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CZECH REPUBLIC

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 the Czech Republic, 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 – Mrs. Inga Konstantinaviciute (Lithuania) and Mrs. Anke Herold (European Community); Energy – Mr. Eilev Gjerald (Norway) and Mr. Yannis Sarafidis (Greece); Industrial Processes – Mr. Riccardo De Lauretis (Italy) and Mr. Marius Tăranu (Moldova); Agriculture – Mr. Erda Lin (China) and Mr. Samuel Adeoye Adejuwon (Nigeria); Land-use Change and Forestry (LUCF) – Mr. Justin Ford-Robertson (New Zealand) and Mrs. Thelma Krug (Brazil); Waste – Mr. Takashi Morimoto (Japan) and Mr. Davor Vesligaj (Croatia). Mr. Samuel Adeoye Adejuwon and Mrs. Anke Herold were the lead reviewers of this review. The review was coordinated by Mr. Javier Hanna (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 the Czech Republic for comment prior to its publication.

B. Inventory submission and other sources of information

3.   The Czech Republic has submitted common reporting format (CRF) tables for the years 1992 and 2002 together with a national inventory report (NIR) containing background information on methods, key sources and data sources. The NIR also includes sections on uncertainty estimates and a description of quality assurance/quality control (QA/QC) procedures for each sector. Where needed the expert review team (ERT) also used the previous year's submission and other information. 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 the Czech Republic was carbon dioxide (CO_2), contributing 86.2 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4) – 7.2 per cent – and nitrous oxide (N_2O) – 5.7 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) taken together contributed 0.9 per cent of total GHG emissions in the country. The Energy sector accounted for 87.7 per cent of total GHG

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[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.

emissions, followed by Agriculture (5.2 per cent), Industrial Processes and Solvent and Other Product Use (4.2 per cent), Waste (2.0 per cent) and Other accounting for 0.9 per cent (potential emissions of PFCs, HFCs and SF_6 are reported under 7 Other). Total GHG emissions amounted to 142,837.93 Gg CO_2 equivalent in 2002 and had decreased by 25.6 per cent since 1990. CO_2 emissions decreased by 25 per cent over the years 1990–2002, CH_4 emissions by 38.3 per cent and N_2O emissions by 27.6 per cent. Emissions from HFCs, PFCs and SF_6 increased by 49,328.6 per cent, 5,018 per cent and 27 per cent, respectively, over the years 1995–2002.

D. Key sources

5.   The Czech Republic has reported a tier 1 key source analysis, both level and trend assessment, as part of its 2004 submission. The key source analysis presented in the NIR is based on the data for the year 2001, which is not the most recent year for which the inventory has been submitted. The key source analysis performed by the secretariat was based on data for 2002[3] but the results are very similar. The Czech Republic identified two additional key sources: "Mobile Combustion – Off-road, including Waters (CO_2)" and "Usage of New Gases (HFCs, PFCs and SF_6)". The secretariat instead identified N_2O from Stationary Combustion – Coal and CH_4 from Manure Management as key sources.

6.   The ERT is of the view that the key source analysis should be based on data for the most recent year. As the quantitative uncertainty assessment provided by the Party is quite advanced, the ERT encourages the Party to provide a tier 2 key source analysis in its next inventory submission.

E. Main findings

7.   The ERT acknowledges the improvements the Party has made since the previous 2003 review, for example, to the documentation and transparency, and the revision of the emission factors (EFs) for non-CO_2 gases. However, a number of key changes addressed in previous reviews have not yet been implemented. One of the most important issues is the lack of a complete set of CRF tables for the entire time series. Other key outstanding issues are indicated in paragraphs 18 and 19 of this report.

F. Cross-cutting topics

Completeness

8.   The Czech Republic has provided inventory data for the years 1992 and 2002 but CRF table 2(II).F has not been provided for those two years. Tables 4.C, 4.E and 4.F have not been provided for 1992. Notation keys are used throughout the tables. In addition, the trend tables include data for 1990, 1994 and 1996–2001. In 2003 the Party submitted CRF tables for 1994 and 2001, and in 2002 it submitted the tables for 1990 and 2000. However, no data have yet been submitted for the years 1991, 1993 and 1995 in any inventory submission, and data for the years 1996 and 1997 have only been provided at a high level of aggregation (in the CRF recalculation tables) so far and no complete set of CRF tables is available for those years. The CRF tables submitted in 2004 are more complete than those submitted in previous years. The trends for HFCs, PFCs and SF_6 are presented only for the years 1995–2002 and not for 1990–1994. The ERT strongly recommends the Party to provide a complete CRF for the entire time series with its next inventory submission as issues such as time-series consistency cannot be checked on the basis of the years currently submitted.

9. CO_2 process emissions from iron and steel production reported in the Energy sector have been reallocated to the Industrial Processes sector for 2001 and 2002 but not for the period 1990–2000.

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[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 transparency and documentation of the NIR have improved as compared to the 2003 submission. However, further attention should be given to the documentation of methodologies, data sources and country-specific EFs. The notation keys are widely used and generally follow the UNFCCC reporting guidelines; however, in some tables the notation keys should be used instead of reporting "0.00" or leaving cells blank.

11.   The NIR does not include a section "1.8 General assessment of completeness" and the sector descriptions do not yet fully comply with the structure provided in the UNFCCC reporting guidelines.

