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**Report of the individual review of the annual submission of Belarus  
submitted in 2009\***

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\* In the symbol for this document, 2009 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 2009 annual submission of Belarus, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 14 to 19 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Katarina Mareckova, (European Community); energy – Mr. Christo Christov (Bulgaria), Mr. Takeshi Enoki (Japan) and Mr. Norbert Nziramasanga (Zimbabwe); industrial processes – Mr. Riccardo De Lauretis (Italy) and Ms. Valentina Idrissova (Kazakhstan); agriculture – Mr. Jorge Alvarez (Peru) and Ms. Anna Romanovskaya (Russian Federation); land use, land-use change and forestry (LULUCF) – Mr. Emil Cienciala (Czech Republic) and Mr. Xiaoquan Zhang (China); and waste – Ms. Medea Inashvili (Georgia) and Mr. Seungdo Kim (Democratic People's Republic of Korea). Ms. Romanovskaya and Mr. Zhang were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene (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 Belarus, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

### B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in Belarus was carbon dioxide (CO<sub>2</sub>), accounting for 70.7 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (17.8 per cent) and nitrous oxide (N<sub>2</sub>O) (11.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.04 per cent of the overall GHG emissions in the country. The energy sector accounted for 69.9 per cent of the total GHG emissions, followed by agriculture (19.1 per cent), waste (6.8 per cent) and industrial processes (4.0 per cent). The solvent and other product use sector accounted for 0.09 per cent. Total GHG emissions amounted to 55,945.96 Gg CO<sub>2</sub> eq and decreased by 45.3 per cent between 1990<sup>2</sup> and 2007. The explanatory information on trends is rather limited for all sectors and does not allow for an assessment of the rationale behind the trends.

4. Tables 1 and 2 show GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

### C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 May 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007. A national inventory report (NIR) was submitted on 19 May 2009. Belarus also, on voluntary basis, in part, submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on changes in the national system and in the national registry. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

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<sup>1</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>2</sup> As a target for Belarus is not yet included in Annex B to the Kyoto Protocol, it is not mandatory for Belarus to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol. A base year level has not been set for Belarus and thus is not reported. For a comparison with the latest inventory submission, the emission level of 1990 was used instead of the base year emission level.

**Table 1. Total greenhouse gas emissions<sup>a</sup> by gas, 1990–2007**

Greenhouse gas	Gg CO <sub>2</sub> eq							Change 1990–2007 (%)
	Base year <sup>b</sup>	1990	1995	2000	2005	2006	2007	
CO <sub>2</sub>	NA	102 089.86	56 294.03	51 919.47	55 329.32	57 701.28	56 583.33	–44.6
CH <sub>4</sub>	NA	15 411.54	11 612.87	11 422.48	13 249.32	13 929.77	14 231.46	–7.7
N <sub>2</sub> O	NA	11 627.99	6 230.15	7 643.78	8 828.27	9 668.84	9 161.62	–21.2
HFCs	NA	NA, NE, NO	NA, NE, NO	9.35	26.19	30.05	31.08	NA
PFCs	NA	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA
SF <sub>6</sub>	NA	NA, NE, NO	0.01	0.41	1.48	1.87	2.27	NA

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

<sup>a</sup> “Total greenhouse gas emissions” includes emissions from Annex A sources only (excluding emissions/removals from the land use, land-use change and forestry sector).

<sup>b</sup> As a target for Belarus is not yet included in Annex B to the Kyoto Protocol, it is not mandatory for Belarus to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol. A base year level has not been set for Belarus and thus is not reported. For a comparison with the latest inventory submission, the emission level of 1990 was used instead of the base year emission level.

**Table 2. Greenhouse gas emissions by sector, 1990–2007**

Sector	Gg CO <sub>2</sub> eq							Change 1990–2007 (%)
	Base year <sup>a</sup>	1990	1995	2000	2005	2006	2007	
Energy	NA	102 236.84	57 028.48	52 482.15	55 274.60	57 624.21	55 945.96	–45.3
Industrial processes	NA	2 252.55	1 207.93	1 686.67	2 649.14	2 744.99	3 220.13	43.0
Solvent and other product use	NA	74.40	62.33	76.04	69.19	67.49	72.56	–2.5
Agriculture	NA	21 990.86	13 703.51	13 795.05	14 821.41	15 776.47	15 301.79	–30.4
LULUCF	NA	–22 028.43	–26 673.76	–27 248.32	–25 088.20	–26 008.48	–24 941.85	NA
Waste	NA	2 574.73	2 137.64	2 955.57	4 620.24	5 118.65	5 469.32	112.4
Other	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	NA	102 236.84	57 028.48	52 482.15	55 274.60	57 624.21	55 945.96	–45.3
<b>Total (without LULUCF)</b>	NA	2 252.55	1 207.93	1 686.67	2 649.14	2 744.99	3 220.13	43.0

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

<sup>a</sup> As a target for Belarus is not yet included in Annex B to the Kyoto Protocol, it is not mandatory for Belarus to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol. A base year level has not been set for Belarus and thus is not reported. For a comparison with the latest inventory submission, the emission level of 1990 was used instead of the base year emission level.

