



COMPLIANCE COMMITTEE

CC/ERT/ARR/2009/14
25 March 2009

**Report of the individual review of the greenhouse gas inventories of the
Czech Republic submitted in 2007 and 2008**

Note by the secretariat

The report of the individual review of the greenhouse gas inventories of the Czech Republic submitted in 2007 and 2008 was published on 25 March 2009. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2008/CZE, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.



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**Report of the individual review of the greenhouse gas inventories
of the Czech Republic submitted in 2007 and 2008***

* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of the Czech Republic, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the Subsidiary Body for Implementation at its twenty-seventh session,¹ the focus of the review is on the most recent (2008) submission. The review took place from 8 to 13 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Klaus Radunsky (Austria) and Mr. Marius Țăranu (Republic of Moldova); energy – Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland) and Ms. Roberta Quadrelli (International Energy Agency); industrial processes – Ms. Suvi Monni (European Community) and Mr. Menouer Boughedaoui (Algeria); agriculture – Ms. Tajda Mekinda-Majaron (Slovenia) and Mr. Sergio González (Chile); land use, land-use change and forestry (LULUCF) – Ms. Naoko Tsukada (Japan) and Mr. Walter Oyhantçabal (Uruguay); waste – Mr. Kai Skoglund (Finland) and Mr. Oscar Paz (Bolivia). Mr. Radunsky and Mr. González were the lead reviewers. The review was coordinated by Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of the Czech Republic, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Inventory submission and other sources of information

3. The 2008 inventory was submitted on 9 April 2008; it contains a complete set of common reporting format (CRF) tables for the period 1990–2006 and a national inventory report (NIR). This is in line with decision 15/CMP.1. The Party indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.² In its 2007 submission, the Czech Republic included a complete set of CRF tables for the period 1990–2005, submitted on 17 April 2007, and an NIR, submitted on 3 May 2007. The Czech Republic submitted additional information in response to questions raised by the expert review team (ERT) during the course of the centralized review. Where needed, the ERT also used the 2006 submission, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2006, the main GHG in the Czech Republic was carbon dioxide (CO₂), contributing 86.3 per cent to total GHG emissions expressed in CO₂ eq, followed by methane (CH₄), 8.1 per cent, nitrous oxide (N₂O), 5.0 per cent, hydrofluorocarbons (HFCs), 0.59 per cent, perfluorocarbons, 0.02 per cent and sulphur hexafluoride (SF₆), 0.06 per cent. The energy sector accounted for 82.2 per cent of the total GHG emissions, followed by industrial processes (10.0 per cent), agriculture (5.2 per cent), waste (2.3 per cent) and solvent and other product use (0.3 per cent). Total GHG emissions amounted to 148,203.9 Gg CO₂ eq and decreased by 23.7 per cent between the base year and 2006. In 2005 (as contained in the 2007 inventory submission), total GHG emissions amounted to 140,966.33 Gg CO₂ eq. The shares of gases and sectors in 2005 and 2006 (as shown in the 2007 and the 2008 inventory submissions, respectively) differ slightly: the main differences are an increase in the share of CH₄ and HFC emissions from 7.6 per cent and 0.4 per cent, respectively, to 8.1 per cent and

¹ FCCC/SBI/2007/34, paragraph 104.

² Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

0.6 per cent, of total GHG emissions, as well as a decrease in the share of N₂O emissions from 5.5 per cent to 5.0 per cent. The share of the energy sector decreased from 83.7 per cent to 82.2 per cent, while those of industrial processes and waste sectors increased from 8.5 per cent and 2.0 per cent respectively, to 10.0 per cent and 2.3 per cent, correspondingly. Large inter-annual fluctuations have been noted for N₂O for the period from 1990 to 1994 and for fluorinated gases, for almost the whole period 1995–2006. The ERT also noted significant inter-annual fluctuations in emission estimates for some sectors (including agriculture, LULUCF and waste), with the most important being noted in the LULUCF sector (i.e. a 136.0 per cent increase in removals from 1990 to 1991, or a 47.5 per cent decrease in removals from 2005 to 2006). The ERT noted that the NIR does not provide sufficient explanations for these large fluctuations.

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

D. Key categories

6. The Czech Republic has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2008 submission. The key category analysis performed by the Party and that performed by the secretariat³ produced similar results. The Czech Republic has included the LULUCF sector in its key category analysis, which was performed in accordance with 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) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The following key categories were identified in the 2008 submission but not in the 2007 submission: stationary combustion – solid fuels – N₂O, and other land (5.F) – CO₂. The ERT acknowledges that the Czech Republic has used the results of the key category analysis as a tool to support and guide the improvement of its inventory.

E. Main findings

7. The inventory submission is generally complete in terms of years and GHGs, and close to complete in terms of categories. The inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, except that the uncertainty analysis was performed without addressing the LULUCF categories.

³ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

Table 1. Greenhouse gas emissions by gas, 1990–2006

| Greenhouse gas emissions | Gg CO ₂ eq | | | | | | | | Change base year–2006 (%) |
|--------------------------|------------------------|------------|------------|------------|------------|------------|------------|------------|---------------------------------|
| | Base year ^a | 1990 | 1995 | 2000 | 2003 | 2004 | 2005 | 2006 | |
| CO ₂ | 163 864.56 | 163 864.56 | 131 109.59 | 126 755.68 | 125 880.83 | 126 604.94 | 125 943.17 | 127 917.96 | –21.9 |
| CH ₄ | 18 461.46 | 18 461.46 | 13 644.30 | 12 072.91 | 11 726.98 | 11 544.72 | 11 615.71 | 11 932.69 | –35.4 |
| N ₂ O | 11 840.80 | 11 840.80 | 8 084.00 | 7 715.43 | 7 223.15 | 7 794.75 | 7 500.32 | 7 375.31 | –37.7 |
| HFCs | 0.73 | NA, NE, NO | 0.73 | 262.50 | 590.14 | 600.30 | 594.22 | 872.35 | 118 668.2 |
| PFCs | 0.12 | NA, NE, NO | 0.12 | 8.81 | 24.53 | 17.33 | 10.08 | 22.56 | 18 318.7 |
| SF ₆ | 75.20 | 77.68 | 75.20 | 141.92 | 101.25 | 51.89 | 85.88 | 83.07 | 10.5 |

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

^a Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O and 1995 for HFCs, PFCs and SF₆.

Table 2. Greenhouse gas emissions by sector, 1990–2006

| Sectors | Gg CO ₂ eq | | | | | | | | Change base year–2006 (%) |
|-------------------------------|------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------------|
| | Base year ^a | 1990 | 1995 | 2000 | 2003 | 2004 | 2005 | 2006 | |
| Energy | 156 234.78 | 156 234.78 | 125 521.00 | 121 431.39 | 120 451.67 | 119 991.85 | 120 696.27 | 121 778.38 | –22.1 |
| Industrial processes | 19 203.90 | 19 127.84 | 14 024.36 | 13 319.84 | 13 469.97 | 14 727.99 | 13 382.93 | 14 789.56 | –23.0 |
| Solvent and other product use | 764.83 | 764.83 | 596.31 | 568.56 | 525.16 | 519.28 | 513.77 | 512.93 | –32.9 |
| Agriculture | 15 467.44 | 15 467.44 | 9 579.73 | 8 387.14 | 7 771.76 | 8 037.49 | 7 737.64 | 7 643.66 | 50.6 |
| LULUCF | NA | –3 945.38 | –7 550.36 | –7 363.08 | –5 815.51 | –5 963.94 | –6 423.15 | –3 374.59 | NA |
| Waste | 2 649.59 | 2 649.59 | 3 192.54 | 3 250.32 | 3 328.33 | 3 337.30 | 3 418.75 | 3 479.41 | 31.3 |
| Total (with LULUCF) | NA | 190299.10 | 145363.59 | 139594.17 | 139731.38 | 140649.98 | 139326.22 | 144829.35 | NA |
| Total (without LULUCF) | 194 320.55 | 194 244.49 | 152 913.95 | 146 957.24 | 145 546.89 | 146 613.92 | 145 749.37 | 148 203.94 | –23.7 |

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.