12.   Some inconsistencies between the information in the NIR and that provided in the CRF were identified: for example, table 2 of the NIR was checked against CRF table 10. There are inconsistencies between the N_2O values for 2002 (in the CRF the value is 8,151 Gg CO_2 equivalent and in the NIR it is 8,174 Gg CO_2 Gg equivalent). In CRF table Summary 3 it is stated that the estimation of CH_4 emissions from the Energy sector (fuel combustion) is based on the tier 2 method, but according to the NIR tier 1 was used. The ERT recommends the Party to clarify these inconsistencies and to eliminate them in its next inventory submission.

Recalculations and time-series consistency

13.   The Czech Republic has provided recalculations only for 1992 (table 8(a)). The GHG inventory for this year was not provided in previous submissions. The Party noted that revisions for the years 1990 and 1994, including conversion to the CRF, were submitted in the two most recent years; however, the status of the data for other years submitted earlier remains unclear. The NIR reports that the entire time series has been recalculated as part of QA/QC procedures, but this is not documented in the CRF or the NIR. Section 9 of the NIR only describes the most important recalculations over the years, not all the recalculations performed. The Czech Republic has not provided explanatory information for the recalculations in CRF table 8(b), but only provided short justifications in the documentation box. In CRF table 8(b) it is stated that CH_4 emissions from the Waste sector have been recalculated for the whole period 1990–1999, but comparison of the emissions trend data presented in the CRF tables 10 of the 2004 submission with those presented in the 2003 submission did not show any changes. The Party should provide revised time-series data in order to enable the ERT to assess the inventory fully.

14.   The recalculations for 1992 have resulted in an increase of 1.4 per cent in the estimate of total national emissions for 1992 (without LUCF). By gas, the recalculations for 1992 result in a decrease in CO_2 emissions by 0.7 per cent, an increase in CH_4 emissions by 2.6 per cent, and an increase in N_2O emissions by 32.2 per cent. It remains unclear which emissions data from which year of submission are considered to be the actual recalculated data, so that it is not possible to calculate the impact of the recalculations for other years than 1992.

15.   No complete time series of CRF tables is available so far, so that no assessment of time-series consistency and trends is possible. The ERT recommends the Party to provide a complete set of CRFs, in particular for the base year, and to provide in the NIR relevant background data in order to explain the observed trends better.

Uncertainties

16.   The NIR reports for the first time that a tier 1 uncertainty analysis has been performed for the year 2001, and the results of this analysis are presented, both at a summary level and at the individual source category level. The analysis does not include the LUCF sector. The overall uncertainty of the inventory in 2001 is 7.02 per cent and the trend uncertainty is 2.86 per cent. Qualitative uncertainty estimates are also provided in CRF table 7. The NIR states that the uncertainty analysis should be considered as preliminary. The ERT recommends the Party to take the remaining steps in order to present a final and reliable quantitative uncertainty estimation in its next inventory submission.

Verification and quality assurance/quality control approaches

17.   The Czech Republic has not implemented a general QA/QC system or a QA/QC plan. Sector-specific QA/QC procedures are described in the NIR. These procedures are not implemented in a systematic way and the QA/QC system is still under development. The ERT recommends the Party to finalize this system and to include specific objectives with the dates for implementation in its next submission.

G. Areas for further improvement

Identified by the Party

18.   The Party identifies in the NIR several areas for improvement:

(a)   Reallocation of CO_2 emissions from iron and steel production from the Energy sector to the Industrial Processes sector for the period 1990–2000;

(b)   Recalculation of N_2O emissions from Road Transportation using 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);

(c)   Estimation of actual HFCs, PFCs and SF_6 emissions in the 2005 inventory submission;

(d)   Carrying out of the formal plan to develop and implement a revised methodology for the LUCF sector;

(e)   Use of the tier 2 method for estimation of CH_4 emissions from Solid Waste Disposal on Land (as a key source).

Identified by the ERT

19.   The ERT identifies the following cross-cutting issues for improvement. The Party should:

(a)   Increase the transparency of the inventory by completing the CRF tables for the entire time series and expanding the description of country-specific methodologies and country-specific EFs;

(b)   Provide more detailed and complete justifications for the recalculations in the NIR and the CRF to improve the overall transparency of the inventory;

(c)   Report a more reliable quantitative uncertainty estimation;

(d)   Provide a key category assessment for the most recent inventory year;

(e)   Prepare and implement a formal QA/QC system and prepare a QA/QC plan.

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, GHG emissions from the Energy sector amounted to 125,302.70 Gg CO_2 equivalent, or 87.7 per cent of the total emissions of the Czech Republic, and had decreased by 26.7 per cent since 1990. CO_2 emissions in 2002 were 26.3 per cent lower than 1990 levels. This trend is discussed in the NIR and it is attributed to the declining consumption of coal and its partial replacement by natural gas. In 2002, 46.6 per cent of emissions from the Energy sector derived from Energy Industries, followed by

Manufacturing Industries and Construction (24.9 per cent), Other sectors (12.3 per cent) and Transport (10.4 per cent). Fugitive Emissions from Fuels contributed 4.8 per cent of sectoral emissions. The percentage contributions of Manufacturing Industries and Construction and Other Sectors have decreased since 1990, while the shares of Energy Industries and Transport have increased. The share of Fugitive Emissions from Fuels has remained constant. Transport is the only source category within the sector where CO_2 emissions increased in absolute terms from 1990 to 2002 (by 70.8 per cent).