6. The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP), by its decision 10/CMP.2, adopted the amendment to Annex B to the Kyoto Protocol, which states Belarus' quantified emission reduction commitment of 92 per cent in relation to the base-year level over the period 2008–2012. In accordance with the provisions of Article 20 of the Kyoto Protocol, the amendment will enter into force on the ninetieth day after the date of receipt by the Depository of an instrument of acceptance by at least three fourths of the Parties to the Protocol. At the time of the centralized review of the 2009 submission of Belarus, this had not yet been achieved. Therefore it is not mandatory for Belarus to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol. The expert review team (ERT), however, took note of the information that was provided, such as changes to national registry and changes to the national system.

7. During the review, Belarus provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report. Where necessary, the ERT also used the previous years' submissions during the review.

#### Completeness of the inventory

8. The inventory covers main source and sink categories for the period 1990–2007 and is complete in terms of years and geographic coverage, but many subcategories are reported as not occurring “NO” (e.g. wastewater handling) or included elsewhere (“IE”) (e.g. in the industrial processes and energy sectors). Belarus has reported potential emissions of fluorinated gases (F-gases) as not estimated (“NE”). Actual emissions of F-gases are reported only for electrical equipment (SF<sub>6</sub>) and refrigeration production (HFCs). In addition, the reporting of emissions from the LULUCF sector is not complete.

9. The following categories are reported as “NE”: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from navigation and residual fuel oil; activity data (AD) from natural gas, gas/diesel oil, liquefied petroleum gas (LPG), ethane in feedstock and non-energy use of fuels; fugitive CO<sub>2</sub> and CH<sub>4</sub> emissions from solid fuels (peat mining and briquettes production); fugitive CO<sub>2</sub> and CH<sub>4</sub> emissions from oil, natural gas and other sources, venting and flaring, oil and combined; CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from gasoline in aviation bunkers; CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from gasoline, gas/diesel oil, residual fuel oil, lubricants and coal in marine bunkers; CO<sub>2</sub> emissions from limestone and dolomite use; CO<sub>2</sub> emissions from soda ash production; CO<sub>2</sub> emissions from ferroalloys production; HFC and PFC emissions from consumption of halocarbons and SF<sub>6</sub>; CH<sub>4</sub> and N<sub>2</sub>O emissions from industrial wastewater handling; CH<sub>4</sub> emissions from domestic and commercial wastewater handling; CO<sub>2</sub> and N<sub>2</sub>O emissions from waste incineration; CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from land converted to forest land, cropland, settlements and wetlands; CO<sub>2</sub> emissions from grassland; and CH<sub>4</sub> and N<sub>2</sub>O emissions from wetlands.

10. During the review, in response to questions raised by the ERT, the Party provided estimates or explanations for the following categories: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O from residual fuel oil in navigation (see para. 43); reporting of feedstock and non-energy use of naphtha, lubricants, bitumen, natural gas, gas/diesel oil, LPG and ethane (see para. 37), fugitive emissions from venting and flaring of oil (see para. 47), CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from gasoline used in aviation bunkers and gasoline, gas/diesel oil, residual fuel oil, lubricants, coal used in marine bunkers (see para. 42), CO<sub>2</sub> emissions from ammonia (NH<sub>3</sub>) production (see para. 58), CO<sub>2</sub> emissions from lime production (see para. 59), CO<sub>2</sub> emissions from limestone and dolomite use (see para. 61), CO<sub>2</sub> emissions from soda ash production, CO<sub>2</sub> emissions from ferroalloys production, HFCs, PFCs emissions from consumption of halocarbons and SF<sub>6</sub> (see para. 56), HFCs, PFCs emissions from refrigeration and air conditioning equipment under consumption of halocarbons and SF<sub>6</sub> (see para. 51), N<sub>2</sub>O emissions from nitric acid production, CO<sub>2</sub> emissions from glass production (see para. 62), CH<sub>4</sub> emissions from enteric fermentation (see paras. 70 and 71), direct N<sub>2</sub>O emissions from soils (see para. 73), CH<sub>4</sub> and N<sub>2</sub>O emissions from waste disposal on

land (see para. 86), CH<sub>4</sub> emissions from industrial wastewater handling, domestic and commercial wastewater handling (see para. 88), and CO<sub>2</sub> and N<sub>2</sub>O emissions from waste incineration (see para. 91).

