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REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY OF THE CZECH REPUBLIC SUBMITTED IN THE YEAR 2002[1]

Desk review

I. OVERVIEW

A. Introduction

1.   The Conference of the Parties (COP), by its decisions 6/CP.5 and 34/CP.7, requested the secretariat to conduct individual reviews of greenhouse gas (GHG) inventories submitted by Parties included in Annex I to the Convention (Annex I Parties), according to the UNFCCC guidelines for the technical review of GHG inventories from Annex I Parties, hereinafter referred to as the review guidelines.[2] The principle objectives[3] of the review of the GHG inventories is to ensure that the COP has adequate information on GHG inventories and GHG emission trends, and to examine the information submitted by Annex I Parties in accordance with the UNFCCC reporting guidelines[4] for consistency with those guidelines.

2.   The desk review of the Czech Republic took place from 9 to 27 September 2002. The desk review was carried out by a team of nominated experts from the roster of experts, working in their own countries. The assignments of the experts were as follows: generalists – Mr. Moussa Cisse (Mali) and Mr. Riccardo De Lauretis (Italy), energy – Ms. Anke Herold (Germany) and Mr. Eilev Gjerald (Norway), industrial processes – Mr. Philip Acquah (Ghana) and Ms. Marian Van Pelt (USA), agriculture – Mr. Mingxing Wang (China) and Ms. Penny Reyenga (Australia), land-use change and forestry – Mr. Wojciech Galinski (Poland) and Mr. Mikhail Gytarsky (Russian Federation), waste – Mr. Eduardo Calvo (Peru) and Mr. Carlos Lopez (Cuba). Ms. Anke Herold and Mr. Moussa Cisse were the lead reviewers for this desk review. The review was coordinated by Ms. Sevdalina Todorova-Brankova (UNFCCC secretariat).

3.   In accordance with the UNFCCC review guidelines, a draft version of this report was communicated for comment to the Government of the Czech Republic, which supported its publication without amendments.

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[1]   In the symbol for this document, 2002 refers to the year in which the inventory was submitted, and not to the year of publication. The number (1) indicates that this is a desk review report.
[2]   For the UNFCCC review guidelines and decision 6/CP.5 see document FCCC/CP/1999/7, pages 109 to 114 and 121 to 122, respectively.
[3]   For the objectives of the review of GHG inventories see document FCCC/CP/1999/7, page 109, paragraph 2.
[4]   The guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories (FCCC/P/1999/7), are referred to in this report as the UNFCCC reporting guidelines.

B. **Inventory submission and other sources of information**

4.   In its 2002 submission, the Czech Republic submitted common reporting format (CRF) tables for the years 1990 and 2000 and recalculation tables for the years 1990 and 1996–1999 together with a national inventory report (NIR) containing information on methodologies, underlying data, key sources and trends. The submission was received in the secretariat on 12 March 2002 and revision of the CRF for the year 2000 was submitted on 6 June 2002.

5.   The 2002 status report and the draft 2002 synthesis and assessment (S&A) report, together with the Party's responses to it, as well as the previous status reports, S&A reports and the report of the desk review of the Czech Republic's 2001 GHG inventory were made available to the expert review team (ERT). The country provided additional information and clarification during the review at the request of the experts. The Party's responses have been taken into consideration in this report. A full list of materials used during the review is provided in annex I to this report.

C. **Emission profile, trends and key sources**

6.   In the year 2000, the most important GHG in the Czech Republic was carbon dioxide (CO_2), contributing 86.6 per cent to total[5] national GHG emissions, followed by methane (CH_4) with 7.3 per cent and nitrous oxide (N_2O) with 5.5 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) contributed 0.6 per cent to overall GHG emissions in the country.

7.   Total emissions without land use change and forestry (LUCF) declined steadily over 1997–1999 by 12 per cent but increased in 2000 by 5.2 per cent compared to 1999. The overall trend for PFCs, HFCs and SF_6 emissions was upwards with an increase of 2,590 per cent for PFCs, 30,412 per cent for HFCs and 12 per cent for SF_6 emissions with respect to the year 1995. The increase in F–gases trend can be attributed to the different estimation quality during these years, as explained by the Czech Republic in its NIR.

8.   The Czech Republic reported a key source tier 1 analysis, both level and trend assessment, as part of its 2002 submission. The choice of methodologies and the determination of areas for inventory improvement are based on the national key source analysis. The key source analysis performed by the Party and the secretariat produced similar results with small differences due to the choice of activities aggregation in the energy sector. The key sources discussed in this report cover the key sources identified in either of the approaches.

D. **General assessment of inventory**

9.   The national inventory submitted by the Czech Republic is not fully in conformity with the UNFCCC reporting guidelines, due mainly to the lack of CRF tables for the entire time series and some other factors explained in the paragraphs below.