22. The NIR and the CRF contain estimates of emissions for all direct and indirect GHGs and from all major sources related to fuel combustion. Emissions from Manufacturing Industries and Construction are not disaggregated into sub-source categories but they are reported under Other due to the lack of the necessary activity data (AD). The ERT encourages the Czech Republic to continue its efforts to disaggregate emissions from Manufacturing Industries and Construction, and recommends the Party to develop an implementation plan setting priorities and time frames and defining the expected results.

23. Fugitive Emissions from Oil and Natural Gas are only estimated for CH_4, while no emissions are reported from Venting and Flaring. The ERT recommends that the Party make the necessary efforts to include emissions from all relevant sources and gases in the inventory.

24. For key source categories, the different tier methods as recommended in the IPCC good practice guidance are used. For non-key source categories, higher-tier methods are usually used together with country-specific or plant-specific EFs. The methods used are described in a general way that makes it possible to assess how far the Party has implemented the IPCC good practice guidance. Sources and references for methods, AD and EFs are documented. However, detailed information on assumptions and input data for different estimation steps, which would allow reconstruction of the inventory from the underlying data, are usually not provided. Transparency could be improved by providing more information regarding: (a) the energy data used for estimating emissions; (b) the net calorific values of the fuels; (c) the application of the Model for Assessment of Energy Demand (MAED); and (d) the country-specific EFs for N_2O emissions from stationary combustion. The ERT recommends that the Czech Republic add this information, which is available, to its NIR.

25. The NIR identifies several issues that need further consideration in the official energy balance compiled by the Czech Statistical Office, especially on final energy consumption. These issues are mostly related to the disaggregation of fuel consumption by sector. For that reason, specialized procedures (use of detailed bottom–up models) are applied by the Czech Hydrometeorological Institute (CHMI). However, the NIR does not contain adequate background information on the application of these procedures; it gives only a short description.

26. In the Energy sector, recalculations for the year 1992 have been reported for all subcategories under 1.A Fuel Combustion Activities and 1.B Fugitive Emissions from Fuels. The recalculations led to a reduction in the estimates of total GHG emissions from the Energy sector of 2.6 per cent for the year 1992. Table 8(b) is not filled in, while the documentation box briefly states the need for the recalculation. The NIR explains that the main reason for the recalculation was the implementation of the sectoral approach described in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) instead of the reference approach.

27. QA/QC activities for the Energy sector are reported in the NIR in a brief and general way in the form of planned activities for improving the inventory and specific actions undertaken, in particular for the estimation of fugitive emissions.

B. Reference and sectoral approaches

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

28. CO_2 emissions from fuel combustion have been calculated using the reference approach and the sectoral approach. For the year 2002, there is a difference of 3.01 per cent in the CO_2 emission estimates

between the two approaches. Explanations are provided in the relevant documentation box of the CRF tables as well as in the NIR.

29. The ERT identified several areas of difference between the inventory data (for both 1992 and 2002) and the data from the International Energy Agency (IEA). The Czech Republic is aware of the problem and attributes it to institutional problems in developing the national energy balance. The ERT recommends that the Party should either correct or analyse and explain the differences between the national data and the IEA data. Moreover, the ERT encourages all the agencies involved to cooperate in order to resolve the institutional problems related to the development of the national energy balance. Until then, the ERT considers that it would be helpful to provide in the NIR the relevant information, from the national energy balance, that is used for the compilation of the inventory.

International bunker fuels

30. The Czech Republic estimates emissions from domestic and international aviation separately. The allocation is based on fuel deliveries for international aviation as recorded in a 2003 report of the Czech Statistical Office entitled "Supply of basic final refinery products". The methodology applied for estimating emissions is not described in the NIR. The ERT assumed that the default methodology of the IPCC Guidelines is applied, but the implied emission factors (IEFs) for CH_4 and N_2O reported in the CRF tables are not the EFs given in the IPCC Guidelines (for CH_4 the IEF is 20.95 kg/TJ in the CRF and 0.5 kg/TJ in the IPCC Guidelines, and for N_2O the IEF is 2.30 kg/TJ in the CRF and 2 kg/TJ in the IPCC Guidelines). The ERT recommends that the Party include further methodological information in its future inventory submissions and encourages it to consider applying higher-tier methods based on landing and take-off (LTO) data.

Feedstocks and non-energy use of fuels

31. The non-energy use of fuels is taken into account in both the reference and the sectoral approaches using mostly IPCC default values for the fraction of carbon (C) stored. The relevant AD are provided by the Czech Statistical Office (in a 2003 report entitled "Balance of energy processes in energy sector").

C. **Key sources**

Stationary combustion: solid fuels – CO_2

32. The EFs and fuel parameters used are the default values proposed by the IPCC Guidelines. Given the significance of this source category to the country's total GHG emissions and the variability of the characteristics of coal in different countries and regions, the ERT encourages the Party to consider the use of country-specific fuel parameters (e.g., net calorific values and EFs) instead of the default ones.

Stationary combustion: liquid and gaseous fuels – CO_2

33. The 2004 previous review stages identified several instances where the IEFs reported in the CRF tables were considered as outliers. According to the NIR and the response of the Party, this is attributed to the inclusion of non-energy fuel use and the relevant (referring to the non-stored carbon) emissions in the sectoral approach. The ERT recommends the Party to include all necessary information and data on this topic in its next submission.