11. The ERT recommends that Belarus improve the completeness of its next annual submission, especially for those categories that are known to occur within the Party and for which methodologies are available in 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 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) to estimate emissions. The ERT encourages the Party to explore the approaches available in the relevant scientific literature and to estimate emissions for categories that do not have methodologies prescribed in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, with a view to enhancing further, to the extent possible, the completeness and accuracy of its inventory. The ERT also recommends that the Party, when reporting emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series and that the choice of methods and emission factors (EFs) are clearly explained in the NIR.

#### **D. Main findings**

12. The inventory is generally in line with the Revised 1996 IPCC Guidelines, 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 ERT noted the progress made since the last submissions but identified an urgent need for improvement of transparency, consistency, completeness of the inventory reporting and implementation of quality assurance/quality control (QA/QC). Emissions from most of the key categories were estimated using a tier 1 methodology and IPCC default EFs which is not in line with the IPCC good practice guidance.

13. The ERT noted the long list of subcategories reported as “NE” (see para. 99), some of which could be classified as key categories. In addition, particularly in the energy sector, subcategories were aggregated in such a way that the ERT could not assess whether all necessary categories had been included. This lack of transparency could lead to underestimations or overestimations of emissions from the energy sector or to double counting between the energy and industrial processes sectors.

14. Belarus’ inventory of the LULUCF sector is incomplete as many of the mandatory categories are not reported. The system of land-use representation is not yet sufficiently elaborated to provide adequate, consistent, complete and transparent information on the IPCC land-use categories, including land-use conversion. The ERT noted a potential overestimation of net removals within the sector.

15. The NIR and CRF tables lack transparency. Information related to the selection of methodologies, identification of EFs, assumptions for choosing parameters and sources of AD for the entire time-series, as well as documentation for the number of applied EFs and AD is patchy. The ERT noted several cases of inconsistency between the NIR and the CRF tables.

16. The ERT encourages Belarus to explore the possibility of structuring its reporting in its next annual submission in accordance with the annotated outline of the NIR, and the guidance contained therein, which can be found on the UNFCCC website.<sup>3</sup>

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<sup>3</sup><[http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/reporting\\_requirements/application/pdf/annotated\\_nir\\_outline.pdf](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf)>.

17. In the course of the review, the ERT formulated a number of recommendations relating to elements listed above, which are elaborated in the relevant sectoral chapters and in the conclusions and recommendations chapter.

## **E. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management**

### 1. Overview

18. The ERT concluded that the institutional, legal and procedural arrangements for inventory preparation functions are in place and that the national system continues to perform its required functions. However, the ERT noted that the data collection and management system, archiving system and QA/QC need to be further developed and that the ability of the national system to respond to questions raised during the review in a timely manner, particularly in the LULUCF sector, should be addressed by the Party.

19. The NIR reports on changes to the national system since the previous annual submission. The ERT acknowledges improvements in the legal framework in Belarus through the issuing of additional decrees supporting inventory performance; however, the NIR did not report on changes in the institutional framework. Also, the ERT noted that the information included refers mainly to inventory improvements and QA/QC implementation and not to changes in legal and institutional arrangements. The ERT recommends that Belarus include this information in its next annual submission.

### 2. Inventory planning

20. The NIR described the institutional arrangements for the preparation of the inventory. The Ministry of Natural Resources and Environmental Protection has overall responsibility for the national inventory, coordinates planning and provides resources. The Scientific Research Centre "Ecology" (hereinafter referred to as the SRC "Ecology") is responsible for the compilation of the inventory and preparation of information for international reporting. The National Committee on Statistics collects the AD and is the main data provider to SRC "Ecology". In addition, the National Committee on Statistics conducts surveys for data collection within other organizations, such as the state consortia for oil and chemistry (Beltopgas, Beltransgas), the state energy consortium and the state aviation committee. Other ministries, such as the Ministry of Industry, Ministry of Transport and Communications, Ministry of Public Health, Ministry of Agriculture and Food, Ministry of Finance and Ministry of Housing and Communal Services are also involved in the preparation of the inventory.