^a Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O and 1995 for HFCs, PFCs and SF₆.

8. The 2008 inventory submission shows significant improvement and covers most sectors and categories, but the ERT identified a need for further improvements in the following areas: (i) a more comprehensive description of the national quality assurance/quality control (QA/QC) plan should be included in the next NIR, including descriptions of the QA/QC and verification measures in specific sections in the relevant sector chapters of the NIR; (ii) higher tier methods should be used for key categories, where appropriate (e.g. for iron and steel production); (iii) the transparency of the inventory should be improved further by including additional information in the NIR with regard to the assessment of inventory completeness, the identification of emission factors (EFs) used, improved descriptions of individual sectors, explanations as to the selection of methodologies, and information on the sources of activity data (AD); (iv) estimates for all missing categories should be prepared and reported, and a discussion of these categories and of other potential sources or sinks not addressed in the current inventory submission should be provided in the NIR, as well as a discussion on the possibility of including them in future submissions; (v) the uncertainty analysis should be improved by using the sector split recommended by the IPCC and by addressing the LULUCF categories as well.

9. The ERT acknowledges the significant improvements that have been made in the inventory between the 2007 and 2008 submissions based on the recommendations of previous reviews. The ERT noted that the Czech Republic has submitted CRF tables 7 (key categories) and 9(b) (completeness), and provided in the NIR explanations for differences between the reference and the sectoral approaches. Additionally, the Party has reported CH₄ and N₂O emissions from 1.A.3(a) (transport, civil aviation, aviation gasoline) and CO₂ emissions/removals from 5.B.1 (cropland remaining cropland). Country-specific EFs have been used for Czech bituminous (hard) coal and brown coal in the energy sector.

F. Cross-cutting issues

1. Completeness

10. The inventory is complete in terms of years and GHG gases, and close to complete in terms of categories. Information gaps relating to reporting were identified in the CRF summary tables 3 (methods/EFs), 8(b) (recalculation – explanatory information) and 9(a) (completeness), while the NIR also does not include an assessment of the completeness of the inventory. No estimations have been provided for: CO₂ emissions from 1.B.1(a) (fugitive emissions from coal mining and handling); CO₂ and CH₄ emissions from 1.B.2(c) (venting and flaring for oil and natural gas); CO₂ emissions from 2.A.5 (asphalt roofing) and 2.A.6 (road paving with asphalt); CO₂ and CH₄ emissions from 2.C.2 (ferroalloys production); CO₂ emissions/removals from 5.C.1 (grassland remaining grassland); and N₂O emissions from 6.B.1 (industrial wastewater and sludge).

11. The ERT reiterates the recommendation of the review of the 2006 GHG inventory submission for the Czech Republic and encourages the Party to prepare and report estimates for all the missing categories and provide in the NIR a discussion of these categories and of other potential sources or sinks not addressed in the current inventory submission, as well as the possibility of including them in future submissions. The ERT noted that between the 2007 and 2008 submissions, the Czech Republic has reported the CH₄ and N₂O emissions from 1.A.3(a) (transport, civil aviation, aviation gasoline) and CO₂ emissions/removals from 5.B.1 (cropland remaining cropland).

2. Transparency

12. The ERT identified gaps in information in the CRF summary tables 3 (methods/EFs) – the information box has been not used, 8(b) (recalculation) – the tables lack significant information that should be provided, and 9(a) (completeness) – very limited information was provided in the table. The ERT encourages the Party to provide complete information in the CRF tables in a manner that is consistent with the “Guidelines for the preparation of national communications by Parties included in

Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” (hereinafter referred to as the UNFCCC reporting guidelines).

13. The ERT also reiterates the recommendation of the review of the 2006 GHG inventory submission for the Czech Republic, encouraging the Party to improve the transparency of the inventory by including additional information in the NIR with regard to the assessment of inventory completeness, the identification of EFs used, improved descriptions of individual sectors, explanations as to the selection of methodologies, and information on the sources of AD.

14. The ERT acknowledges the significant improvements that have been made in the inventory between the 2007 and 2008 submissions, based on the recommendations of previous reviews. The ERT noted that the Czech Republic has submitted CRF tables 7 (key categories) and 9(b) (completeness), and provided in the NIR explanations for differences between the reference and the sectoral approaches. Also, country-specific EFs have been used for Czech bituminous (hard) coal and brown coal in the energy sector.

3. Recalculations and time-series consistency

15. The ERT noted that recalculations reported by the Party for the time series from 1990 to 2005 have been undertaken to take into account more accurate AD, improved EFs and other parameters, and the implementation of higher tier methodologies within the waste and LULUCF sectors, in accordance with the IPCC good practice guidance and IPCC good practice guidance for LULUCF. The recalculated emissions decreased in 1990 by 1.0 per cent excluding LULUCF, and by 2.2 per cent including LULUCF, and increased in 2005 by 0.1 per cent excluding LULUCF, and decreased by 1.2 per cent including LULUCF. The most significant recalculations were noted in the LULUCF sector (CO₂ removals increased by 130.6 per cent in 1990 and by 38.3 per cent in 2005 due to recalculations) and in the waste sector (GHG emissions decreased by 10.0 per cent in 1990 and increased by 17.3 per cent in 2005). The rationale and impact of the recalculations are addressed in the chapter on recalculations and improvements as well as in the relevant sector chapters of the NIR. Overall, the recalculations resulted in an improvement of the inventory.

4. Uncertainties

16. The Czech Republic has provided a tier 1 uncertainty analysis for 59 source categories and for the inventory as a whole (excluding the source categories from the LULUCF sector). The Party used the results of the uncertainty analysis to prioritize further improvements in the inventory. The ERT noted that the quantitative uncertainty for the total emissions was estimated to be 6.2 per cent (6.7 per cent in the 2007 submission), while the uncertainty of the trend was estimated to be 3.1 per cent (3.0 per cent in the 2007 submission). The uncertainty analysis is, to a large extent, based on the default uncertainties included in the IPCC good practice guidance and on expert judgement. The ERT recommends that the Party undertake an uncertainty analysis for its next annual submission using the same source categorization as used in the key categories assessment. It reiterates the recommendation of the review of the 2006 GHG inventory submission for the Czech Republic, encouraging the Party to use more country-specific information and to request that the institutions providing AD or those institutions in charge of estimating emissions estimate the relevant uncertainty data as well.

5. Verification and quality assurance/quality control approaches

17. No important changes were noted between the 2007 and 2008 submissions; however, during the review, the Party informed the ERT about progress towards a QA/QC plan that is in accordance with the IPCC good practice guidance. This plan will include general QC procedures (tier 1) as well as source/sink category-specific procedures (tier 2) for key categories and for those individual categories in which significant methodological and/or data revisions have occurred. The ERT reiterates the recommendation of the review of the 2006 GHG inventory submission for the Czech Republic,

encouraging the Party to implement as soon as possible a QA/QC system at the Czech Hydrometeorological Institute (CHMI) in order to meet all the requirements for the national inventory system (NIS).

18. QA measures include an independent expert review undertaken in 2004 and 2005 by an expert from the Slovak Hydrometeorological Institute responsible for the Slovak GHG inventory preparation. The ERT was informed of the cooperation between the Czech and Slovak emission inventory experts through workshops organized by both the Czech and Slovak Hydrometeorological Institutes (about one or two per year) and through ad hoc consultations between experts. The draft inventory data are also checked by experts from the CHMI before being forwarded to the UNFCCC, and an additional review is made by the Ministry of the Environment. The comments received from the relevant experts involved, as well as the actions taken based on these comments, are documented and archived. The ERT reiterates the recommendation of the review of the 2006 GHG inventory submission for the Czech Republic, encouraging the Party to introduce better documentation of QC at all stages of the inventory preparation, within the CHMI as well as for other institutions/experts contributing to the inventory preparation.