Mobile combustion: road transportation – CO_2 and N_2O

34. The Czech Republic bases its estimation of GHG emissions from this source on a disaggregation of total consumption by mode of transport and fuel. The EFs and fuel parameters used for estimating CO_2 emissions are the default values proposed by the IPCC Guidelines. Additionally, fuel consumption in the category Road Transportation is disaggregated by freight transport, public passenger transport and individual passenger transport, while this last category is further disaggregated by type of pollution control technology (catalytic converters, non-catalytic converters, etc.). The MAED model, which is a

detailed simulation model for energy demand analysis, is applied for this disaggregation taking into consideration data from an annual study carried out by the Ministry of Transport. However, no background information on the implementation of the model (input data, assumptions, etc.) is provided in the NIR. The ERT recommends the Party to provide more relevant background information in its next submission.

35. It is not clear how the N_2O EFs for catalytic vehicles (tier 2 methodology) have been estimated. The Party is aware of the problem and is planning to recalculate N_2O emissions from Road Transportation. The ERT encourages the Party to work on this recalculation taking into consideration, as a first step, the relevant EFs provided in the IPCC good practice guidance with a view to developing country-specific EFs in the longer term. The ERT recommends the development of an implementation plan setting priorities and time frames and defining the expected results.

36. Emissions of N_2O (as well as CH_4) from liquefied petroleum gas (LPG) in the category Road Transportation are not estimated. The ERT encourages the Czech Republic to include these emissions in its future submissions.

Fugitive emissions: coal mining and handling – CH_4

37. CH_4 emissions from Underground Mines are estimated using the tier 2 approach for the main coal-producing basin (Ostrava–Karvina) and an IPCC tier 1 approach for other underground mining areas (Kladno). CH_4 emissions from surface mines for the category Mining Activities, as well as for Post-Mining Activities, are estimated using the IPCC tier 1 approach. The NIR contains adequate justification for this use of different tiers.

D. **Non-key sources**

Stationary combustion: all fuels – CH_4 and N_2O

38. According to the NIR, CH_4 emissions from Stationary Combustion for all fuels are estimated by applying a tier 1 approach with the IPCC default EFs. Fuel data used for estimating CH_4 emissions are aggregated into four main categories: solid fuels, liquid fuels, gaseous fuels and fuelwood. However, the estimated IEFs are different from the default EFs reported in the IPCC Guidelines. For instance, in Manufacturing Industries and Construction the IEFs the Party has estimated for these four fuel categories are 2.18 kg/TJ, 3 kg/TJ, 0.21 kg/TJ and 3.90 kg/TJ, respectively, while the default IPCC EFs are 10 kg/TJ, 2 kg/TJ, 5 kg/TJ and 30 kg/TJ, respectively. It seems that some modifications have been made, but no information is provided in the NIR. Until the disaggregation of energy demand per fuel and technology is finalized, it is recommended that the Party include such information in the NIR of its future submissions.

39. A similar approach is followed for estimating N_2O emissions from Stationary Combustion, but in this case the EFs used are country-specific. However, given the aggregated reporting of the Manufacturing Industries and Construction category, the application of these EFs is not clear and no information is provided in the NIR.

40. The NIR explains the rationale for estimating country-specific EFs for solid fuel consumption in electricity generation and provides relevant references. During the 2003 in-country review the Party provided those EFs, but they are not included in the 2004 submission. The ERT recommends the Party to include in its next submission information related to the disaggregation of energy consumption by sector, fuel and technology, as well as the country-specific EFs.

Fugitive emissions: oil and natural gas – CH_4

41. CH_4 emissions from oil and natural gas operations are estimated using higher-tier methodologies and country-specific EFs. Where they differ from the default values reported in the IPCC Guidelines, the differences are discussed and explained in the NIR. The ERT is of the view that, especially for CH_4 emissions from gas operations, where a tier 3 methodology is applied, more background information could be provided referring to table 2.17 of the IPCC good practice guidance.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

42.   In 2002, total GHG emissions from the Industrial Processes sector amounted to 6,774.29 Gg CO_2 equivalent, or 4.7 per cent of total national GHG emissions (including potential emissions of PFCs, HFCs and SF_6 reported under 7. Other). The Solvent and Other Product Use sector was responsible for 0.4 per cent of total national GHG emissions. Emissions from the sector increased by 43.9 per cent between the base year (1990) and 2002. The increase is due mainly to the reallocation of the CO_2 emissions from iron and steel production from the Energy sector to the Industrial Processes sector (for the years 2001 and 2002 only). Without this reallocation, emissions from the sector would have fallen by 47.0 per cent from 1990 to 2002. The decrease comes mainly from Cement Production and Nitric Acid Production, where emissions fell by 50.0 per cent and 19.5 per cent, respectively, between the base year and 2002. Emissions of CO_2 represented 65.0 per cent of total emissions of the Industrial Processes sector in 2002. Iron and Steel Production was responsible for 59.3 per cent of CO_2 emissions from the sector, and Cement Production for 36.4 per cent. Potential emissions of HFCs accounted for 16.1 per cent of total emissions from the sector, and N_2O emissions from Nitric Acid Production for 13.1 per cent.