10.   The methodology used to estimate GHG emissions was broadly consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, hereinafter referred to as the IPCC Guidelines, and the Czech Republic made efforts to start to implement the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, hereinafter referred to as the IPCC good practice guidance.[6]

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[5]   Total national GHG emissions refer to aggregate emissions of CO_2, CH_4, N_2O, PFCs, HFCs and SF_6, all expressed in terms of CO_2 equivalent, excluding CO_2 emissions/removals from LUCF.
[6]   According to the conclusions of the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its twelfth session, the IPCC good practice guidance should be applied by Annex I Parties as far as possible for inventories due in 2001 and 2002 and should be used for inventories due from 2003. Annex I Parties with economies in transition may phase in the IPCC good practice guidance two years later than other Annex I Parties.

1. Completeness

11.   The Czech Republic provided full CRF inventory data for the years 1990 and 2000. Time series at the level of table 8 and table 10 included data for the years 1990 and 1996–2000 only. For F–gas emissions, data are provided for the years from 1995 to 2000. However, only potential emissions from consumption of halocarbons and sulphur hexafluoride (SF_6) are estimated. In the agriculture and LUCF sectors there are missing tables. Since the notation keys are not consistently used, it is unclear whether the omissions are not estimated (NE) or not occurring (NO). With these exceptions, the inventory covers all major sources and sinks as well as all direct and indirect gases.

2. Transparency

12.   The transparency of the NIR and the CRF should be improved for some sectors and source categories where more detailed information on the methodologies, emission factors and parameters used should be provided, as indicated in the sectoral sections of this report. The proper use of notation keys in the CRF would also improve the transparency of the reporting.

3. Recalculations

13.   The Czech Republic provides recalculated estimates and some explanatory information (tables 8(a) and 8(b)) for the years 1990 and 1996–1999. The effect of the recalculations for the year 1999 is an increase of 1.18 per cent in total emissions without LUCF and an increase of 1.25 per cent including LUCF. Justifications for the recalculations are provided in the CRF and the NIR; however, explanatory information is not provided for all recalculations performed, and more detailed and complete information should be provided as indicated in the sectoral sections.

4. Uncertainties

14.   Quantitative uncertainty estimates are not provided but in the CRF table 7 quality estimates are reported using the quality codes (H = high, M = medium, L = low) for each pertinent gas and IPCC category. With further implementation of the IPCC good practice guidance, the Czech Republic is also encouraged to provide a quantitative uncertainty analysis.

5. Quality assurance/quality control (QA/QC)

15.   No information is available on specific QA/QC procedures and whether the inventory data have been subject to any self-verification or independent review. The NIR, however, gives some information on limited activities to verify activity data and includes a reference to general rules established to allow control and review of inventories in line with QA/QC procedures outlined in the IPCC good practice guidance. The ERT recommends application of a more rigid QA/QC in future inventories.

6. Issues relating to previous reviews

16.   The main recommendations highlighted in the 2001 desk review,[7] and implemented in the 2002 inventory submission, were the provision of an NIR including information on methodologies, emission factors and the provision of the key source analysis in line with the IPCC good practice guidance. The current submission also provides full CRF tables for the base year and information on emission trends and recalculations. The recommendations in the sectoral sections have been followed as more information was provided on methodologies and data, but some further explanation and documentation should be added in several areas. Despite the recommendation made in the previous review, the allocation of emissions between industrial processes and the energy sector has not been revised.

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[7]   See document FCCC/WEB/IRI(1)/2001/CZE.

17.   The Czech Republic responded to the draft 2002 S&A report by accepting comments to the section on agriculture and waste, and providing explanations for some of the other findings. It also states its intention to elaborate further on the issues that could not be resolved at this stage.

7. Areas for further improvement

18.   The Czech Republic is planning to provide a complete inventory time series, including CRFs for the years 1991–1995 and estimates for the sectoral source categories that were not estimated as indicated in the sectoral sections. In the long term, the Czech Republic plans to revise CH_4 emissions from the agriculture sector and CO_2 removals from the LUCF sector. The Czech Republic is encouraged to include estimation of GHG emissions/removals in soils when undertaking improvements in inventory completeness.

19.   The ERT notes the overall improvement in the 2002 inventory submission as compared to the 2001 submission and supports the need for further work in the areas of planned improvement. The Czech Republic should further increase the transparency of its inventory, by providing detailed underlying and additional information on emission factors and methodologies used which would allow future ERTs to replicate inventory calculations and to assess the results in greater depth as indicated in the sectoral sections. More detailed information and explanation should also be provided for the recalculations performed by the Party. The Party should also check the use of notation keys as indicated in the sectoral sections.

20.   Following the approach of recent years, the Czech Republic is encouraged to aim further to implement more aspects of the IPCC good practice guidance with regard to the calculation of quantitative uncertainties according to the IPCC good practice guidance, the application and documentation of QA/QC procedures and the collection of additional activity data which would enable the Party to estimate key source emissions based on higher tier methods.

II. ENERGY

A. Sector overview

21.   The energy sector contributed 89.7 per cent of total emissions (without LUCF) of the Czech Republic in 2000, with 47 per cent deriving from energy industries, which are the largest source in this sector. CO_2 emissions from fuel combustion decreased by 22 per cent between 1990 and 2000 as a consequence of a decreased consumption of coal and its partial replacement by natural gas. Fugitive emissions of CH_4 dropped by 32 per cent between 1990 and 2000, which is explained as being due to technology modernization.