6. Follow-up to previous reviews

19. The Czech Republic has systematically addressed issues raised in the previous reviews and followed the recommendations, where deemed appropriate or possible. Thus, in comparison with the review reports of the 2006 submission, a more detailed aggregation level of categories was used for the tier 1 key category analysis, which was presented for the first time as a separate annex to the NIR. The LULUCF sector has also been included in the analysis of key categories. The Party has submitted the CRF table 7 (key categories) and provided explanations in the NIR for the differences between the reference and the sectoral approaches. The reported gaps in the energy sectoral tables have been filled. Some missing estimates have been reported, such as for CH₄ and N₂O emissions from 1.A.3(a) (transport, civil aviation, aviation gasoline) and for CO₂ removals from 5.B.1 (cropland remaining cropland). Additional information has been included in the NIR regarding explanations for the selection of methodologies and information on the sources of AD; a better description of the individual sectors has also been ensured. The ERT noted as well that the Czech Republic has recalculated the emission estimates for the whole time series (inclusive for 1998–2005), based on an update of the figures of the final national energy balance.

G. Areas for further improvement

1. Identified by the Party

20. The 2008 NIR identifies several areas for improvement in the sector chapters, including:
- (a) Reallocating, from the energy to the waste sector, the CO₂ emissions from petrochemical materials used in the production of plastics that end up in combustion plants;
 - (b) Continuing to perform studies on the potential for refining the calculation of N₂O emissions from mobile combustion on the basis of emission measurement results;
 - (c) Implementing a more detailed air transport monitoring system with respect to domestic flights;
 - (d) Conducting a study to determine the ratio between methane produced and brown coal obtained by surface mining, in order to identify an appropriate EF that would correspond to the country-specific conditions;
 - (e) Implementing an uncertainty assessment for all subsectors within the industrial processes sector;

- (f) Moving to a higher tier methodology (tier 2) when estimating GHG emissions from 2.C.1 (iron and steel production);
- (g) Preparing an inventory of fluorinated gases in products (currently only emissions from bulk import and export are reported) and collect data on the lifetime of refrigeration and air-conditioning equipment, together with information on the disposal and destruction of equipment containing fluorinated gases;
- (h) Implementing the new methodologies available in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* when estimating GHG emissions from the agriculture sector;
- (i) Consolidating current emissions/removals estimates for the LULUCF sector, paying specific attention to the verification of AD, EFs and other parameters, and addressing the assessment of uncertainties in accordance with the requirements of the IPCC good practice guidance for LULUCF.

2. Identified by the expert review team

21. The ERT identifies the following cross-cutting issues for improvement. The Party should:
- (a) Develop a national QA/QC plan for meeting all the requirements of the national inventory system and include descriptions of the QA/QC and verification measures in specific sections of the sector chapters of the NIR, in accordance with the guidance in the UNFCCC reporting guidelines on the structure of the NIR;
 - (b) Use higher tier methodology for key categories where appropriate (e.g. iron and steel production, manure management);
 - (c) Prepare and report estimates for all the missing categories and provide in the NIR discussion of these categories and of other potential sources or sinks not addressed in the current inventory submission, as well as the possibility of including them in future submissions;
 - (d) Improve the transparency of the inventory by including in the NIR an assessment of inventory completeness, the identification of EFs used, improved descriptions of individual sectors, explanations for the selection of methodologies, and information on sources of AD;
 - (e) Improve the uncertainty analysis by using the sector split recommended by the IPCC and by also addressing the LULUCF categories;
 - (f) Develop a data collection strategy with the aim of closing all gaps with respect to all categories not yet covered.
22. Recommended improvements relating to specific source/sink categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

23. The energy sector is the main sector in the GHG inventory of the Czech Republic. In 2006, the energy sector accounted for 121,778.4 Gg CO₂ eq, or 82.2 per cent of total GHG emissions. Emissions from the sector decreased by 21.4 per cent between 1990 and 2006. There were large falls in emissions from stationary combustion, particularly in energy use in other sectors, which fell by 64.4 per cent, and

manufacturing industries and construction, which fell by 40.5 per cent. In contrast, emissions from public electricity and heat production increased by 0.9 per cent. Road transport emissions increased by 191.2 per cent while other transport emissions fell: domestic civil aviation by 88.9 per cent and railways by 59.9 per cent. Within the sector, 94.9 per cent of emissions came from CO₂, 5.0 per cent from CH₄ and 0.9 per cent from N₂O. Public electricity and heat production accounted for 45.0 per cent of energy emissions, manufacturing industries and construction for 22.9 per cent and road transport for 14.6 per cent. All fugitive emissions accounted for 4.6 per cent of the sectoral emissions.

24. Following the recommendation of the ERT for the previous submission, the Czech Republic has improved the completeness of its inventory by including estimates of CH₄ and N₂O emissions from gasoline combustion in aviation (1.A.3(a)), and N₂O emissions from liquefied petroleum gas consumption in road transport (1A.3(b)). However, fugitive CH₄ emissions from the venting and flaring of oil and natural gas (category 1.B.2(c)) are still not estimated. The ERT encourages the Party to estimate these emissions.

25. The sector was largely complete but emissions were not estimated from 1.B.2.a.1 (exploration) and 1.B.2.c (venting and flaring).

B. Reference and sectoral approaches

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

26. CO₂ emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2006, there is a difference of 9.64 per cent in the CO₂ emission estimates between the reference approach and the sectoral approach. This is explained in the documentation box of CRF table 1.A(c) and the NIR. The difference is reduced to 1 per cent if the non-energy use of fuels is deducted. The ERT encourages the Party to fill in the column for apparent energy consumption (excluding non-energy use and feedstocks) in table 1.A(c) with data from tables A1.1, A1.2 and A1.3 in the NIR, as this would improve the transparency of the comparison.

2. International bunker fuels

27. The Czech Republic states that it has no international shipping and so international marine bunkers are not reported. The ERT notes that river transport between countries would be international and therefore suggests that the Party reconsider this point.

28. Fuel for international aviation bunkers is estimated by subtracting the estimated amount used in domestic flights and military use from the total aviation kerosene sales. As there are few domestic flights most of the fuel is international. The ERT commends the Czech Republic on the improved discussion of this in its NIR. However, data for international aviation show inter-annual variations of more than 10.0 per cent for several years. The ERT recommends that the Czech Republic provide explanations for these variations.

3. Feedstocks and non-energy use of fuels

29. Use of feedstocks and non-energy use of fuels is clearly identified in the NIR and fuels are allocated to the correct sector, except for some carbon currently allocated to petrochemical plants that the Czech Republic has stated will be reallocated to waste in the next annual submission. The ERT thanks the Party for the clearer discussion of this in the NIR.

4. Country-specific issues

30. The Czech Republic uses tier 1 approaches with default EFs to estimate emissions of CO₂ from fuel combustion in the 2007 submission. In 2008, country-specific factors for coal were adopted (see para. 33 below). Following the IPCC good practice guidance, a higher tier would be appropriate for

CO₂ from stationary fuel combustion. The ERT recommends that the Party explore options for initiating a process to apply country-specific EFs for all key categories within the energy sector. Application of such country-specific EFs should be a regular part of annual inventory compilation as these factors can change over time. The ERT notes that this information is often held by fuel suppliers and large consumers.

31. The ERT notes that the latest NIR contains more detailed information on EFs and methods than the 2006 NIR. However, the ERT reiterates the recommendation from previous reviews that the Party make further efforts to ensure that its NIR contains all the EFs used, descriptions of any models used, and energy data and other AD needed to compile the inventory.