43.   The CRF tables include estimates of most gases and sources of emissions from the Industrial Processes sector. Not included are Limestone and Dolomite Use, Asphalt Roofing, Ferroalloys Production, Dichloroethylene and Methanol; all these are reported as "not estimated" ("NE"). No information has been provided in the CRF completeness table 9 as to why these sources are not reported. CO_2 emissions from Ammonia Production and Steel, Sinter and Coke are still included in the Energy sector even though the AD are reported under the Industrial Processes sector. The only reallocation noted is for CO_2 emissions from Iron and Steel Production (pig iron production), but, as noted above, this applies only for the two most recent years. The ERT encourages the Party to separate combustion emissions from process emissions and report them in accordance with the UNFCCC reporting guidelines, and in particular to continue the work of reallocating CO_2 emissions from iron and steel production from the Energy sector to the Industrial Processes sector for the years 1990–2000. The ERT also advises the Party to reallocate CO_2 emissions from ammonia production from the Energy sector to Industrial Processes.

B. Key sources

Iron and steel production – CO_2

44.   In accordance with the IPCC good practice guidance, CO_2 emissions from Iron and Steel Production are reported under 2.C Metal Production in the Industrial Processes sector since 2001. The methodology used for estimating emissions from Iron and Steel Production is consistent with the IPCC tier 1 method, the calculations being based on the amount of coke burned in blast furnaces; national net calorific value (28.74 TJ/kt), the IPCC default EF (29.5 t C/TJ) and an oxidation factor of 0.98 are used. For the year 2002 there is a difference of only 1.7 per cent between the estimates obtained using the method described above (2,614 Gg) and the estimates obtained using the IPCC tier 1a method (2,660 Gg). It should be noted that the quantities of coke input into blast furnaces reported in the documentation box of table 2(I).A-G (24,658 TJ for 2002, which is equivalent to 858 kt, and 23,811 TJ for 2001, which is equivalent to 829 kt) do not match with the coke consumption quantities indicated in this table (2,231 kt for 2002 and 3,522 kt for 2001): according to the NIR the latter correspond to the total amount of coke produced in the Czech Republic. In addition, the NIR states that estimated CO_2 emissions from Iron and Steel Production have been reported under Pig Iron instead of Coke. The ERT recommends the Party to take these observations into consideration for its future submissions. In order to obtain more accurate estimates for this key source, the ERT also encourages the Party to use the tier 2 method, which includes a correction for the carbon stored in the metal produced and makes it possible to calculate CO_2 emissions from iron production and steel production separately.

Cement production – CO_2

45.   The IPCC default method based on cement production has been used for calculating CO_2 emissions. The ERT is of the view that the Czech Republic should explore the possibility of estimating CO_2 emissions by using the more accurate clinker production method. If clinker production data cannot be obtained directly, they should be inferred from cement production (the tier 1 method).

Nitric acid production – N_2O

46.   The tier 1 method and plant-specific EFs used in the Czech Republic for estimating N_2O emissions from Nitric Acid Production are consistent with the IPCC Guidelines. The country-specific EF (6.57 kg N_2O/ t HNO_3) is based on the study by Markvart and Bernauer (2003). AD are obtained from the three producers.

C. **Non-key sources**

Lime production – CO_2

47.   AD are reported in CRF table 2(I).A-G. However, CO_2 emissions (roughly estimated to be about 1,170 Gg in 1990 and 988 Gg in 2002) have been reported as equal to removals, based on the assumption that all emissions from lime production are subsequently removed by lime use. As already indicated in the 2003 in-country review report, further research on the sequestration of CO_2 emissions originating from lime production by lime use is recommended.

Ammonia production – CO_2

48.   AD are reported in CRF table 2(I).A-G, although CO_2 emissions (roughly estimated to be about 338 Gg in 2002) have been included under 1.A.2 Manufacturing Industries and Construction and are reported here as "included elsewhere" ("IE"). The ERT encourages the Party to consider reallocating CO_2 emissions from ammonia production to the Industrial Processes sector.

Consumption of halocarbons and SF_6

49.   There is no production of PFCs, HFCs and SF_6 in the Czech Republic. Only potential emissions have been estimated for period 1995–2002. The ERT noted that the Party reports these potential emissions in CRF table Summary 2 under sector 7. Other instead of sector 2. Industrial Processes. The ERT recommends the Party to report PFCs, HFCs and SF_6 adequately in CRF table Summary 2 in its next submission. Actual emissions of PFCs, HFCs and SF_6 have not been reported, as current national statistics do not allow it. The ERT welcomes the Party's plan to report actual emissions in the 2005 inventory submission.

Solvent and other product use

50.   This sector includes in particular emissions of non-methane volatile organic compounds (NMVOCs) from the use of solvents (103.4 Gg in 2002, calculated using the CORINAIR methodology), which are simultaneously considered to be a source of CO_2 emissions (306.8 Gg in the same year). A ratio of 0.857 kg C/kg solvent was applied, based on realistic stoichiometry. The Solvent and Other Product Use sector also includes N_2O emissions (0.7 Gg in 2002) from its use in the food industry and in health care.

IV. AGRICULTURE

A. **Sector overview**

51.   In 2002, the Agriculture sector in the Czech Republic accounted for 5.2 per cent of total national GHG emissions. It is the second-largest contributor of GHG emissions after Energy. Generally, emissions in the Agriculture sector in the Czech Republic show a declining trend of about 40.7 per cent between 1990 and 2002.

52.   No AD are provided for Field Burning of Agricultural Residues. Although the Party states that field burning of agricultural residues is prohibited, it should explain how the residues are disposed. Some sectoral background data tables are not complete (e.g., in table 4.A average daily feed intake and CH_4 conversion are missing), and in table 4.B the figures for animal mass and volatile solids (VS) daily excretion are not entered. In tables 4.A, 4.B and 4.D the additional information box is not provided. In some tables "0.00" is used or cells are left blank instead of using the appropriate notation keys (e.g., tables 4 and 4.B).