22.   For those years for which CRF tables are provided, the Czech Republic reports a fairly complete inventory in the energy sector. The few exceptions are CH_4 emissions from venting and flaring, which were not estimated, and emissions from manufacturing industries and construction which were not disaggregated into subsectors, but reported under "other". As requested in the previous review the Czech Republic now includes CO_2 emissions from sulphur dioxide (SO_2) scrubbing under fugitive emissions from solid fuels. The NIR mentions that the national data system register of emissions and sources of air pollution (REZZO) uses different source categories in the energy sector. It would be useful if the Czech Republic would include more detailed information (for example in a tabular format) on the correspondence of national REZZO source categories and IPCC source categories in order to facilitate the assessment of completeness and consistency within IPCC source categories.

23.   The inventory in the energy sector is transparent, as the methods, activity data and emission factors used are explained in the NIR. Explanations in the NIR focus on difficult areas of inventory estimation as well as on country-specific methods and emission factors. Improvements and changed methods and emission factors are clearly documented. Justifications and general assumptions are provided. However, the use of notation keys could be improved in some CRF tables. For example,

emissions from subsectors 1.A.2.a to 1.A.2.e are reported as 0, while reporting as included elsewhere (IE) would be more appropriate, since they were summarized under 1.A.2.f Other. Emissions from venting and flaring should be reported as NE in table 1 (not as 0) consistently with table 1.B.2.

24.   For key source categories, tier methods as recommended in the IPCC good practice guidance and country-specific/plant-specific emission factors are used. Methods are described in a general way which enables assessment of implementation of the IPCC good practice guidance. Sources and references for methods, activity data and emission factors are well documented. However, detailed assumptions and input data for different estimation steps, which would allow reconstruction of the inventory from the underlying data, are not usually provided. The ERT recommends the Czech Republic to add to its NIR information on assumptions and activity data.

25.   In the energy sector, recalculations occurred for N_2O emissions from fuel combustion activities in 1990 for all subcategories under 1.A. Fuel combustion. Recalculations led to an emission decrease of 77.1 per cent for the year 1990. The CRF documentation box explains that the recalculation for N_2O was performed according to the IPCC Guidelines. However, it remains unclear why N_2O emissions only for the year 1990 were recalculated. Further explanation should be provided regarding the recalculations carried out.

26.   QA/QC activities for the energy sector are included in a brief and general way in the form of a description of planned activities for improving the NIR.

B. Key sources

1. Stationary combustion

Energy industries: coal, gas, oil – CO_2, coal – CH_4, N_2O

27.   The draft 2002 S&A report indicated that for energy industries the 2000 value of the CH_4 implied emission factor (IEF) for solid fuels had dropped from 12.34 kg/TJ (in 1990) to 2.03 kg/TJ. The decrease was explained in the Czech Republic's response to the draft 2002 S&A report as being due to the closure of obsolete enterprises. The ERT suggests that this explanation should be included in the next NIR.

Manufacturing industries and construction: coal, gas, oil – CO_2, coal – CH_4, N_2O

28.   Activity data and emissions are not provided at a disaggregated level. Emissions are aggregated under "other". The NIR states that the energy production statistics did not provide necessary activity data for the disaggregation. The NIR should explain more clearly how the aggregate estimates for this sub-sector were arrived at.

Other sectors: coal, gas, oil – CO_2, coal – CH_4, N_2O

29.   The 2000 value of the CH_4 IEF for solid fuels for the subcategory agriculture/forestry/fisheries increased from 111 kg/TJ in 1990 to 200 kg/TJ in 2000. The Czech Republic's response to the draft 2002 S&A report was not completely clear on this item. The ERT recommends the Party to reassess the IEF and to provide further explanation for this increase.

Other stationary combustion: coal – N_2O

30.   Country-specific N_2O emission factors have been used to calculate this key source category as requested by the IPCC tier 2 method. The NIR should explain more explicitly which technology types were considered in the estimation, and the emission factor used.

2. Mobile combustion

Road transportation – CO_2 and N_2O[8]

31.   In the estimation of N_2O from road transport, the IPCC tier 2 method has been used. The draft 2002 S&A report indicated that the value of the N_2O IEF for gasoline (19.1 kg/TJ) was among the highest of the reporting Parties (with a range from 0.57 kg/TJ to 19.09 kg/TJ). The range of N_2O IEFs for gasoline in road transport within the European Union countries, which may also be representative of the Czech Republic is from 4.67 kg/TJ to 16.98 kg/TJ. A detailed description of how the emission factor has been derived is provided in the NIR. Emission factors have been taken mainly from the IPCC Guidelines. The IPCC good practice guidance provided updated default emission factors for N_2O from road transport which are lower than those used by the Czech Republic. It is recommended that the Czech Republic uses the updated emission factors and sources as provided in the IPCC good practice guidance.