### 3. Inventory preparation

#### Key categories

21. Belarus has reported a key category tier 1 analysis, both level and trend assessment including and excluding LULUCF, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat<sup>4</sup> produced different results owing to different levels of aggregation of categories. The key category analysis was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the results of the key category

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<sup>4</sup> 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 IPCC good practice guidance for LULUCF. 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 or period. 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.



analysis presented in CRF table 7 are aggregated to a higher level making it not possible to assess whether the results are consistent with those presented in the NIR. The ERT recommends that Belarus harmonize the presentation of key category analyses in the CRF tables and the NIR or follow the aggregation of categories as proposed in the IPCC good practice guidance (table 7.1).

22. When comparing key categories in the 2008 and 2009 submissions, the ERT noted that CO<sub>2</sub> from NH<sub>3</sub> production, CO<sub>2</sub> from cropland remaining cropland and CO<sub>2</sub> from railways were identified as key categories in the 2008 submission but not in the 2009 submission.

23. Emissions from all categories were estimated mainly using a tier 1 methodology and IPCC default EFs. The ERT recommends that Belarus make efforts to apply higher tier methodologies for key categories such as CO<sub>2</sub> emissions from combustion of all fuels used in stationary sources, CO<sub>2</sub> emissions from cement production, CH<sub>4</sub> emissions from enteric fermentation, N<sub>2</sub>O emissions from agricultural soils, and CH<sub>4</sub> emissions from solid waste disposal on land, as required by the IPCC good practice guidance. The ERT notes that it is good practice to use a country-specific EF and higher tier methodology for the estimation of emissions from key categories. The ERT recommends that Belarus develop and use a country-specific EF and provide an explanation as to why the default EF suits its national circumstances for the key categories for which it continues to use the tier 1 method. The ERT also recommends that Belarus enhance its efforts to obtain the necessary AD, in particular for the estimation of CH<sub>4</sub> emissions from solid waste disposal on land.

#### Uncertainties

24. Belarus estimated uncertainties for all categories included in the inventory and provided the results in annex IV of its NIR. The Party used a quantitative approach following the IPCC tier 1 methodology, the same approach as in its 2007 submission. Many of the AD and EF uncertainties used in the analyses are based on expert judgement and/or IPCC default values. The combined uncertainty for 2007 (including LULUCF sectors) was estimated to be 24.9 per cent with a trend uncertainty of –10 per cent. The ERT noted that uncertainties for individual AD and EF are generally lower than those indicated in the IPCC good practice guidance; the ERT recommends that Belarus improve uncertainty analyses.

#### Recalculations and time-series consistency

25. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations have been undertaken and reported by Belarus for the time series 1990–2006. The effect of such recalculations on total national emissions is minor: total GHG emissions increased in 1990 by 1.68 per cent and in 2006 by 0.59 per cent. Explanatory information for these recalculations is not provided in either the NIR or in CRF table 8(b). The ERT recommends that Belarus include explanations for these recalculations in its next annual submission.

#### Verification and quality assurance/quality control approaches

26. Belarus provides information in the NIR on its QA/QC plan. The QA/QC plan was approved on 24 April 2009 by governmental decree No.8, which assigned responsibility for implementation of the plan to SRC “Ecology”. The plan considers implementation of general control mechanisms and specific procedures for different categories. Belarus plans for further improvements to be carried out in 2009. There is no information provided on if or how the QA/QC plan was implemented in practice. The ERT noted the improvements made and encourages Belarus to continue its effort and further elaborate sector- and category-specific procedures and to provide documentation on the quality checks performed in its next annual submissions.

## Transparency

27. The organization of the NIR, in general, follows the structure outlined in 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). However, some recommended sections of the guidelines are not provided, including chapter 10 on recalculations and improvements, annexes such as ‘CO<sub>2</sub> reference approach and comparison with sectoral approach and relevant information on the national energy balance’ or ‘Assessment of completeness and (potential) sources and sinks of GHG emissions and removals excluded’.

28. The ERT welcomes the improvements made since the last submission but considers that Belarus’ NIR is still not transparent enough because detailed information is lacking for all elements of the inventory. Information on methods, rationale behind the selection of AD and EFs, documentation of and references to parameters used in inventories is not sufficient for any sector. Many of the energy data are not reported owing to confidentiality, particularly for 1990. Explanations for emission trends are general and are not supported by quantitative information. Such limited information does not allow the ERT to assess underlying assumptions and rationale for the choice of methods and parameters or to properly evaluate the estimates presented. The ERT reiterates recommendations from previous reviews and strongly recommends that Belarus improve its description of methods and provide the rationale behind the selection of methodologies and EFs in its next annual submission.