32. The Party explained to the ERT that it used energy data, in energy units, from the Czech Statistical Office (CSO). The ERT recommends that the Party present in the NIR the calorific values used and their derivation, and explain how the inventory applies QA/QC to these data.

C. Key categories

1. Stationary combustion: solid fuels – CO₂

33. Following a recommendation from previous reviews, the Czech Republic has recalculated the entire time series using country-specific CO₂ EFs. These comprise two numbers, one for bituminous coal and one for brown coal. In response to a request from the ERT, the Party explained that it uses bituminous coal, coking coal and two types of lignite; the ERT recommends that the Party provide the EFs and national heat contents for all of these coal types, as the transparency of the inventory would increase if the NIR briefly discussed the methods used for deriving these factors.

2. Stationary combustion: liquid and gaseous fuels – CO₂

34. Estimates were made using a tier 1 approach and default factors from the Revised 1996 IPCC Guidelines; however, they are not given in the NIR. The implied EFs show some relatively large changes (e.g. manufacturing industry and construction liquid fuels in 1993–1994: 4.3 per cent and solid fuels in 1990–1991: –6.9 per cent; other sector (1.A4) liquid fuels for 1994–1995: –2.7 per cent and solid fuels for 1993–1994: –3.3 per cent). The ERT recommends that the Party indicate all the EFs used in the NIR and explain how they were chosen, as well as the corresponding data on fuel consumption, and provide an explanation of any significant changes. The ERT notes that the Party estimates the uncertainty of these default EFs at 3 per cent. The NIR should contain a justification for this uncertainty estimate, especially for default factors.

3. Road transport: liquid fuels – CO₂

35. CO₂ is estimated based on a tier 1 or tier 2 approach. The NIR does not discuss the origin of the EFs but the CRF table indicates that they are IPCC defaults. However, for gasoline, the CO₂ factor of 68.6 t/TJ for 1990–1994 was changed to 72.6 t/TJ for 2000–2006, with a linear increase in between; for diesel the implied EF of 73.3 t/TJ remained constant until 1999 and was changed to 73.6 t/TJ thereafter. The Party explained that this was because the Czech Transport Research Centre assumed responsibility for estimating this sector in 2000 and used its own EFs; previously, IPCC default EFs had been used. The ERT recommends that the Party explain the methods used, justify the change in carbon contents in the NIR and explain how it implemented the IPCC good practice guidance on time-series consistency between the two estimates. The ERT also recommends that the Party describe the methodology correctly in CRF summary table 3s1.

4. Road transport: liquid and gaseous fuels – N₂O

36. For this category, N₂O emissions have increased at a much faster rate than that of fuel use and this increase appears to be driven by emissions from gasoline use: N₂O from motor gasoline has

increased by 1,137.1 per cent while motor gasoline consumption has increased by only 89.9 per cent. The implied EF for N₂O from gasoline has increased from 2.437 kg/TJ in 1990 to 16.129 kg/TJ in 2006. This increase in N₂O emissions is driven by a high EF for catalyst vehicles. In addition, the time series shows some large inter-annual increases (1996–1997: +10.5 per cent, 1997–1998: +18.4 per cent, and 1998–1999: +11.7 per cent). The ERT recommended that the Party document and explain such large annual increases in emissions in the NIR. The ERT questions whether this high EF is still valid for recent European catalyst-equipped vehicles. It recommends that the Party revise this value and examine recent studies of emissions from European cars (e.g. the COPERT IV study and reports, which show that EURO 2 and subsequent vehicles have lower N₂O emissions than EURO 1). In order to improve transparency, the ERT recommends that the Czech Republic present in the NIR the factors used, the composition of the national vehicle fleet, as well as a discussion of the data and their origin.

5. Coal mining and handling: CH₄

37. Deep-mined coal methane emissions were measured up to 1995, resulting in a variable implied EF. Since 1995, the EF remained constant. The ERT recommends that this factor be updated annually to reflect the variability in emissions.

38. In the previous review, the ERT supported the Party's plan to perform a study on methane emissions from brown coal produced from surface mining, which would determine an EF corresponding to country-specific characteristics. The ERT reiterates its support for this plan, as IPCC default factors are currently used for this key category.

D. Non-key categories

1. Stationary combustion: all fuels – CH₄ and N₂O

39. Following the recommendation of the previous review, the Czech Republic has recalculated the entire time series using appropriate default EFs. The ERT acknowledges this improvement.

2. Solid fuel transformation: CO₂ and CH₄

40. Emissions of CH₄ are reported under industrial processes, iron and steel, whereas CO₂ emissions are reported under stationary combustion, industry, owing to data constraints. The ERT recommends that, in order to improve transparency, the Party provide a more detailed explanation of this in both the NIR and the CRF tables.

III. Industrial processes and solvent and other product use

A. Sector overview

41. In 2006, the industrial processes sector accounted for 14,789.6 Gg CO₂ eq, or 10.0 per cent of total GHG emissions, and the solvent and other product use sector accounted for 512.9 Gg CO₂ eq, or 0.3 per cent of total GHG emissions. Between 1990 and 2006, emissions from the industrial processes sector decreased by 22.7 per cent and for the solvent and other product use sector emissions decreased by 32.9 per cent. The key driver for the fall in emissions is the 33 per cent decrease in emissions from iron and steel production. Another driver was the decrease in emissions from the mineral and chemical industry. The only category with an increase in emissions is the consumption of halocarbons and SF₆.

42. Most of the emissions came from iron and steel production, which accounted for 55.5 per cent of the sectoral emissions, while cement production accounted for 11.4 per cent, limestone and dolomite use for 7.0 per cent and nitric acid production for 6.0 per cent.

43. The following categories are reported as not estimated ("NE"): asphalt roofing; road paving with asphalt; carbon black; N₂O from ethylene; dichloroethylene; styrene; methanol; and ferro-alloys

production. The ERT reiterates the recommendation from the previous review and encourages the Party to estimate these emissions, to complete CRF table 9 (completeness) and to use notation keys correctly. However, the ERT recognizes that the IPCC does not provide methods for some of these sources, and encourages the Party to explore the methods used by other Parties.

44. The NIR does not include a discussion of trends or an uncertainty analysis for mineral products and fluorinated gases in its chapter on industrial processes. The ERT encourages the Czech Republic to estimate emissions from the missing categories, to estimate uncertainties for the missing sources and to include the discussion of trends in the NIR. The ERT also encourages the Czech Republic to further improve the consistency of its NIR with the relevant reporting guidelines under the UNFCCC, in particular regarding discussion on uncertainties and trends for key categories in the relevant chapters.

45. The methodologies, AD and EFs used are not always described in a transparent manner in the NIR. Although the structure of the industrial processes chapter in the NIR follows the UNFCCC reporting guidelines, the ERT noted that this structure makes the NIR difficult to follow in cases where emission sources within a category are not described (e.g. CH₄ from metal production) or where the methodological description of one subcategory is placed in the middle of the description of another category (e.g. production of caprolactam). The type of AD is not reported in CRF table 2(I).

46. During the review, the Czech Republic provided responses to several questions from the ERT. The ERT recommends that the Czech Republic include this information in the next NIR and improve the transparency of the NIR and the CRF tables.

B. Key categories

1. Iron and steel – CO₂

47. The emissions from iron and steel are estimated using the tier 1 method based on coke consumption in blast furnaces. The NIR discusses the Party's plans to apply a tier 2 approach in the future. The ERT reiterates the encouragement from the previous review to implement these plans.

48. During the review, the ERT requested further information on the net calorific value (NCV) and the source of AD for this category. In response, the Czech Republic provided the ERT with the NCV, which varies between 28.0 and 28.8 MJ/kg during 1990–2006, and AD for coke consumed in blast furnaces obtained from the CSO. The ERT encourages the Czech Republic to report the information on NCV and AD in its next annual submission to improve transparency. The ERT reiterates the recommendation from the previous review that the Czech Republic report the number of plants and describe the prevailing technologies.