B. Key sources

Enteric fermentation – CH_4

53.   The 2003 in-country review revealed that the Czech Republic's CH_4 estimates are based on older tier 2 calculations which are not comparable to those of other European countries and that complete recalculation of this source category is needed. The 2004 NIR states that recalculations are planned (using the tier 2 method for cattle and tier 1 for other animals), including an enhanced livestock characterization, and that the findings will be published as soon as QA/QC procedures are completed. As preliminary results already exist, the ERT encourages the Czech Republic to include these recalculations in its next inventory submission together with appropriate documentation in the NIR.

Agricultural soils: direct soil emissions – N_2O

54.   The Czech Republic has used the tier 1 methodology to estimate direct N_2O from Agricultural Soils. For this key source category the ERT encourages the Party to develop country-specific EFs or country-specific fractions ($Frac_{GSAP}/Frac_{GASM}$) and, as indicated last year, the fractions used to estimate N_2O emissions from Agricultural Soils should be reported.

55.   As indicated in the 2003 in-country review report, the 1992 and 2002 value of the N_2O IEF for Cultivation of Histosols (5 kg N_2O-N/ha) is lower than the updated IPCC default value (8 kg N_2O-N/ha). This should be further explained.

C. Non-key sources

Manure management – CH_4 and N_2O

56.   The CH_4 IEFs were identified by the 2004 previous review stages as outliers or lower/higher than the IPCC defaults for several animal categories. The Party replied that CH_4 emissions from Enteric Fermentation are to be completely recalculated for the whole time series since 1990 and that the Czech inventory team plans to report these recalculations next year.

57.   The 1992 and 2002 value of N excretion for Poultry (1.0 kg N/head/year) is higher than the IPCC default value (0.6 kg N/head/year). This should be further explained.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

58.   The LUCF sector is a net sink for the Czech Republic, with CO_2 removals being relatively stable over the period 1994–2002. In 2002, estimated net CO_2 removals of 4,492.21 Gg were 111.1 per cent above those in 1990 (2,127.86 Gg) and corresponded to 3.7 per cent of the total CO_2 emissions in the country (123,047.96 Gg). The removals are a result of the balance of emissions and removals in category 5.A Changes in Forest and Other Woody Biomass Stocks, comprising forest management for timber, the afforestation of agricultural land, and other non-forest trees along rivers and on small tracts of land.

59.   There is an inconsistency in the NIR between pages 24 and 25, where the text first indicates net removals for 2002 of 4,435 Gg CO_2 equivalent (net LUCF removals, including CO_2, CH_4 and N_2O), and the second text indicates the same value for only CO_2 removals. The text should be corrected.

60.   For the 2004 submission, the Czech Republic has only submitted numerical data in CRF table 5 for category 5.A Changes in Forest and Other Woody Biomass Stocks. No data are provided for the other categories: Forest and Grassland Conversion, Abandonment of Managed Lands, and CO_2 Emissions and Removals from Soil are all indicated as "NE". Non-CO_2 GHG emissions (CH_4, N_2O, carbon monoxide (CO) and nitrogen oxide (NO_X)) are estimated for "On-site burning of cleared forests" on managed lands.

61.   For the reporting on 5.A Changes in Forest and Other Woody Biomass Stocks, the Czech Republic includes a section on methodological issues and time series; a description of source-specific QA/QC and verification activities; source-specific recalculations; and source-specific planned improvements, which were not included in previous submissions. However, the NIR still provides only limited information on the methods, AD and EFs used. The level of detail varies between different categories and is generally not sufficient to enable a thorough review of the methods or to provide the rationale for using country-specific methods and EFs, or for the choice of AD.

62.   Although the Czech Republic includes, in the NIR, a table with conversion factors used (table 7.2), there is no information on how the values were estimated. The NIR mentions that "Some conversion and expansion factors recommended by 1995 IPCC Guidelines are specified and slightly modified to better reflect current national forest management conditions" (page 59). Table 7.2 in the NIR (Conversion Factors Used for Carbon Balance Estimate) should indicate which are the IPCC default values and which are country-specific. The non-CO_2 GHG emissions from on-site burning of harvested timber are estimated using the 1995 IPCC Guidelines, assuming the IPCC EFs. Following the recommendations of previous reviews, CO_2 emissions from liming have been estimated for 2001 and 2002 but were not included in the CRFs of the 2003 and 2004 submissions, to avoid inconsistencies in the time series. Uncertainties associated with emissions and removals are not included.

63.   During the 2003 in-country review, it was recommended that additional information from the available documentation should be included in future NIRs and appropriate references made to research and expert opinion in order to provide the rationale for using country-specific methods and EFs, and for the choice of AD. This recommendation has not been followed up in the 2004 NIR. In general the Party should make the methodologies applied to generate country-specific factors more transparent. Objective analysis should be carried out to justify the annual changes in growth rates of coniferous and non-coniferous forest. The origin of the AD should be specified in the NIR, as well as a clear indication of the use of country-specific values or IPCC defaults. The connections between changes in forestland area, deforestation, commercial harvesting, afforestation and/or reforestation should be clearly shown to improve transparency. Improvements in the reporting of non-CO_2 GHGs should also be incorporated to improve the transparency of the reporting.

64.   The NIR refers to recalculations for 1992 being included in the CRF (for estimates of emissions and removals under category 5.A). It is not clear what type of change this involved and the NIR should explain more clearly which part of the estimation has been updated (e.g., AD or method).