3. Fugitive emissions

Coal mining and handling – CH_4

32.   Different methodologies have been used for the estimates for coal mining: tier 3 for 93 per cent of coal production, and tier 1 for the remaining 7 per cent because data for a tier 3 approach were not available from all regions. For post-mining activities the tier 1 approach was used in general.

C. Non-key sources

33.   Higher tier methods or detailed country-specific emission factors have been used for some non-key sources such as CH_4 emissions from gas distribution networks.

34.   Emissions from venting and flaring are not estimated. Although extraction and production of natural gas does exist in the Czech Republic, this was not considered to be an important source.

D. Reference and sectoral approaches

35. CO_2 emissions from fuel combustion have been calculated using the reference approach and the sectoral approach. For the year 2000, there was a difference of –1.85 per cent in the CO_2 emission estimates for both approaches, which did not need to be explained by the Party.

36.   The draft 2002 S&A report indicated several areas of difference between inventory data and data from the International Energy Agency (IEA). In its response to the draft 2002 S&A report, the Czech Republic explained that differences in apparent consumption of solid fuels were seen as a new problem which is considered to be important and which will be analysed further. Differences in the figures for liquid fuels should also be included in this analysis.

E. Bunker fuels

37.   The Czech Republic estimates emissions from domestic and international aviation separately. The NIR does not, however, provide a description of the rationale for the split between domestic and international emissions. The ERT recommends the inclusion in future inventory submissions of information on the methodology used for the estimation of emissions from international aviation.

F. Feedstocks and non-energy use of fuels

38.   The methodology used for the estimation of feedstocks and non-energy use of fuels is explained in the NIR and is consistent with the IPCC Guidelines.

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[8] N_2O from road transport identified as a key source in the Czech Republic key source analysis only.

III. INDUSTRIAL PROCESSES

A. Sector overview

39.   In the year 2000, the industrial processes sector contributed 2.9 per cent to national GHG emissions without LUCF. The source categories that significantly contributed to total sectoral emissions are 2.A.1 CO_2 emissions from cement production (47 per cent), 2.B.2 N_2O emissions from nitric acid production (24 per cent), and 2.F Consumption of halocarbons and SF_6 (21 per cent). Over the period 1990–2000, industrial emissions decreased by 7.9 per cent due to the restructuring of the sector. However, an increase of 9.3 per cent was reported from 1999–2000 which is consistent with the general trend of increasing sectoral emissions from 1996–2000 except for 1999 when a decline of 11.1 per cent was reported. The Czech Republic explains that the reasons for this trend were very difficult to assign. Emissions of PFCs and HFCs grew rapidly from 1996–2000 (PFCs increased by 124 per cent and HFCs by 403 per cent), reflecting the phasing out of ozone-depleting substances, particularly the increasing use of HFCs for refrigeration, and the use of PFCs in electronic cleaning as well as in blending with cooling agents.

40.   Emissions from the following source categories were not estimated in 2000: CO_2 from 2.A.3 Limestone and dolomite use and 2.A.5 Asphalt roofing, CH_4 from 2.B.1 Ammonia production. CO_2 emissions from 2.B.1 Ammonia production, 2.B.5 Ethylene and 2.C.1 Iron and steel production were reported as included in energy combustion estimates with the relevant values provided in the documentation boxes of CRF table 2(I).A-G. The NIR explains that the national REZZO database permits even further disaggregation for some of the missing sources than requested in the CRF (limestone, ammonia production or iron and steel).[9] The Party is encouraged to provide estimates for the missing sources and the sources included elsewhere or to provide further clarification on the problems relating to their estimation.

41.   The Czech Republic presents a complete time series (1990–2000) in the NIR for CO_2 emissions from cement production (2.A.1) and N_2O from nitric acid production (2.B.2), while the other sources were estimated for 1990 and 1996–2000. The ERT recommends that efforts be made to ensure that the completeness of the time series can be achieved for all source categories in the sector.

42.   In the industrial processes sector, the Czech Republic recalculated consumption of halocarbons (HFCs and PFCs) and SF_6 for the period 1996–1998, and also N_2O for all sectors for the base year 1990 to ensure consistency in the time series. However, as noted in the draft 2002 S&A report, the Czech Republic did not complete CRF table 8(b), other than to say that the HFC, PFC and SF_6 emission estimates were completely revised and that the N_2O change was due to a small correction. The ERT recommends that table 8(b) be completed by source category to increase the transparency of reported recalculations. Further justifications for the recalculations should be added.

43.   The ERT notes that industrial processes emissions appear to be low because of the methodological choices made by the Party, namely, inclusion of non-energy CO_2 emissions from industrial processes source categories under energy sector CO_2 emissions from natural gas consumption as a feedstock for the production of ammonia (2.B.1), and CO_2 emissions from coke consumption as a reducing agent in pig iron (2.C.1), as well as exclusion of CO_2 emissions from lime production assuming total CO_2 sequestration in the application of lime in mortar making, implying that the net emissions are zero. The CO_2 emissions not accounted for (950 Gg) and included elsewhere (estimated at 8,391 Gg) constitute 9.3 per cent of total emissions without LUCF compared to the 2.9 per cent reported in 2000.

