 2001 (according to the 2003 submission) the livestock population data given in the CRF tables were much lower than the corresponding values published by FAO. Moreover, the FAO data for 2002 show a decrease over 2001. Considering the increase in emissions reported in the Party's 2004 submission, further clarification is needed to make sure the AD are correct. It is also recommended that the inventory agency of Bulgaria cross-check the animal population data by comparing with the data on the production of animal products (such as meat, milk and wool) for 2001 and 2002. Bulgaria informed the ERT that information on the differences between the national data and those submitted to FAO has been shared with the respective departments of the responsible Ministry.

49. Bulgaria has applied a tier 1 methodology and IPCC default EFs to estimate CH_4 emissions from enteric fermentation for all livestock categories.

Direct emissions from agricultural soils – N_2O

50. The NIR does not specify the methodology level (i.e., tier 1a or 1b) used, the AD or the choice of EF. Although the EFs and parameters given in the NIR are those of the IPCC good practice guidance, the information available was not sufficient to enable the ERT to assess the appropriateness of the EFs used. Bulgaria confirmed in responding to the draft of this report that it used a method of the tier 1a level with the corresponding parameters of the IPCC good practice guidance. The ERT nevertheless recommends that Bulgaria clearly describe in its NIR the methodology used, including the tier level, and its choice of EFs and related parameters.

51. Bulgaria has recalculated the emissions from this subsector by changing the EF for cultivation of histosols from 5 to 8 to be consistent with the IPCC good practice guidance.

52. The N_2O emissions trend shows some inter-annual fluctuations: for example, between 2001 and 2002 emissions increased 2.9 per cent, whereas between 2000 and 2001 they had declined by 8.1 per cent. The NIR states that the increase in N_2O emissions from agricultural soils is the result of the application of larger amounts of fertilizer. However, according to data published by FAO, the use of nitrogenous fertilizer in Bulgaria fell from 2001 to 2002 (the data according to FAO are: 144,900 Mt for 2000, 172,302 Mt for 2001 and 152,127 Mt for 2002). Bulgaria explained that the increase in fertilizer application is caused by increased use of manure, animal production on paddock and crop residues, whereas the use of synthetic fertilizers has decreased.

Animal production – N_2O

53. For $Frac_{GRAZ}$ Bulgaria has used a value of 0.456, which is relatively high compared to those of other reporting Parties (an IPCC default is not available). Bulgaria indicated that this is a country-specific value; however, it should also explain the underlying assumptions that have led to its choosing this value.

C. Non-key sources

Indirect emissions from agricultural soils – N_2O

54. Bulgaria has recalculated the emissions from this subsector by changing the fraction of nitrogen leaching and run-off ($Frac_{LEACH}$) from 0.3 to 0.1 (the IPCC default is 0.1–0.8). The NIR states that the 55 per cent decrease of emissions in 2002 compared to 2001 was a direct result of the decrease of $Frac_{LEACH}$. The ERT recommends Bulgaria to apply this change to the rest of the time series, bearing in mind that recalculations should be applied to the whole time series according to the UNFCCC reporting guidelines. Bulgaria indicated that this recommendation would be implemented for the 2005 submission.

Manure management – CH_4

55. The NIR states that a tier 2 methodology is used for estimating the EFs for dairy cattle, non-dairy cattle and swine. However, no information on country-specific parameters is provided in the NIR.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

56. In 2002 the LUCF sector in Bulgaria represented net removals of 8,318 Gg CO_2, equivalent to 13 per cent of total national GHG emissions without LUCF. Over the period 1988–2002, the contribution of the LUCF sector has steadily increased. Net removals by LUCF were more or less stable (with some fluctuations) over the period 1992–1999, with an average annual removal of 6,872 Gg CO_2; they then increased markedly in the period 2000–2002, to an annual average of 8,920 Gg CO_2. The 36 per cent increase in net CO_2 removals between 1999 and 2000 is noteworthy. The NIR provides some explanation of the decrease in removals between 2001 and 2002 but not of the overall trend for the period 1988–2002.