65.   The 2003 in-country review report recommended the Party to include an assessment of the uncertainty of its LUCF estimates based on expert judgement and to identify the aspects of the methodology which contribute to uncertainty. This has not been done in the 2004 NIR; however, the Party indicated that estimates will be included upon implementation of the new IPCC good practice guidance for Land Use, Land-use Change and Forestry (LULUCF).

66.   The NIR reports that all the data and EFs have been verified and checked. The inventory has been peer-reviewed by an independent expert and approved by the Ministry of the Environment.

B. Sink and source categories

Changes in forest and other woody biomass stocks – CO_2

67.   Limited details are provided on the country-specific approach to estimating forest management and timber harvest, the sources of AD and the development of the country-specific factors provided in the

NIR. The 2003 in-country review recommended that some of the data and information provided during the visit should be included in the NIR. The ERT recommends the Party to identify the sources of data clearly and include relevant information on the forest inventory and other national statistics.

68.   The NIR only provides limited information on the rationale for including non-forest trees in the Changes in Forest and Other Woody Biomass Stocks category. This was requested in the 2003 in-country review report.

69.   Carbon stock estimates for forest and other woody biomass stocks are reported in CRF table 5.A in aggregate for deciduous and coniferous forests, resulting in a single IEF. The transparency of the reporting would be improved if estimates could be disaggregated by forest type and reported separately in the rows provided for commercial forests in table 5.A.

70.   The Party uses a value of 0.45 t C/t dm for the carbon content in dry mass, whereas the default IPCC value is 0.5 t C/t dm. This should be explained.

71.   The annual increments in above-ground biomass, estimated as 7.5 t dm/ha for non-coniferous and 5.5 t dm/ha for coniferous forest, are well above the IPCC default values of 4.0 and 3.0 t dm/ha, respectively. The ERT recommends the Party to explain the methodology applied and the sources used to justify the use of country-specific values. The ERT also encourages the Party to include further information to make it evident that the country-specific values are more appropriate to national circumstances than the IPCC defaults.

72.   There are inconsistencies between the values reported in the NIR for annual biomass growth (7.5 t dm/ha for non-coniferous and 5.5 t dm/ha for coniferous forest) and the value given in table 5.A (4.83 t dm/ha). In the 2003 NIR, the average annual growth rate was estimated as 4.79 t dm/ha; this value has increased to 4.83 t dm/ha in the 2004 NIR. The Party has not provided objective information to justify this change in average growth rate. The NIR should include better information on the sources of data, explain the differences, and justify the selection of the values used.

73.   The Party reports a carbon uptake of 126.52 Gg C under Non-forest Trees (trees along rivers) in table 5.A. No data are provided to support this estimate.

74.   The Party reports in the NIR that "area of forestland has slowly increased since 1990 and equaled 2,637 thous. ha in 2000" (page 59). The AD in table 5.A under Area of Forest/Biomass Stocks for 2002 are 2,560 kha. This would imply that an area of about 77 kha was deforested between 2000 and 2002. The records for 2000, 2001 and 2002 indicate the following areas of forestland: 2,637 kha in 2000; 2,556.22 kha in 2001; and 2,560 kha in 2002, that is, a loss of 80.78 kha from 2000 to 2001; and an increment of 3.78 kha from 2001 to 2002. A reforestation of this extent should be reported.

75.   In the 2001 CRF of previous submission, the Party reported the total biomass removed in commercial harvest as 9,881.10 kt dm. Using the Food and Agriculture Organization of the United Nations (FAO) value for the Czech Republic for above-ground biomass, of 125 t/ha (dm), this would correspond to an area of approximately 79 kha, which is close enough to the area loss reported from 2000 to 2001 (see paragraph 74 above). In the 2002 CRF, the Party reports total biomass removed in commercial harvest as 9,925.92 (which would correspond to a deforested area of approximately 79 kha), but indicates an increment in area of 3.78 kha. The figures reported in the 2003 NIR and the 2004 NIR are therefore inconsistent. The ERT recommends that the Party explain and remove these inconsistencies.

Changes in forest and other woody biomass stocks – CH_4, N_2O, CO, NO_X

76.   Trace gas emissions from on-site burning in forest management have been estimated using the IPCC default approach and an assumption that 7 per cent of harvested biomass is burned on-site. These emissions are reported under category 5.E Other. The NIR should include information to support the assumption of 7 per cent, as well as the amount of biomass, in tonnes dry matter, that is burned on-site each year.

Forest and grassland conversion

77.   The Party does not provide any numerical data in table 5.B, and reports "NE" for non-CO_2 emissions from on-site biomass burning and decay, but the NIR indicates that non-CO_2 emissions from on-site burning (of 7 per cent of the cleared timber harvest) are insignificant and are added only for the sake of completeness. No data are reported in either table 5.B or table 5, and no information to support the percentage is provided.

78.   The Czech Republic presented a table in the 2003 NIR (table 8.1) with basic statistical data for the carbon balance calculation in 1990, 1994, and 1996–2001. This relevant information is not included in the 2004 NIR. There seems to be an inconsistency between this information in the 2003 table 8.1 and the information in the 2004 NIR regarding the area of forestland. The 2003 table presents the value of 2,552 kha in 2000, whereas the 2004 NIR indicates a corresponding area of 2,637 kha. The ERT recommends that the Party clarify the inconsistency and include basic statistical data in the NIR.