44.   No information is provided on QA/QC in this sector. The Party should describe QA/QC activities implemented or planned, such as mechanisms of quality control in relation to the compiling and use of national REZZO data.

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[9]   Section 5.4.2, page 35 of the NIR.

B. Key sources

1. Cement production – CO_2

45.　The Czech Republic used tier 1 and the IPCC default emission factor for cement production. The NIR states that data availability in published statistical information did not allow the choice of a higher tier method. The Czech Republic is encouraged to apply the IPCC good practice guidance by obtaining plant-specific activity data from clinker processing plants for the purposes of the inventory.

46.　CO_2 emissions decreased by 3.5 per cent in 2000 compared with 1999. The overall reduction from 1990 to 2000 is 36 per cent. Although it can be assumed that this change is due to the restructuring in the sector, the Party is encouraged to provide in its NIR reasons for the emission reductions.

2. Nitric acid production – N_2O

47.　Country-specific technology-based emission factors, which have been developed for selective and non-selective N_2O abatement systems, are documented in the NIR. The activity data (production) reported in the CRF are 79 per cent higher than those of the United Nations statistics. The Czech Republic explained that the activity data are plant specific and therefore considered to be more accurate than the United Nations data. For verification purposes the Czech Republic compares the inventory data for N_2O emissions from nitric acid production with the estimates in a national study. The results are presented in table 5.3 in the NIR. For better understanding of the methodologies used in the two approaches, the ERT encourages the Party to provide more information.

3. Consumption of halocarbons and SF_6[10]

48.　Since actual emissions of HFCs, PFCs and SF_6 are not provided, and only potential emissions from consumption of halocarbons and SF_6 have been estimated, potential to actual emission ratios for these gases have not been calculated. The Czech Republic indicates in the NIR that detailed emission inventories could not be prepared under current legislation for confidentiality reasons, which limited the statistical publication of industrial data where the number of producers was three or fewer. It is recommended that the Czech Republic uses the appropriate notation key C to indicate data confidentiality. The ERT also recommends that the Party should report actual emissions at least at the most aggregated level and should explain how confidentiality provisions apply to emissions from consumption of halocarbons and SF_6.

49.　Potential emissions have been estimated using custom statistics and questions addressed to individual importers and exporters for the years 1995, 1996 and 2000, years for which sufficient information was available from the customs department. Estimates for the years 1997–1999 were derived using a different method, which is not clearly explained in the NIR. The ERT recommends that further explanation be included in the NIR on the way in which the estimates are calculated and how time series consistency is achieved.

C. Non-key sources

1. Limestone and dolomite use

50.　The draft 2002 S&A report observed that CO_2 emissions from 2.A.3 Limestone and dolomite use were reported as NE, and that no reasons for the exclusion were provided in the completeness table (table 9). The NIR explains that non-energy CO_2 emissions from limestone use for sulphur recovery in coal power plants and alkaline carbonates in iron and steel production were reported in the energy sector under source categories 1.B Fugitive emissions and 1.A.2 Manufacturing industries and construction, respectively. Therefore, the notation keys used for 2.A.3 should have been IE instead of NE.

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[10]　Identified as a key source in the Czech Republic key source analysis only.

2. Lime production – CO$_2$

51. The draft 2002 S&A report indicated that activity data were reported but no emissions presented. The Czech Republic indicates in the CRF and the NIR that emissions from lime production are subsequently absorbed during application by chemical bonding in hardening of mortar (sink) and that therefore the net emissions are zero. The ERT recommends that the Czech Republic should study this process and develop an appropriate sequestration factor. Further, with this methodological choice, various applications of lime would have to be identified, classified and documented because not all the applications of the lime produced in the Czech Republic may lead to CO$_2$ sequestration (such as pH control). The sequestration processes, such as water softening and CO$_2$ absorption in food storage should be identified and included in the mortar making and reported as CO$_2$ removals for lime use under 2.A.7 Other.

3. Chemical industry: other (dichloroethylene and methanol) – CH$_4$

52. The draft 2002 S&A report observed that CH$_4$ emissions were not reported for this source category. The activity data were reported as NE, but no reason for the exclusion of these sources was provided in the completeness table (table 9). The ERT additionally notes that CH$_4$ emissions from carbon black, ethylene and stylene were reported as an aggregate value of 0.39 Gg. The ERT recommends that the Czech Republic should improve the transparency of the reporting of this source category, that is, by the use of notation keys in the chemical industry subsector and by considering the allocation of CH$_4$ emissions to specific subcategories.

4. Production of halocarbons and SF$_6$

53. The CRF reports 0 emissions while the NIR remarks that halocarbons and SF$_6$ are not produced in the country. The ERT recommends use of notation key NO (not occurring) in the CRF for the relevant source category.

IV. AGRICULTURE

A. Sector overview

54. Agricultural emissions of CH$_4$ and N$_2$O contributed 5.1 per cent (7,542 Gg) to total GHG emissions without LUCF in 2000. Emissions declined by 39.8 per cent from 12,521 Gg in 1990.