2. Cement production – CO₂

49. Emissions of CO₂ from cement production are estimated based on clinker consumption (tier 2 method). AD are obtained from the Czech Cement Association (CCA). Such data are also provided by the CSO, but the data from the CCA are considered more accurate. These two data sources are compared as part of the QA/QC procedure. The ERT encourages the Party to indicate the magnitude of the difference between these two data sets in its next annual submission.

50. The EFs are based on calcium oxide and magnesium oxide content of clinker and the cement kiln dust (CKD) factor. During the review, the ERT was provided with the parameters used for calculation. The CKD factor used, 0 per cent (meaning that all CKD is completely recycled), may not be realistic. According to the IPCC good practice guidance, the value is typically between 1.5 and 2 per cent for modern plants. The ERT encourages the Czech Republic to consider further whether the CKD factor used is suitable and to provide a description of this issue in its next NIR.

3. Limestone and dolomite use – CO₂

51. The emission estimation methodology for this category is not described transparently in the NIR. As clarified by the Party during the review, CO₂ emissions from limestone and dolomite use for desulphurization and sintering are included in this category. The ERT appreciates the clarifications received from the Czech Republic during the review, and encourages the Party to include in its next annual submission more detailed information on this category, including the EF in t/sinter and the methodology to estimate emissions from desulphurization. The ERT encourages the Czech Republic to continue the comparison with other data from the European Union emissions trading scheme as a QA/QC measure, to include limestone used for sintering in the comparison, and to explain the differences in its NIR. The ERT also repeats the recommendation from the previous review that the Czech Republic also consider other uses of limestone and dolomite, and encourages the Czech Republic to report on the potential occurrence of these uses in the NIR.

4. Nitric acid production – N₂O

52. Emissions from nitric acid production are estimated based on country-specific EFs that are derived from in-situ measurements. The AD are based on questionnaire responses from producers. The ERT noted that the EFs applied from 2004 onwards for 0.4 MPa plants are different from those EFs applied for earlier years. During the review the Czech Republic clarified that these differences are based on results of direct measurements of N₂O concentrations taken in two production units, and that the results have proven that the selective catalytic reduction technology does not increase the concentration of N₂O in flue gases. The mean value of conversion of N₂O in non-selective catalytic reduction was found to be only 50 per cent rather than the previously considered mean value of 90 per cent. The ERT recommends that the Czech Republic investigate whether the new EF would be applicable also for the years before 2004 in order to ensure time-series consistency. Also, the ERT recommends that the Czech Republic report more precisely when the abatement technologies have been operational each year as it has a significant impact on emissions. The ERT also recommends that the Czech Republic include further information in its next NIR and provide documentation on the referenced measurement study.

5. Other applications using ozone-depleting substance substitutes – HFCs and PFCs

53. Both actual and potential emissions are reported for this category. The data are collected based on voluntary cooperation between sectoral experts and companies. The import and export statistics are based on individual chemicals and do not include fluorinated gases imported in products. All emissions from stationary refrigeration are reported under domestic refrigeration. The ERT reiterates the recommendations from the previous review that the Czech Republic disaggregate the emissions from stationary refrigeration into the relevant subcategories; include the imports and exports of ozone-depleting substance substitutes in products; and improve transparency of the NIR regarding the methods, EFs and AD used.

54. Emissions from this category prior to 1995 are reported as not occurring (“NO”) and/or not applicable (“NA”). The ERT encourages the Czech Republic to clarify whether the use of these substances only began in 1995 or whether the emissions have not been estimated for the years prior to this date. The ERT reiterates the recommendation from the previous review that the Party estimate and report these emissions.

C. **Non-key categories**

1. Lime production – CO₂

55. The Czech Republic reports emissions from lime production and removals from the atmosphere during lime use. During the review, the Party provided the ERT with the equation and the related

parameters used to estimate the emissions from lime production. The ERT encourages the Czech Republic to include this information in its next NIR to improve transparency.

56. Based on a study of Vacha (2004), which is not included in the list of references provided in the NIR, 35 per cent of the emissions from lime production are removed during lime use. During the review, the Party explained that removals were assumed to occur in the production of construction material, the construction industry and agriculture. Such removals are not considered in the IPCC methodology. The ERT reiterates the recommendation from the previous review that the Czech Republic reconsider this assumption, and increase the transparency of reporting for this methodology. In particular, the ERT recommends that the Czech Republic explain the chemical reactions that are considered to remove CO₂ from the atmosphere, and under which conditions these reactions occur, and report emissions and removals separately.

2. Solvent and other product use – N₂O

57. The use of N₂O in the food industry and health care is reported under this category. The emissions are estimated to be constant for the entire time series, and the emissions figures are equal for N₂O use in anaesthesia and N₂O from aerosol cans. During the review, the Czech Republic clarified that N₂O for use in anaesthesia and for aerosol cans is produced in a specific plant in the country. Official production data are not available and, in the inventory, a rough estimate based on external expert judgement is used to estimate emissions. The ERT encourages the Party to include this explanation in the next NIR in order to increase transparency.

IV. Agriculture

A. Sector overview

58. In 2006, the agriculture sector accounted for 7,643.7 Gg CO₂ eq, or 5.3 per cent of total GHG emissions. Between 1990 and 2006, emissions decreased by 50.6 per cent. The key driver for this fall is a decrease in the animal population, mainly cattle. Within the sector, 58.6 per cent of emissions came from agricultural soils, followed by 30.4 per cent from enteric fermentation, and 11.0 per cent from manure management.

59. The ERT noted that the sectoral inventory is complete, except for minor issues that are described in the relevant categories. A detailed QA/QC plan is under development, but some sector-specific QC procedures have been performed in order to check AD and EFs. The QC checks have been performed by experts from the Institute of Forest Ecosystem Research and some minor recalculations have been made for the whole time series 1990–2005. A tier 1 uncertainty analysis is available in tabular format in the NIR but no specific information about the sources of uncertainty estimates for AD and EFs is presented for the sector. Following recommendations of the previous review, the structure of the NIR with regard to the agriculture sector has been improved, and now broadly follows the required structure.

B. Key categories

1. Direct emissions from agricultural soils – N₂O

60. The Czech Republic uses the tier 1 method and the 1996 IPCC default value of 0.0125 kg N₂O-N/kg N for all the subcategories. In line with the IPCC good practice guidance, the ERT encourages the Czech Republic to move towards a higher tier level, particularly for the key categories in this sector.

61. In previous submissions and in the 2007 submission, the Czech Republic reported emissions from cultivated histosols, but in the 2008 submission, these emissions were reported as “NO”. In response to a question by the ERT, the Party stated that, following the 2006 in-country review, the Czech emission inventory team verified the AD required for this category and found that the previously

reported data could not be confirmed by official statistical data; according to the new common consensus of the Czech experts, there are no cultivated histosols on agricultural land in the country. The ERT recommends that the Czech Republic clarify this issue in its next annual submission.

62. The amount of nitrogen (N) excreted from animal waste management systems, after discounting the nitrogen volatilized as NH_3 and NO_x ($\text{Frac}_{\text{GASM}} = 0.2$), does not match the value reported for nitrogen from animal manures applied to soils (CRF table 4D). During the previous review, the Czech Republic explained that daily spread manure was excluded from nitrogen applied to soils. During the 2008 review, the Party clarified that manure from daily spread systems is included. As the figures still do not fully match, the ERT recommends that the Party address and clarify this issue in its next annual submission.