57. CO_2 emissions/removals are reported only for category 5.A Changes in Forest and Other Woody Biomass Stocks. Emissions or removals from land-use change (categories 5.B and 5.C, Forest and

Grassland Conversion, and Abandonment of Managed Lands) and agricultural soils (category 5.D CO_2 Emissions and Removals from Soils) are not estimated.

B. Sink and source categories

5.A. Changes in forest and other woody biomass stocks

58. Bulgaria uses the IPCC default method and country-specific growth rates to estimate emissions and removals in this category. The forest inventory is updated every five years; an average annual increment is applied to all intervening years. Within these five years, growth is therefore constant, and the inter-annual variations result from variations in volume harvested and other uses of wood. However, no quantitative information is provided on the parameters and conversion factors used. Given the relative importance of removals by LUCF in the total national budget, the NIR should provide a better description of the estimation methodology, namely the type of inventory data used and how these are used, so that readers can understand the sudden increase in removals after 1999 which is attributed to the 2000 inventory update. There should also be a discussion of the quality of the forest inventory data and their suitability to the estimation procedures.

59. The NIR states that net removals increased by 12 per cent between 2001 and 2002, whereas in fact both the trends and the figures suggest that removals decreased. This is also borne out by the explanation of increased fellings in 2002. In responding to the draft of this report Bulgaria confirmed the decrease of net removals between the years in question (the indication of increasing removals was due to a translation error in the NIR).

60. The use in table 5 of the notation key "NO" suggests that there are no emissions from temperate forests. The appropriate notation key is perhaps "included elsewhere" ("IE") to indicate that these emissions are included in those reported in the subcategory Other. Clarification is needed on the source of the emissions reported under the subcategory Other. Furthermore, table 5 reports other fuel use, whereas table 5.A provides data on other wood used and indicates that fuelwood consumption does not occur ("NO" is reported).

Recommendations

61. The ERT recommends that Bulgaria make use of the notation keys in all background tables and subcategories, in particular in tables 5.B, 5.C and 5.D, to indicate which activities occur or do not occur, may be included elsewhere, and are not estimated. For example, CRF table 7 indicates that forest and grassland conversion does not occur in Bulgaria, but in CRF table 5 "NE" is reported for temperate forests under this category. The NIR should provide additional explanation. The documentation boxes could also provide explanations regarding the use of notations keys. Changes and recalculations need further documentation in the NIR and the appropriate CRF tables. On the basis of its understanding of the methodology, the ERT recommends that revised growth rates should also be applied to the five years prior each forest inventory update, since the update provides the real growth over the preceding five years.

VI. WASTE

A. Sector overview

62. Emissions from the Waste sector represented about 9.9 per cent in 1988 and 7.7 per cent in 2002 of total GHG emissions in Bulgaria. The Waste sector has one key source – solid waste disposal on land – contributing 91.7 per cent in 1988 and 87.5 per cent in 2002 of the emissions from the sector. CH_4 and N_2O emissions from waste water are estimated to be small, accounting together for 1.2 per cent of total national emissions in 2002.

63. The CRF tables for 2002 for the Waste sector include data for CH_4 emissions for managed and other sites and for waste water and sludge (both industrial and domestic and commercial waste water), and N_2O emissions from human sewage. N_2O emissions from waste water are not estimated and waste incineration is reported as not occurring. Recalculations are not reported in the Waste sector.

64. The Waste chapter of the NIR contains rather limited information on the methods, EFs and AD used. The ERT recommends that Bulgaria provide all the parameters used in the calculations in transparent form in the NIR (for all years). Information related to the AD used,[4] assumptions made and calculations should be provided and documented in line with the UNFCCC reporting guidelines and the IPCC good practice guidance to enable the ERT to review the results. Bulgaria informed the ERT that information on AD and EFs will be extended considerably for the 2005 submission.