55. Emission reporting in the CRF for the agriculture sector is complete. However, the use of the notation keys NE, NO, not applicable (NA) should be checked and revised. Some source categories are reported as NE (for example, CH$_4$ from 4.D Agricultural soils) or NO (for example, 4.C Rice cultivation, 4.E Prescribed burning of savannas and 4.F Field burning of agricultural residues) in the summary tables but the use of the notation keys is not carried through into the sectoral reports and background data tables.

56. Information about the activity data, methodologies, emission factors and qualitative assessments of uncertainty are provided in the NIR and CRF. Documentation of the methodologies and assumptions used to estimate CH$_4$ emissions should be improved. It would assist future reviews if the additional information tables were completed. Most of the data needed to complete the tables are available, with some already provided in the NIR.

57. The IPCC Guidelines methodologies have been used to estimate emissions. The IPCC tier 2 methodology with country-specific data has been used to estimate CH$_4$ emissions, while IPCC default methodologies and assumptions have been used to estimate N$_2$O emissions. Different CH$_4$ emission factors have been applied across the time series. It is unclear from the NIR whether the changes in emission factors were due to changes in the livestock characterization over the period or whether the previous years' inventories failed to be recalculated.

58.   The Party has already accepted comments in the draft 2002 S&A report on the agricultural sector. This report contains only additional comments.

B. Key sources

1. Enteric fermentation – CH$_4$

59.   The livestock characterization information used for the tier 2 analysis is not reported in the NIR. Information regarding the parameters may be provided in the publications cited but for transparency it is recommended that this information should be included in the NIR and the sectoral background tables of the CRF. Buffalo, camels and llamas, mules and asses should be reported as either NO or NE in table 4 of the CRF.

60.   The intake (MJ/day) and CH$_4$ conversion values are reported in the NIR. However, the intakes provided in table 7.2 of the NIR do not appear to be the values used to estimate emissions for the 2000 inventory. The NIR indicates that values for breeding animals have been updated. For transparency it is recommended that the revised factors and the time period for which they are used is identified in the NIR. Cattle and sheep IEFs were significantly lower than the IPCC defaults and the values reported by other Parties. Without documentation it is not possible to analyse the reasons for the differences.

61.   The emission factor for swine is significantly higher than the IPCC default (3.41 versus 1.5 kg/hd/yr). A CH$_4$ conversion factor of 2 per cent was assumed; this may, however, be too high. Estimates of methane conversion derived for the Australian and Swedish inventories suggest a conversion rate of 0.6 per cent and 0.54 per cent respectively. The horse emission factor is significantly higher than the IPCC default (47.20 versus 18 kg/hd/yr). The use of a CH$_4$ conversion factor of 8 per cent for horses is too high as these are pseudo-ruminant animals and would have relatively lower conversion rates than ruminant animals. The ERT recommends revision of these emission factors and conversion factors.

2. Agricultural soils – direct N$_2$O emissions

62.   Assuming that the activity data were reported in the correct units, the N$_2$O emissions from N-fixing crops and crop residues appear to have been calculated incorrectly. It seems that the kg dry biomass has been multiplied by the IPCC kg N$_2$O-N/kg N emission factor. The kg dry biomass must be converted into kg N before the IPCC default emission factor is applied.

C. Non-key sources

1. Manure management – CH$_4$

63.   It is unclear whether the country-specific volatile solids (VS) parameters have been calculated using the same livestock characterization as that used for enteric fermentation. The methodology and assumptions used to estimate VS should be documented.

64.   The allocation of manure to animal waste management systems (AWMS) is inconsistent with that used for the calculation of N$_2$O emissions. It is recommended that the allocation of waste to AWMS for the calculation of CH$_4$ from manure management should be modified to reflect the IPCC default allocation used for the N$_2$O estimates.

65.   Emissions from anaerobic lagoons are currently reported as zero. If this treatment does not occur in the Czech Republic, this source category should be reported as NO in the CRF.

2. Manure management – N$_2$O

66.   In table 4.B(b) of the CRF the poultry N excretion rate is reported as 1.0 kg N/hd/yr; however, the emissions are calculated using the IPCC default of 0.6 kg N/hd/yr. The ERT suggests revision of the table 4.B(b) to remove this inconsistency.

67.   N excretion by AWMS is reported in tonnes N/yr rather than kg N/yr, causing the degree of difference in the IEFs identified in the draft 2002 S&A report. The justification given was the limited column width in the CRF. It is recommended that in future reporting should use the units requested by the CRF.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

68.   The LUCF sector represents a net sink offsetting 2.7 per cent of total emissions of the Czech Republic in 2000. From 1990 to 2000, CO_2 emissions increased by 6.0 per cent, CO_2 removals rose by 16.0 per cent, while overall net CO_2 equivalent removals in the LUCF sector increased by 91.3 per cent.