63. In the 2008 submission, fractional parameters were reported for the period 1990–2005 only; $\text{Frac}_{\text{NCRO}}$ was reported as 0.03 kg N/kg dm, $\text{Frac}_{\text{NCRBF}}$ as 0.015 kg N/kg dm and Frac_R as 0.15 kg N/kg crop-N, which all differ from the IPCC defaults (0.015, 0.3 and 0.45, respectively). The ERT noted that the $\text{Frac}_{\text{GRAZ}}$ value is kept constant throughout the period 1990–2005, although the amount of animal manures from grazing animals decreased drastically in that time. The ERT recommends that the Czech Republic revise the values for $\text{Frac}_{\text{NCRO}}$, $\text{Frac}_{\text{NCRBF}}$, Frac_R and $\text{Frac}_{\text{GRAZ}}$ for all years, ensuring consistency among the CRF tables. This recommendation also covers fractional parameters for indirect emissions.

64. A value of 0.0119 kg N_2O -N/kg N, as the nitrogen symbiotic fixation EF, was erroneously reported for 2002. The ERT recommends that the Czech Republic correct this value in its next annual submission.

2. Enteric fermentation – CH_4

65. Methane emissions were estimated using a tier 2 method for cattle and the tier 1 method, as well as 1996 IPCC default values, for other livestock, which is in line with the IPCC good practice guidance. The ERT concluded that more information on major assumptions, data collection, expert consultations and parameters should be included in the NIR; this was also recommended during the previous review.

66. Milk yield is given in kg/day and not in the standard unit for CRF tables (kg/head/day), which was also the case in previous submissions. A number ranging from 32,000 to 68,000 was reported for other non-specified in CRF tables 4.A, 4.B(a)s1 and 4.B(b), for all the years, except 2006. The ERT encourages the Czech Republic to correct and clarify these issues in its next annual submission.

67. The notation key included elsewhere (“IE”) was used in CRF table 4s1 for methane emissions from the category other, but these emissions were not estimated. The ERT encourages the Czech Republic to use the notation key “NE” in its next annual submission.

3. Manure management – CH_4

68. The Czech Republic applied the IPCC tier 1 method for this category, although it is a key category by trend. This methodological approach is not in line with the IPCC good practice guidance and the ERT recommends that the Czech Republic estimate emissions from cattle following a higher tier method.

C. **Non-key categories**

Manure management – N_2O

69. Emissions from goats and horses are reported as “IE”, although AD are available, and no explanation is given for this in the NIR. The Party clarified during the review process that these animal species are reported under the category other, as “IE”. The ERT concluded that there is no reason to

report these animal species under the category other and asked the Party to report them separately. The Party agreed to report these animal species concordantly in its next annual submission.

70. The reported poultry nitrogen excretion rate (1.0) differs from the IPCC default value, although the Czech Republic reported that it used the 1996 IPCC default value (0.6). During the review, the Party explained that this technical mistake was caused by rounding and will be corrected in the next annual submission.

V. Land use, land-use change and forestry

A. Sector overview

71. In 2006, the LULUCF sector was a net sink of 3,374.6 Gg CO₂ eq, which offset about 2.3 per cent of total GHG emissions from other sectors. Removals by this sector decreased by about 14.4 per cent between 1990 and 2006.

72. The Czech Republic has reported on the LULUCF sector using the revised CRF tables, following decision 13/CP.9, since its 2006 submission, in accordance with the IPCC good practice guidance for LULUCF. In its 2008 submission, the Czech Republic carried out a major refinement of the system for land-use identification at the level of the individual cadastral units, which are also used to determine land-use changes. Under this new system, the Czech Republic has recalculated all years from 1990 to 2005.

73. The LULUCF section of the 2008 submission of the Czech Republic is more complete than the previous submissions. However, for several categories, such as cropland remaining cropland, land converted to cropland, grassland remaining grassland, and land converted to settlements, emissions and removals have been considered as negligible and are therefore reported as "NE"; there are also some omissions in the CRF tables. The NIR states that some emissions were omitted based on the application of tier 1 methods of the IPCC good practice guidance for LULUCF; however, the ERT noted that there is no provision in the UNFCCC reporting guidelines that allows for excluding the reporting of any category or source other than those that are optional. The ERT recommends that the Czech Republic complete its reporting by estimating the categories that are currently reported as "NE" or that are omitted, in line with the UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF, using national data or, if national data are not available, default IPCC data, or report as "NA" or "NE", as appropriate.

74. Uncertainty estimates have not yet been provided for the LULUCF sector. During the previous review, the ERT was informed that an uncertainty estimate would be prepared and included in the 2008 submission. The ERT further encourages the Czech Republic to provide uncertainty estimates for the sector in its next annual submission.

75. Information on key category analysis was provided in the NIR and CRF table 7 in line with the IPCC good practice guidance for LULUCF. Three categories are identified as key categories in the LULUCF sector: CO₂ from forest land remaining forest land, CO₂ from cropland remaining cropland and CO₂ from land converted to grassland.

76. QA/QC procedures have been significantly improved through establishing a complete summary table for national land area and land-use categories for each of the reporting years. However, the systems and procedures for QA/QC for the LULUCF sector are not described in the NIR. The ERT recommends that the Czech Republic document clearly its QA/QC procedures for the LULUCF sector in its next NIR.

77. Concerning the consistent representation of land area, the Czech Republic has revised its land-use definitions, based on recommendations from the previous review, and provides a sufficient and transparent description of approaches and methods used in land-use classification and consistent land representation. The Party also provides land-use matrices describing initial and final areas of each of the

six major land-use categories and the identified annual land-use conversions among these categories from 1990 to 2006. However, the ERT noted some inconsistency in the usage of notation keys and recommends that the Czech Republic improve this in the next NIR submission.

78. Estimates for direct N₂O emissions from N fertilization of forest land and other, non-CO₂ emissions from drainage of soils and wetlands, and N₂O emissions from disturbance associated with land-use conversion to cropland are very limited, both in the CRF tables and the NIR. Most of these categories are reported as “NO” or “NA”, and the ERT noted some inconsistency and a lack of transparency. For example, for direct N₂O emissions from N fertilization of forest land and other, all AD and emissions are reported as “NO”, but there is no information in the NIR; for non-CO₂ emissions from drainage of soils and wetlands, most AD and emissions are reported as “NO” and “NA”, but there is no information in the NIR; and for N₂O emissions from disturbance associated with land-use conversion to cropland, emissions from organic soils in cropland converted from forest land and grassland are not reported while corresponding area data are reported as “NO”. The ERT recommends that the Czech Republic improve its reporting and use appropriate notation keys in line with the UNFCCC reporting guidelines (following incorporation of the provisions of decision 13/CP.9).

79. For biomass burning, emissions of CO₂, CH₄ and N₂O are estimated separately for both controlled burning and wildfire, which is in line with the IPCC good practice guidance for LULUCF. However, this category is only estimated for forest land remaining forest land; all other subcategories are reported as “NO”, but no information on the other subcategories is provided in the NIR. The ERT recommends that the Czech Republic improve its transparency and include information on these subcategories in its next annual submission.

B. Key categories

1. Forest land remaining forest land – CO₂

80. Forest land covers 33.6 per cent of the total land area. In its 2008 submission, the Czech Republic provides estimates for five distinct forest type subdivisions. In response to an issue identified by the ERT in the previous review, the Party now properly includes this information in its NIR and CRF tables. However, the ERT noted that the Czech Republic includes the subdivision “clear-cut area” in this category and provides only an estimate for the area, while carbon stock changes are reported as “IE”. The ERT encourages the Czech Republic to provide a clear definition of this subdivision and provide estimates for carbon stock changes.