### 4. Inventory management

29. According to its NIR, Belarus has an established centralized archiving system maintained by SRC “Ecology”. The Party reports that it regularly archives inventory information, such as submissions, spreadsheets for individual category calculations used for inventory compilation, references, comments and responses to the peer reviews. The documents are archived at the end of each reporting cycle. Based on the information provided, the ERT notes that the archiving system may still require further improvements, particularly in the management of data flow and QC and encourages Belarus to make such improvements to the system.

## **F. Follow-up to previous reviews**

30. The ERT noted some improvements had been made as a follow-up to previous reviews, the most significant of which is the development of a national QA/QC plan. Other improvements include the development of a legal framework for inventory preparation. The ERT noted limited improvements in transparency, completeness and accuracy of the reporting and that most of the recommendations raised during previous reviews seem not to have been implemented.

## **G. Areas for further improvement**

### 1. Identified by the Party

31. The Party indicated in the NIR that it intends to improve its inventory by:
- (a) Improving the elaboration and implementation of the QA/QC plan;
  - (b) Developing a system for collection of AD and EFs in order to improve estimates and close all reporting gaps, including measuring CH<sub>4</sub> generation from solid waste disposal on land;
  - (c) Increasing the level of detail in the information systems to enable calculation of emissions for the recommended CRF tables subcategories, including specifications of

solid waste composition by region and season and the differentiation/discrimination between managed and unmanaged landfill sites;

- (d) Developing country-specific EFs and inventory parameters for all sectors, including obtaining the data required for applying tier 2 methodology for solid waste disposal on land;

## 2. Identified by the expert review team

32. The ERT identifies the following cross-cutting issues for improvement:
- (a) Elaborate and implement a QA/QC plan for the entire GHG inventory and for each sector, with improved descriptions of the QA/QC and verification activities and procedures in specific sections of the sectoral chapters of the NIR, following the structure outlined in the UNFCCC reporting guidelines;
  - (b) Improve the completeness of the inventory in all sectors, prioritizing estimation of key categories such as ammonia production, fugitive emissions, limestone and dolomite use, emissions from LULUCF, wastewater handling and waste incineration;
  - (c) Ensure consistency between the NIR and CRF tables in accordance with the UNFCCC reporting guidelines;
  - (d) Enhance transparency of the inventory by including in the NIR sufficient information and explanations on the selection of methodologies, identification of EFs, assumptions for choosing parameters and sources of AD for all years from 1990, with improved descriptions of individual sectors, for example, waste management practices in the country;
  - (e) Report in the NIR and relevant CRF tables, including CRF table 8(b) tables detailed information on the recalculations performed;
  - (f) Use higher tier methods for key categories, where appropriate ;
  - (g) Devote particular attention, efforts, staff and resources to the improvement of land-use representation and land-use change identification systems as these elements are critical in determining the quality of the LULUCF inventory.

## **II. Energy**

### **A. Sector overview**

33. The energy sector is the main sector in the GHG inventory of Belarus. In 2007, emissions from the energy sector amounted to 55,945.96 CO<sub>2</sub> eq, or 54.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 45.3 per cent. Among the key drivers for this fall in emissions are the restructuring of the national economy towards a market economy; a decrease in the share of energy intensive industries in the gross domestic product; an increase in energy efficiency; a switch in fuel from residual oil and coal to natural gas; and more intensive use of fuel wood in households.

34. Within the sector, 54.5 per cent of the emissions were from energy industries, followed by 15.6 per cent from manufacturing industries and construction, 15.6 per cent from other sectors, 10.2 per cent from transport and 1.2 per cent from the category other. Fugitive emissions accounted for 2.9 per cent and came from oil and natural gas. The ERT noted that wood and peat are the main local energy resources. Natural gas is imported from the Russian Federation and a significant proportion is

transited through Belarus to neighbouring countries. Crude oil is also imported from the Russian Federation and processed in refineries; the volumes of produced fuels (gasoline, diesel and residual oil) that were not consumed in the country. A negligible amount of coal is combusted in Belarus. Reporting in the energy sector lacks transparency. No detailed energy consumption data are provided for the entire time series, but an energy balance in natural units is provided for 2007. The ERT reiterates the recommendation of the previous review that Belarus pay particular attention to the availability of detailed and complete energy balances for 1990–2008 in its next annual submission.