69.   The Czech Republic reports on forest management (5.A. Changes in forest and other woody biomass stocks) and non-CO_2 emissions from on-site burning of wood biomass (reported under 5.E Other). Tables 5 and 5.A from the CRF are completed. Tables 5.B to 5.D are not completed, because emissions/removals from categories 5.B Forest and grassland conversion and 5.C Abandonment of managed lands do not occur in the country, and there are no reliable data for estimates for 5.D CO_2 emissions and removals from soils. At the request of the ERT, the Czech Republic provided additional information on liming, which in 2000 caused 22 Gg of CO_2 emissions or 0.01 per cent of the country's total emissions. To improve completeness of reporting, the Czech Republic is encouraged to include emissions from liming under category 5.D of the LUCF sector.

70.   The Czech Republic used national methods to estimate emissions and removals in the LUCF sector. The Czech Republic is encouraged to check consistency in emissions and removals reporting in the NIR and CRF. The NIR should include more information on growth rate, expansion factor and methodology used to account for emissions/removals of CO_2 and non-CO_2 gases and should justify the differences from the IPCC default methodology. This will result in more complete and transparent reporting in the LUCF sector.

71.   The Czech Republic reports on recalculations for 1990 and 1996–1999 in CRF table 8(a). The reasons for recalculations in the LUCF sector are not clearly documented in the CRF and NIR and should be explained in future inventory submissions.

72.   The Czech Republic has made efforts towards consistent reporting of estimates of CO_2 emissions and removals for 1991 to 1995. A complete revision of CO_2 removals in the LUCF sector is among the priority tasks for future work. The ERT supports the planned activities, particularly the provision of additional information on currently lacking source categories, accounting methodologies, activity data and parameters used.

B. Sink and source categories

1. Changes in forest and other woody biomass stocks

73.   To account for changes in forest and other biomass stocks the Czech Republic has used a country-specific method based on a calculation of the balance between CO_2 emissions from felling and removals in biomass of managed forests, afforested agricultural lands and separate trees. This is described in the NIR and is generally consistent with the IPCC default methodology. Activity data are provided by the Czech Forest Management Institute (ÚHÚL). At the ERT's request, the Czech Republic has explained that the differences between country-specific and IPCC methodology are in the use of country-specific conversion and expansion factors and expert judgement, which are documented in appropriate references provided in the NIR.

74.   The draft 2002 S&A report indicated insufficient description of activity data on removals from trees along rivers and annual growth rates used for calculations of CO_2 removals in the LUCF sector. An

increase in CO_2 removals from 1990 to 2000 was also noted with no changes in forest areas, stocks and on-site burning reported. No explanation was provided. The Czech Republic is encouraged to provide more information on activity data and parameters used in calculations as well as detailed values of GHG emissions and removals obtained.

2. Other (estimating non-CO_2 emissions)

75.   The Czech Republic used the default IPCC method to account for non-CO_2 emissions from on-site burning of biomass. An assumption was made that 7 per cent of major harvesting is burnt on site. The Czech Republic is encouraged to provide further explanation of the reasons for the assumptions used in the calculation of non-CO_2 GHG emissions in the LUCF sector.

VI. WASTE

A. Sector overview

76.   The relative contribution of the waste sector to total emissions in 2000 (without LUCF) was 1.9 per cent (1.1 per cent due to CH_4 emissions from landfill sites). Given the stable emissions from incineration and N_2O from human sewage, the decreasing CH_4 emissions from solid waste and waste-water handling cause the overall emission decrease (21.7 per cent in the period 1990–2000) from the sector.

77.   The inventory is practically complete in the waste sector except that non-CO_2 gases from waste incineration are included in the energy sector (while not used for energy generation) instead of the waste sector. Limited use of or lacking notation keys have been detected in some tables. The ERT recommends the Czech Republic to improve the use of notation keys and to provide explanation for the allocation of the non-CO_2 emissions in the energy sector.

78.   General documentation of methodologies and references is provided. However, in some source categories (see below), more specific information about methods, emission factors and activity data is missing in the NIR. The ERT recommends the Czech Republic to provide more information in the NIR for those source categories for which the information is currently limited. The estimates of emissions are mostly comparable with those of other Parties.

79.   According to the NIR, since the last submission the IPCC good practice guidance has been gradually introduced in the waste sector. This has led to changes in determination of the CH_4 emissions from landfill sites and waste-water management.

80.   Recalculated series of CH_4 emissions from landfill sites and waste-water management are provided in the NIR but there are inconsistencies with the recalculated data reported in the CRF. The ERT recommends that the Czech Republic should improve the documentation of the recalculations for the waste sector in future submissions, and should improve consistency between the CRF and the NIR.

B. Key sources

1. Solid waste disposal on land – CH_4

81.   Although the CRF and NIR indicate the use of the tier 3 method for estimating emissions from this source, no detailed information on the method is provided. The reporting in table 6.A does not help the transparency of the reporting for this source category, since the additional information box is not completed and no notation keys are used. The ERT encourages the Czech Republic to provide information and documentation on the tier 3 method and data used in the determination of CH_4 emissions from solid waste disposal and to improve the use of notation keys in reporting the source category.