81. The ERT noted that transparency has been improved in this submission in the description and documentation of methodology, AD and EFs, in order to estimate emissions and removals from the sector. The Czech Republic estimates carbon stock change in forest land remaining forest land using the IPCC default approach rather than a “stock-change approach”, introducing some country-specific parameters (e.g. expansion to include over-bark volume factor (F_B) and the factor of unreported harvest loss (F_{HL})) and adding some modifications to the equations of the IPCC good practice guidance for LULUCF, in order to facilitate the use of available data. These parameters and modifications were discussed during the previous review and the ERT suggested that the Czech Republic change its national data to fit the IPCC equations and document them in a tabular format, or use its modified equations and provide adequate documentation as required. Following this suggestion, the Czech Republic provides clearer explanations for these parameters and methodologies and also provides all parameters used to estimate carbon stock changes including F_B and F_{HL} for four distinct forest types in the NIR.

82. Net carbon stock change in dead organic matter is not reported, with the exception that clear-cut area is reported as “IE”. In response to issues raised by the ERT during the previous review, the Czech Republic stated that, in accordance with the IPCC good practice guidance for LULUCF, carbon stock change in dead organic matter was assumed to be “zero”. The ERT recommends that the Czech Republic complete its reporting by estimating those categories that are not currently reported, in

accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF. The Party should use national data or, if national data are not available, use default IPCC data and report those categories as “NO”.

83. For soil carbon, only emissions from mineral soils have been estimated and organic soils are not reported. Additionally, the area of organic soil is provided in the spruce subdivision, but reported as “IE” for all other subdivisions. The ERT encourages the Czech Republic to complete its reporting and improve documentation in the NIR to clarify this inconsistency.

2. Cropland remaining cropland – CO₂

84. Cropland covers about 44 per cent of the total land area and was a net source of 138.2 Gg CO₂ eq in 2006. Emissions from this category decreased by about 89.6 per cent between 1990 and 2006. According to the NIR, this trend was caused by a constant decline in the area of cropland and lime application.

85. In its 2008 submission, the Czech Republic provides estimates for carbon stock change in living biomass and soil, applying the IPCC default approach and EFs. The ERT notes that this category has been identified in the NIR as a key category and recommends that the Party use a tier 2 or tier 3 method, in accordance with the IPCC good practice guidance for LULUCF.

86. An estimate for CO₂ emissions from lime application is also reported; however, those emissions from lime application have been estimated and reported only as an aggregated value because, as the NIR states, it is impossible to separate the data for limestone and dolomite applications. As the change in liming activity over time has caused this category to become a key category, the ERT recommends that the Czech Republic use an appropriate approach in order to separate these data and provide disaggregated estimates in its future submissions.

3. Land converted to grassland – CO₂

87. Grassland covers about 14 per cent of the total land area and was a net sink of 396.4 Gg CO₂ eq in 2006. Removals from the sector increased by about 289 per cent between 1990 and 2006. According to the NIR, this trend was caused by constant growth in the area of grassland.

88. Carbon stock changes in living biomass and soil are estimated using the IPCC tier 2 and tier 3 methods. The ERT observed some large inter-annual differences in the implied carbon stock change factor in mineral soils for some years but this issue was clarified by the Czech Republic: these changes reflect the annual changes in areas converted to grassland from other land-use categories within a 20-year rolling period. Carbon stock change in dead organic matter is not reported in this category. The ERT recommends that the Czech Republic complete its reporting in future submissions.

C. Non-key categories

1. Wetlands – CO₂

89. Wetlands cover about 2.0 per cent of the total land area and were a net sink of 18.9 Gg CO₂ eq in 2006. Emissions from the sector increased by about 17.8 per cent between 1990 and 2006. According to the NIR, this trend was caused by constant growth in the area of wetlands.

90. Based on the comprehensive land representation system, the Czech Republic estimated all land areas for wetlands remaining wetlands and land converted to wetlands. In land converted to wetlands, carbon losses and net carbon stock change have been provided for living biomass only. However, any emissions caused by the land-use change activity itself should be estimated using the methodologies described in the IPCC good practice guidance for LULUCF. The ERT encourages the Czech Republic to provide this information in future submissions.

2. Settlements – CO₂

91. In its 2008 submission, the Czech Republic revised its land-use definition of settlements in order to better match the definition provided by the IPCC good practice guidance for LULUCF. As a result, settlements are now estimated to represent about 8.5 per cent of the total land area, having grown in size over the period 1990–2006.

92. For this category, quantitative data are provided only for carbon stock change in living biomass in forest land converted to settlements, using the IPCC tier 1 default approach. All other changes in carbon stocks in land converted to settlements are reported as “NA” or are omitted. The ERT noted that in the case of land-use change from other uses, carbon stocks, especially soil organic carbons, can change. The ERT encouraged the Czech Republic to report emissions and/or removals in this category in future submissions, providing that some data are available, or to use the notation key “NE”, if data are not available.

3. Other land – CO₂

93. Following the recommendation from the previous review, the Czech Republic has changed the definition of this category in order to better match the definition in the IPCC good practice guidance for LULUCF. This category mainly represents unmanaged land, which accounts for about 1 per cent of the land area, and is considered to be constant. Therefore, land-use conversion under this category has not occurred during the period 1990–2006, and emissions and removals in all the pools and subcategories are reported as “NO”.

VI. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

94. The ERT notes that the Czech Republic has chosen to account for activities under Article 3, paragraph 3, at the end of the commitment period and that the Czech Republic elected forest management as an additional activity under Article 3, paragraph 4. The ERT also notes that the Czech Republic has not reported voluntarily on activities under Article 3, paragraphs 3 and 4, in its 2008 submission. However, the ERT encourages the Czech Republic to obtain all the relevant AD to allow it to report in 2010 the required information under the Kyoto Protocol on any land-use change that relates to afforestation, reforestation or deforestation, according to the parameters selected by the Czech Republic for the definition of forest, as well as for forest management.

VII. Waste

A. Sector overview

95. In 2006, the waste sector accounted for 3,479.4 Gg CO₂ eq, or 2.3 per cent of total GHG emissions. Solid waste disposal on land accounted for 68 per cent of the sectoral emissions, wastewater handling for 20.8 per cent and waste incineration for 11.2 per cent. The Czech Republic has extensively improved its waste sector inventory by updating the estimation method for solid waste disposal on land to the tier 2 first order decay (FOD) method. The Czech Republic has provided all CRF tables for the entire time series, including the base year. QA/QC procedures and an uncertainty analysis have been applied to some extent, although further improvements are planned. However, the ERT noted an inconsistency in the reported total emissions between the NIR (3,475 Gg CO₂ eq) and CRF table (3,479 Gg CO₂ eq). The inconsistency was caused by different estimates for emissions from waste incineration (this is specified in the section on waste incineration). Regarding completeness in the sector, the ERT encourages the Czech Republic to include an estimate for emissions from composting of waste in its future submissions, given that, according to the European Compost Network, 220,000 t of municipal biowaste is composted annually in the Czech Republic.

B. Key categories

1. Solid waste disposal on land – CH₄

96. Solid waste disposal on land is identified as a key source category in both level and trend assessments. The ERT noted that, following the recommendation provided in the previous review, the Czech Republic has implemented the tier 2 FOD method, using mostly IPCC default values. The whole category has been recalculated for this submission. This has improved both the methodological transparency and consistency of the time series. However, further improvement is needed for the transparency and consistency of the AD used.

97. The composition of waste disposed to landfill sites is assumed to be constant. In response to a question raised by the ERT, the Czech Republic explained that there is no official information available about waste composition. The ERT encourages the Party to systematically assess waste composition and include this information in the inventory of its next annual submission.

98. The waste generation rate (kg/person/year) increased in the period 1990–2004 and decreased in 2005 and 2006. The amount of waste disposed to landfill sites fluctuated over the period 1990–2006. In response to a question raised by the ERT, the Czech Republic explained that there is no national-level study on the amount of waste disposed to landfill sites and that the fluctuations are related to socioeconomic driving forces. The ERT noted that, according to the United Nations Statistics Division, the Czech Republic's GDP increased in the years 2004–2006, which contrasts with the trend in waste generation rate. The ERT recommends that the Party study further the factors behind the AD in the waste sector and include more information about them in its next NIR.