Abandonment of managed lands

79. CO_2 emissions and removals from Abandonment of Managed Lands are not estimated because of limited resources. The Party reports "NE" in the CRF tables. If it is unclear for the Party whether afforestation is forest regrowth after agricultural land is abandoned, such estimates could be reported under category 5.C and would mean that this category is already included in the estimation. The Party should clarify whether the notation key "NE" or "IE" would be more appropriate.

CO_2 emissions and removals from soil

80.   The Party reports in the NIR that CO_2 Emissions and Removals from Soil are not estimated because of limited resources. Estimates of CO_2 emissions from Liming of Agricultural Soils (a subcategory of soils) are provided in the NIR but are not reported in the CRF.

VI. WASTE

A. Sector overview

81.   In 2002, emissions from the Waste sector amounted to 2,808.5 Gg CO_2 equivalent, or 2.0 per cent of total national GHG emissions. Emissions from this sector decreased by 5.9 per cent between the base year (1990) and 2002, and increased by 7.2 per cent between 2001 and 2002. CH_4 emissions from Solid Waste Disposal on Land were the main source in the Waste sector and were identified as a key source category by level assessment.

82.   Almost all the information needed on the methodologies and parameters used for estimating emissions from the Waste sector is provided in the NIR.

83.   A quantitative tier 1 uncertainty analysis was conducted in the Waste sector for the year 2001. The uncertainty of CH_4 emissions from Solid Waste Disposal on Land was 47.2 per cent, and the uncertainties of CH_4 and N_2O emissions from Waste-water Handling were 70.7 per cent and 53.9 per cent, respectively.

B. Key sources

Solid waste disposal on land – CH_4

84. CH_4 emissions from Solid Waste Disposal on Land have been estimated using the tier 1 method described in the IPCC Guidelines. Since this was identified as a key source, the tier 2 (first-order decay (FOD) method) should be adopted in accordance with the IPCC good practice guidance. The Party recognizes the need to revise the methodology and has a plan to implement the tier 2 method over the next two years. The ERT welcomes the Party's effort in this regard and recommends that it implement the tier 2 method as early as the 2005 submission.

85.   The methodology used for estimating CH_4 emissions from Solid Waste Disposal on Land is described in the NIR. Almost all the parameters used are reported in the NIR, as well as the waste management practices, in response to the 2003 in-country review report. The ERT welcomes the efforts of the Party to provide the data in order to improve transparency.

86.   The amount of municipal solid waste (MSW) disposed at solid waste disposal sites (SWDS) is reported in the NIR, but the composition of landfilled waste is not reported. The Party explained during the 2003 in-county review that the composition of waste was under investigation. The ERT encourages the Party to provide the data on waste composition as soon as the investigation is completed.

87.   The waste generation rate in the Czech Republic is 0.63–0.74 kg/capita/day according to the NIR. However, the value is reported as 1.27 kg/capita/day in CRF table 6.A. The Party should provide an explanation of the difference.

88.   The amount of CH_4 recovered in the period 1990–2002 is reported in the NIR. The trend is unstable as there is a sharp increase between 1995 and 1997. The ERT recommends the Party to provide detailed information on the trend in and the technologies used for CH_4 recovery in the NIR.

C. Non-key sources

Waste-water handling – CH_4

89. CH_4 emissions from Waste-water Handling have been estimated using the IPCC method and the IPCC default value of biochemical oxygen demand (BOD) per capita. The ERT recommends the Party to develop a country-specific BOD in order to achieve higher accuracy.

90.   All CH_4 emissions from on-site treatment are reported as coming from sludge and none as coming from waste water, which does not seem to be correct. If the AD given for latrines are all for sludge, then CH_4 emissions from waste water should be reported as "IE". The ERT recommends the Party to provide more detail on this matter.

Waste-water handling – N_2O

91. N_2O emissions from Domestic and Commercial Waste-water are reported as "IE". However, no explanation as to where the emissions are included is provided in CRF table 9. The ERT recommends the Party to provide this explanation.

92.   The Party has used 25 kg/person/year for annual per capita protein consumption in estimating N_2O emissions from human sewage. The ERT recommends that the data source of this value should be provided in the NIR to improve transparency.

Waste incineration

93.   Only CO_2 emissions from plastics and other non-biogenic waste are reported under the Waste Incineration source category, while CH_4 and N_2O emissions are reported as "NE" and are accounted for in source category 1.A according to the explanation provided in the documentation box of CRF table 6.C. In addition, CO_2 emissions from biogenic waste are not reported. The ERT recommends that CH_4 and N_2O emissions from waste incineration be reported as "IE" and that CO_2 emissions from biogenic waste be reported. If waste incineration with energy recovery is implemented, CO_2 emissions from incineration should be reported in source category 1.A. No descriptions of the methodology, EFs and AD for Waste Incineration are provided in the NIR. The ERT recommends the Party to provide a description of the data used in estimating emissions from this source category and an overview of the situation of waste incineration in the Czech Republic.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2003 and 2004 Inventory submissions of the Czech Republic. 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 the Czech Republic submitted in the year 2003 (In-country review)". FCCC/WEB/IRI(2)/2003/CZE (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/czerep03.pdf>).

UNFCCC secretariat. "2004 Status report for the Czech Republic" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/cze04.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 the *Czech Republic* (unpublished).

UNFCCC secretariat. Review findings for the Czech Republic (unpublished).

The Czech Republic'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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