35. The ERT noted that most subcategories in the energy sector are not estimated as individual subcategories. The exceptions are emissions from public electricity and heat, transportation and other sectors. Petroleum refining and coal mining and handling and subcategories under manufacturing industries and construction are aggregated and reported under manufacturing industries and construction. The ERT recommends that Belarus disaggregate the emissions estimates by category following the IPCC good practice guidance and report these accordingly in its next annual submission.

36. Fugitive emissions from coal mining and handling and peat extraction, solid fuel transformation and oil venting and flaring, emissions from international navigation are reported as “NE”. The ERT recommends that Belarus estimate all occurring emissions and include them in its next annual submission.

37. The ERT noted that emissions from feedstock and non-energy use of naphtha, lubricants, bitumen are reported as “NO” without explanation in the NIR (that they do not actually occur). Emissions from feedstock and non-energy use of natural gas, gas/diesel oil, LPG and ethane are reported as “NE”. In response to questions raised by the ERT during the centralized review, Belarus noted that feedstocks and non-energy use of bituminous coal, peat, coke, natural gas, crude oil, LPG, and bitumen occur in Belarus and that relevant emission estimates will be presented in the next annual submission.

38. Belarus has provided specific discussion of its QA/QC and verification procedures for the energy sector in the relevant parts of the NIR as well as estimates of the uncertainties associated with the energy sector and categories, following the IPCC good practice guidance.

## **B. Reference and sectoral approaches**

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

39. CO<sub>2</sub> emissions from fuel combustion were calculated using both the reference and sectoral approaches. For the year 2007, there is a difference of 1.81 per cent in CO<sub>2</sub> emission estimates between the reference approach and the sectoral approach. The NIR provides some explanatory information for the difference between the two approaches across the time series.

40. The ERT noted that the production, import, export and stock change of oil are not provided in the reference approach for 2007, while data from the energy balance show an apparent consumption of oil in the country (21,365 kt oil). There are similar inconsistencies in the reporting of peat production and consumption and natural gas, where data provided for apparent consumption do not coincide with the data from the energy balance; unjustified positive volumes of stock change are reported for all years. The ERT recommends that Belarus use the energy balances available in the country to accurately report emissions under the reference and sectoral approaches in its next annual submission.

### **2. International bunker fuels**

41. Emissions from international marine bunkers are reported as “NE” for all years. The International Energy Agency provides the amounts of gas/diesel oil for the period 1990–2001 for domestic navigation and CRF tables provide consumption of gas/diesel oil for the years 2003 and

2005–2007. The NIR does not clarify whether international marine bunkers are included under domestic navigation. The ERT recommends that Belarus estimate emissions from marine bunkers and report them in its next annual submission.

42. The ERT noted that CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from gasoline used in aviation bunkers and gasoline, gas/diesel oil, residual fuel oil, lubricants, coal used in marine bunkers are reported as “NE”. In response to questions raised by the ERT during the centralized review, Belarus noted that gasoline is not consumed in international aviation and that the notation key “NE” will be replaced with the notation key “NO” and that relevant explanations will be added to the next annual submission. Belarus also noted that only gasoline and diesel oil are used by international navigation and that the relevant estimates will be reported in the next annual submission; for the remaining fuels the notation key “NE” will be replaced by the notation key “NO” in the next annual submission.

43. Further, the ERT noted that CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O from residual fuel oil in navigation are reported as “NE”. In response to a question raised by the ERT during the review, Belarus responded that residual oil is not consumed in navigation and that it intends to change the notation key “NE” to the notation key “NO” and provide appropriate explanations in the next annual submission.

### **C. Key categories**

#### Stationary combustion: all fuels – CO<sub>2</sub>

44. The methodology for calculating CO<sub>2</sub> emissions from solid fuel combustion is based on a formula for calculating the EF for coal. The EF for solid fuel is based on the net calorific value (NCV) and carbon content of dry fuel, while the IPCC default data are determined for coal without preliminary drying. From the NIR it is not clear whether the NCV reported applies to dry fuel or how the ‘average coefficient’ is used in the emission calculations. The ERT recommends that Belarus concentrate its efforts to better estimate and document country-specific calorific values of fuels and EFs for peat and peat briquettes, as well as for fuel wood, as these fuels contribute significantly to the country’s energy demand.

45. Natural gas accounts for more than 90 per cent of the total fuel used in the energy industries and for two thirds of the total fuel used in the other sectors. The ERT recommends that Belarus use a higher tier approach to estimate emissions from this key category or that it describe why the chosen approach suits its national circumstances. The ERT encourages Belarus to estimate the NCV and carbon content annually using data from the certificates for the chemical and calorific content of imported gas, issued by accredited laboratories, in order to improve the accuracy of reporting.