99. Emissions from unmanaged waste disposal sites are not reported. In the CRF tables, the notation key "NO" was used, and no information is provided in the NIR. In response to a question raised by the ERT, the Czech Republic informed the ERT that there were no official data (AD) available on the existence of unmanaged waste disposal sites in the country. The ERT recommends that the Party include some information about waste amounts and distribution between the different waste management practices, particularly concerning the 160 Gg that was reported for municipal waste utilization and disposal for 2006 under other categories in table 8.2 of the NIR.

2. Waste incineration – CO₂ and N₂O

100. The Czech Republic used a tier 1 method from the IPCC good practice guidance to estimate emissions from incineration of municipal solid waste, hazardous waste and clinical waste. No recalculations have been performed since the last submission. CH₄ emissions from waste incineration were reported as "NE". The Czech Republic is aware that the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* also include a method for estimating CH₄ from waste incineration, and plans to include this additional gas in its next inventory. However, the estimated small amount of CH₄ in the total means that this is a low priority. Areas for further improvement relate to improving the consistency between the NIR and CRF tables and the consistency of the time series.

101. The total amount of emissions from waste incineration differs between the CRF tables and NIR. In the NIR the total amount is reported as 3,745 Gg of CO₂ eq, while in the CRF tables the total amount is reported as 3,749 Gg of CO₂ eq. The ERT recommends that the Czech Republic address this inconsistency in its next annual submission.

102. The trend in CO₂ emissions from waste incineration appears to be inconsistent (the notation key "NE" was used for the year 1990, and a constant value (357 Gg) was used for the years 1991–2002, but not after 2002) and the fluctuation in the trend is not explained in the NIR. Also, the trend in N₂O emissions from waste incineration seems to be inconsistent (the notation key "NE" was used for the years 1990–2002, but not after 2002) and is not explained in the NIR. In response to a question raised by the

ERT, the Czech Republic informed the ERT about its plan to recalculate the whole time series for CO₂ and N₂O from waste incineration in the near future. The ERT welcomes this plan and recommends that the Czech Republic recalculate the emissions using consistent methods for the whole time series and include some information about the consistency of the time series in its NIR in future.

C. Non-key categories

Wastewater handling – CH₄

103. The Czech Republic used a tier 1 method for estimating emissions from wastewater handling, as recommended by the IPCC good practice guidance. No recalculations have been performed since the last submission. The uncertainty of most of the factors (IPCC default values) is determined according to the IPCC good practice guidance, but the overall uncertainty of the source category has not been quantified.

104. For domestic and commercial wastewater, AD (i.e. amount of wastewater) were not provided in the NIR or the CRF tables; only the fraction of wastewater treated was included in the NIR. There was a general increasing trend, but two outlier years (1991 and 2002) were identified in the trend. The reasons for this trend were not included in the NIR. In order to improve further the transparency of the inventory, the ERT recommends that the Czech Republic include AD and explanations of its trend in its next annual submission.

105. The ERT identified a reporting error, which does not affect the emissions estimates, in the NIR in the section on industrial wastewater (in the last sentence on page 130); the text reads as, “The conversion factor for anaerobic treatment is 0.06 and, for aerobic, 0.7”. The factors should be listed the other way around to read, “aerobic treatment is 0.06 and, for anaerobic, 0.7”. In response to a question raised by the ERT, the Czech Republic recognized this error. The ERT recommends that the Party correct this error in its next annual submission.

VIII. Other issues

106. In its 2008 submission, the Czech Republic provided supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (voluntary reporting in accordance with decision 15/CMP.1) in an annex to the NIR, including information on changes to the national system, changes to the national registry, updated information on the commitment period reserve and assigned amount.

1. Changes to the national system

107. The ERT noted that, according to the supplementary information provided by the Party, there were no changes in the NIS since the last submission and since the Czech Republic’s initial report. With regard to the recommendations included in document FCCC/IRR/2007/CZE, the ERT notes that the national system needs further strengthening in order to fully meet the reporting requirements under the Kyoto Protocol (see also paras. 17 to 21 above).

2. Changes to the national registry

108. The ERT noted that, according to the supplementary information provided by the Party, the registry of the Czech Republic is eligible to connect to the international transaction log (ITL), but that this has not yet happened due to problems in the connectivity between the ITL and the Community Independent Transaction Log. The ERT also notes that the Czech Republic expected this problem to be resolved in the second part of 2008.

3. Commitment period reserve

109. The ERT noted that, according to the supplementary information provided by the Party, the Czech Republic calculates its commitment period reserve to be 741,019,720 t CO₂ eq, based on its total

emissions in the most recently reviewed inventory (total emissions in 2006: 148.203,944 Gg CO₂ eq). The ERT agrees with this figure.

IX. Conclusions and recommendations

110. The 2007 and 2008 inventory submissions are generally complete in terms of years and GHGs, and close to complete in terms of categories. The inventory of the Czech Republic is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, except that the uncertainty analysis was performed without addressing the LULUCF categories.

111. The 2008 inventory submission shows significant improvement and covers most sectors and categories, but the ERT identified a need for further improvements in the following areas:

- (a) A more comprehensive description of the national QA/QC plan should be included in the next NIR, including descriptions of the QA/QC and verification measures in specific sections in the relevant sector chapters of the NIR;
- (b) Higher tier methods should be used for key categories, where appropriate (e.g. for iron and steel production);
- (c) The transparency of the inventory should be improved further by including additional information in the NIR with regard to the assessment of inventory completeness, the identification of EFs used, improved descriptions of individual sectors, explanations as to the selection of methodologies, and information on the sources of AD;
- (d) Estimates for all missing categories should be prepared and reported, and a discussion of these categories and of other potential sources or sinks not addressed in the current inventory submission should be provided in the NIR, as well as on the possibility of including them in future submissions;
- (e) The uncertainty analysis should be improved by using the sector split recommended by the IPCC and by also addressing the LULUCF categories.

112. The ERT concludes that the information provided by the Czech Republic in its annual inventory submission did not address all recommendations included in document FCCC/IRR/2007/CZE. In particular, the ERT noted that the national inventory system still lacks the necessary human and financial resources to improve QA/QC, archiving, completeness of the inventory, particularly regarding emissions estimates for source/sink categories that were not estimated in the recent inventory submission, and transparency.

113. The ERT recommends that the Party address the need for further improvements identified by the Party and the ERT (see paras. 20 and 21 above) and strengthen further the human and financial resources for the national system in order to fully meet the reporting requirements under the Kyoto Protocol.

X. Questions of implementation

114. The ERT did not identify any questions of implementation during the review of the 2007 and 2008 inventory submissions.

Annex**Documents and information used during the review****A. Reference documents**

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/landuse/gp/landuse.htm>>.

“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/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for the Czech Republic 2007. Available at <<http://unfccc.int/resource/docs/2007/asr/cze.pdf>>.

Status report for the Czech Republic 2008. Available at <<http://unfccc.int/resource/docs/2008/asr/cze.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <<http://unfccc.int/resource/webdocs/sai/2007.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2008. Available at <<http://unfccc.int/resource/webdocs/sai/2008.pdf>>.

FCCC/ARR/2006/CZE. Report of the individual review of the greenhouse gas inventory of the Czech Republic submitted in 2006. Available at <<http://unfccc.int/resource/docs/2007/arr/cze.pdf>>.

FCCC/IRR/2007/CZE: Report of the review of the initial report of the Czech Republic. Available at <<http://unfccc.int/resource/docs/2007/irr/cze.pdf>>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Pavel Fott (Czech Hydrometeorological Institute), including additional material on the methodology and assumptions used.