82.   Municipal waste production in 2000 was 4,508 kt and landfill 2,803 kt. No explanation is given on the fraction not disposed of to landfill sites and on the determination of the country-specific emission

factor used. The applied oxidation factor is higher than that recommended by the IPCC good practice guidance. Although references are provided, no explanation is given in the NIR to clearly document the use of a value higher than 0.1. The degradable organic carbon (DOC) has been estimated based on a national study but the NIR does not provide sufficient information on this. The ERT recommends that the Czech Republic should provide more information on the data and emission factors used in emission estimates for this source category.

C. <u>Non-key sources</u>

1. Waste-water handling – CH_4 and N_2O

83. CH_4 emissions from this subsector are low due to a high degree of recovery and flaring. The CH_4 generated in anaerobic processes is assumed as burned but no explanation is provided for this assumption. There are cells both in table 6.B and the additional information box left empty without using notation keys to specify the reason for the omission of this information. Part of the requested information is available in the NIR. The ERT recommends the Czech Republic to improve the use of notation keys and the consistency of the information submitted in the NIR and the CRF.

84.   Thirty-three point two per cent of the total amount of waste water is categorized as "unidentified". For this category of waste water a concentration of 3 kg COD/m^3 is assumed but no information and documentation about this assumption has been submitted. No information is provided as to whether the check method from the IPCC good practice guidance has been used to check the national CH_4 emissions estimate in the domestic waste-water category. The ERT recommends the Czech Republic to provide information on the concentration value assumed for the "unidentified" waste water and on the use of the check method.

85. N_2O emissions from industrial waste-water sources were not considered (reported as zero in table 6 and not reported in table 6.B). The ERT recommends improved consistency between the two tables and the use of notation keys for reporting.

2. Emissions from human sewage – N_2O

86. N_2O emissions are estimated using the default IPCC methodology. The data source for protein consumption has not been documented and referenced in the NIR. In the previous review[11] the ERT detected erroneous allocation values in table 6.B, which remain in this submission. The same value of emissions is reported for all the years, without the provision of explanation. The ERT encourages the Czech Republic to amend adequately the allocation of the values used in table 6.B and also to document the source of protein consumption data. The Party should justify the use of the same value of emissions in this source category for all the years.

3. Waste incineration

87.   As already indicated in the previous review report, no information is provided on the method, activity data and emission factor used in the estimation. Non-CO_2 gas emissions are allocated to the energy sector but no further explanation is provided and no notation keys are used in table 6. The same value of emissions is reported for all the years, but no explanation is provided. The ERT recommends the Czech Republic to provide the relevant information and explanation in its next inventory submission.

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[11]   See document FCCC/WEB/IRI(1)/2001/CZE.

Annex I

MATERIALS USED DURING THE REVIEW

A.   Support materials on the CD-ROM and the web page for the review

2000, 2001 and 2002 *Inventory submissions of the Czech Republic.* 2002 submissions including CRF for 1990 and 2000, recalculation tables for 1990, 1996–1999, and an NIR [unpublished].

UNFCCC secretariat. *2000 Status report for the Czech Republic* [available at http://unfccc.int/program/mis/ghg/statrep00/cze00.pdf].

UNFCCC secretariat. *2001 Status report for the Czech Republic* [available http://unfccc.int/program/mis/ghg/statrep01/cze01.pdf].

UNFCCC secretariat. *2002 Status report for the Czech Republic* [available at http://unfccc.int/program/mis/ghg/statrep02/cze02.pdf].

UNFCCC secretariat*. Synthesis and assessment report on the greenhouse gas inventories submitted in 2000.* FCCC/WEB/SAI/2000 [available at http://unfccc.int/program/mis/ghg/sai2000.pdf].

UNFCCC secretariat. *Synthesis and assessment report on the greenhouse gas inventories submitted in 2001.* FCCC/WEB/SAI/2001 [available at http://unfccc.int/program/mis/ghg/sai2001.pdf].

UNFCCC secretariat. *Draft synthesis and assessment report on the greenhouse gas inventories submitted in 2002* (Part I and Part II – the section on the Czech Republic [unpublished].

The Czech Republic's comments on the draft synthesis and assessment report on the greenhouse gas inventories submitted in 2002, [unpublished].

UNFCCC secretariat. *Key source analysis for the year 2000,* [unpublished].

UNFCCC secretariat. *Handbook for review of national GHG inventories*. Draft 2002, [unpublished].

UNFCCC secretariat. *UNFCCC guidelines on reporting and review.* FCCC/CP/1999/7 [available at http://www.unfccc.int/resource/docs/cop5/07.pdf].

UNFCCC secretariat. Database search tool – *Locator* [unpublished].

IPCC.*IPCC good practice guidance and uncertainty management in national greenhouse gas inventories. 2000.* [available at http:www.ipcc-nggip.iges.or.jp/public/gp/gpgaum,htm].

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for national greenhouse gas inventory, volumes 1–3., 1997* [available at http:www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm].

B.   Additional materials provided by the Party

Response to questions during the review received from Pavel Fott, manager of national GHG inventories in the Czech Republic under the UNFCCC.

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