65. Emissions from the sector decreased by 66 per cent between 1988 and 2002 (this decrease is one of the largest among Annex I Parties), and showed some large inter-annual fluctuations: for example, between 1993 and 1994 they fell by 36.6 per cent. These changes are not appropriately explained and documented, so that it was not possible for the ERT to check that the CH_4 emission trends are consistent. In responding to the draft of this report Bulgaria mentioned that the large inter-annual change in emissions between 1993 and 1994 has been eliminated for the 2005 submission by adjusting the methodology for assessing the selected solid wastes.

B. Key sources

Solid waste disposal on land – CH_4

66. Bulgaria has applied the IPCC default (tier 1) method and IPCC default values for this source. According to the IPCC good practice guidance, the FOD (tier 2) methodology should be applied as this is a key source. Bulgaria indicated during the review that there is not enough historical data available to apply a tier 2 method.

67. Bulgaria reports estimates of CH_4 emissions under 6.A.3 Other but does not specify the source of these emissions. According to the NIR 2004, data on controlled and uncontrolled managed sites are reported by the NSI; however, it is not clear how the amount of waste deposited to solid waste disposal sites (SWDS) is estimated (in particular with regard to the split of the amount of solid waste deposited to SWDS and to category 6.A.3 Other).[5] The ERT recommends the Party to provide such information in the NIR. In its response to the draft of this report Bulgaria explained that the Other category includes emissions from non-controlled waste sites (according to the Bulgarian Statistics terminology). The ERT recommends that Bulgaria explain both in the NIR and in the relevant parts of the CRF (e.g. documentation boxes) what is included in the category Other.

68. Bulgaria stated in the response to the S&A report that a 38 per cent decrease in CH_4 emissions from SWDS between 1993 and 1994 was due to a change in the methodology for reporting collected solid waste in 1994. This methodological change is also mentioned in the NIR. The ERT recommends that Bulgaria explain in its NIR the difference between the two methods. It is very likely that, due to the change in methodology, base year emissions are overestimated (or CH_4 emissions from SWDS from 1994 onwards may be underestimated). The possible inconsistency in AD (amount of deposited solid waste) was already identified in earlier reviews. CH_4 emissions from SWDS are a significant key source, and Bulgaria should therefore make an effort to verify the AD, document its estimation of emissions in line with the IPCC good practice guidance, and, if possible, revise its historical data on deposited solid waste for the period 1988–1993 on the basis of trend data for the period 1994–2001.

[4] Data on population, waste generation, and other parameters are provided only for the year 2002 (in the CRF); waste composition is available for the three years 2000–2002 (in the NIR).

[5] The NIR only provides information to the effect that the methodology for estimating the amount of waste deposited was changed in 1994.

C. Non-key sources

Waste-water handling – CH_4

69. CH_4 emissions from this source are estimated according to the IPCC default methodology. The information provided in the NIR is rather limited[6] and does not make it possible to check whether all subcategories are included consistently over the entire period, for example, the population not connected to waste-water treatment plants. There was a notable increase of 68 per cent in CH_4 emissions between 1994 and 1995 which was explained by the Party as being due to data for the organic degradable component (DC) of waste water in the subsector Pulp and Paper being missing for the period 1988–1994; however, this may not fully explain this increase. The ERT recommends Bulgaria to provide further documentation on this matter and, if possible, improve time-series consistency.

Waste-water handling – N_2O

70. N_2O emissions are estimated only for human sewage, using the IPCC default method. The ERT encourages Bulgaria to make an effort to obtain AD in order to estimate N_2O emissions from industrial, domestic and commercial waste-water handling.

[6] Data on amounts of domestic and industrial waste water and sludge generation, as well as on the type of treatments, are not provided in the NIR even though this was recommended by the previous ERT.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

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

UNFCCC secretariat (2004). "Report of the individual review of the greenhouse gas inventory of Bulgaria submitted in the year 2003 (in-country review)." FCCC/WEB/IRI(2)/2003/BGR (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/bgrrep03.pdf>).

UNFCCC secretariat. "2004 Status report for Bulgaria" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/blg04.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 at <http://unfccc.int/resource/webdocs/sai/2004.pdf>) and Part II – the section on *Bulgaria* (unpublished).

UNFCCC secretariat. Review findings for Bulgaria (unpublished).

Bulgaria'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 (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 (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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