### **D. Non-key categories**

#### Oil and natural gas – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

46. The NIR provides no information on how fugitive emissions from natural gas transit, transmission, distribution and other leakage are estimated. The ERT encourages Belarus to include a description of methodology and data used in emission estimates. Belarus may wish to draw upon the experience of its neighbouring countries (e.g. the Russian Federation and Ukraine) in the emission estimates for similar gas transmission networks.

47. Emissions from venting and flaring of oil are reported as “NE”. Noting that Belarus is processing significant volumes of crude oil the ERT recommends that Belarus estimate CH<sub>4</sub> and CO<sub>2</sub> emissions from venting and flaring of oil systems in its next annual submission, in order to reduce gaps in the inventory. In response to questions raised by the ERT during the centralized review, Belarus noted

that AD data has been collected and that the relevant estimates are to be reported in the next annual submission.

### **III. Industrial processes and solvent and other product use**

#### **A. Sector overview**

48. In 2007, emissions from the industrial processes sector amounted to 3,220.13 Gg CO<sub>2</sub> eq, or 4.0 per cent of total GHG emissions. Between 1990 and 2007, emissions from the industrial processes sector increased by 43.0 per cent. The key drivers for this rise in emissions were an increase in cement production of 100.6 per cent and an increase in nitric acid production of 18.2 per cent, driven by economic growth. Within the industrial processes sector, 84.3 per cent of GHG emissions were from mineral products and 12.9 per cent were from chemical industry. Metal production contributed 1.8 per cent and 0.8 per cent came from consumption of halocarbons and SF<sub>6</sub>.

49. In 2007, emissions from the solvent and other product use sector amounted to 72.56 Gg CO<sub>2</sub> eq, or 0.09 per cent of total GHG emissions in Belarus. Emissions from this sector decreased by 2.5 per cent between 1990 and 2007. In the sector, Belarus has estimated only N<sub>2</sub>O emissions from use for anaesthesia and non-methane volatile organic compounds emissions from paint application, degreasing and dry cleaning, chemical products manufacture and processing. The remaining categories are reported as “NE” and “NO”.

50. In 2007, CO<sub>2</sub> was the largest contributor to GHG emissions from the sector, accounting for almost 84.7 per cent of sectoral emissions. The contributions of CH<sub>4</sub>, N<sub>2</sub>O, HFCs and SF<sub>6</sub> were 1.5, 12.8, 1.0 and 0.1 per cent, respectively. Most of the CO<sub>2</sub> emissions (71.1 per cent) came from cement production; lime production accounted for 25.2 per cent. CH<sub>4</sub> emissions mostly came from iron and steel production. N<sub>2</sub>O emissions were reported only from nitric acid production.

51. Belarus reported only actual HFC emissions from consumption of halocarbons and SF<sub>6</sub>: refrigeration and air conditioning equipment, and SF<sub>6</sub> emissions from electrical equipment. Other sources of HFC and PFC emissions from consumption of halocarbons are reported as “NE”. The NIR lists several planned improvements, including estimation of emissions from foam blowing and fire equipment, and collection of AD on export and import of halocarbons. In response to questions raised by the ERT during the centralized review, Belarus noted that only aggregated emissions from refrigeration and air conditioning equipment are currently available and that it plans to investigate the possibility of disaggregating emissions upon availability of resources. The ERT recommends that Belarus strengthen its efforts in collecting AD and estimating emissions in this category, including mobile sources.

52. Some notation keys seem to be incorrect and their use is not explained in the NIR. Belarus reported CO<sub>2</sub> emissions from pig iron and steel production as “IE” and ferroalloys production as “NE”; however, it is not clear whether pig iron and ferroalloys are produced in the country and consequently both should be reported using the notation key “NO”. The ERT strongly recommends that Belarus clarify all industrial activities in the country and make proper use of notation keys and documentation boxes in the CRF tables and that it provide an overview on these in the NIR of its next annual submission.

53. The NIR lacks transparency and some discrepancies were found in the CRF tables. For example, data are provided in the CRF tables without specifying the activity to which they relate. No discussion is provided on missing activities; the methodologies applied are poorly documented and no rationale is provided in the NIR for the selection of EFs. The ERT encourages Belarus to improve overall transparency of the inventory by including clear and concise information on methods, EFs and AD in its

NIR, as well as other additional information, in order to fully adhere to the requirements of the UNFCCC reporting guidelines.

54. The NIR provided only overall uncertainties for AD for the industrial processes sector. No further discussion of EFs uncertainty or sources of uncertainty is provided. The uncertainty values for industrial processes (5–10 per cent) are given, which are considered by the ERT to be low, as mostly tier 1 methodology and default EFs were applied in the estimation of emissions. The ERT recommends that Belarus estimate uncertainty more thoroughly and include further documentation on uncertainties in the industrial processes sectoral chapter of its NIR.

55. Following recommendations from previous reviews, Belarus recalculated emissions from mineral products (lime production, glass production and soda ash use), applying corrected EFs and correction factors. No specific explanations are provided in the NIR on these revisions. Recalculations resulted in an increase in emissions of 3.3 per cent in 1990 and of 0.24 per cent in 2006.

56. The ERT noted several categories where emissions are reported as “NE”. In response to questions raised by the ERT during the centralized review regarding estimation of CO<sub>2</sub> emissions from soda ash production, Belarus noted that relevant information has been requested from the National Committee on Statistics and, based on the feedback, appropriate estimates will be reported in the next annual submission; regarding CO<sub>2</sub> emissions from ferroalloys production, Belarus noted that a response to the information request from the relevant authorities is pending; regarding HFC and PFC emissions from consumption of halocarbons and SF<sub>6</sub>, Belarus noted that information on fire extinguishers and styrofoam production has been requested from the National Committee on Statistics. The ERT recommends that Belarus facilitate collection of data from the relevant institutions and report on emissions previously reported as “NE” in its next annual submission.

## **B. Key categories**

### Cement production – CO<sub>2</sub>

57. Belarus used the IPCC tier 2 methodology, clinker production volumes and the default IPCC value for calcium oxide (CaO) content by weight in clinker. There are three cement producing plants in Belarus. Belarus, based on the plant-specific data, intends to estimate country-specific CaO and magnesium oxide content in clinker. The EF used (0.5071 t/t) does not take into account the cement kiln dust (CKD) correction factor (the default value is 1.02). Given that cement production is a key category in Belarus, the ERT encourages Belarus to strengthen its efforts in collecting plant-specific AD and EFs and to report in its next annual submission recalculated CO<sub>2</sub> emissions for the complete time series.

## **C. Non-key categories**

### 1. Ammonia production – CO<sub>2</sub>

58. In the 2007 submission, CO<sub>2</sub> emissions from NH<sub>3</sub> production are reported as “NO”, with the explanation that all CO<sub>2</sub> emissions are recovered and used for urea production. In 2006, the category appeared to be a key category and Belarus estimated CO<sub>2</sub> emissions from NH<sub>3</sub> production following the IPCC tier 1b approach. According to the Revised 1996 IPCC Guidelines, as this carbon will be stored only for a short time, no adjustment should be made for intermediate binding of CO<sub>2</sub> in downstream manufacturing processes and products. In response to questions raised by the ERT during the centralized review, Belarus noted that recalculations have been made for the entire time series and that recalculated estimates will be reported in its next annual submission. The ERT recommends that Belarus estimate CO<sub>2</sub> emissions from NH<sub>3</sub> production following the most accurate methodology (tier 1a), based on natural gas input and applying plant-specific EFs based on the carbon content in natural gas and that the Party report these emissions for the entire time series.

## 2. Lime production – CO<sub>2</sub>

59. AD and emissions for lime production are reported, whereas AD of dolomite lime production is reported as not applicable (“NA”) and emissions from dolomite lime production as “NE”. It is not clear from the NIR which type of lime is produced in Belarus, whether AD were disaggregated based on IPCC good practice guidance recommendations, or which EFs were used to estimate emissions from lime production. The ERT noted that improvements are planned in the category.

60. In response to questions raised by the ERT during the centralized review, Belarus noted that it has separated CO<sub>2</sub> emissions from quick lime and those from dolomitic lime following the provisions of the Revised 1996 IPCC Guidelines, recalculated emissions for the entire time-series and intends to report these in its next annual submission. The ERT welcomed this development and reiterates the recommendation from the previous review that Belarus should estimate CO<sub>2</sub> emissions from dolomite lime production and provide an overview of the industry and methodological approaches used.

## 3. Limestone and dolomite use – CO<sub>2</sub>

61. Belarus reported CO<sub>2</sub> emissions from limestone and dolomite use as “NE”. To some extent emissions from this category are reported under other categories (e.g. limestone use for liming is reported under LULUCF, and some limestone and dolomite use is reported under cement and lime production). However, the remaining use of limestone and dolomite is “NE”. In response to questions raised during the ERT the centralized review, Belarus noted that relevant information has been requested from the National Committee on Statistics and, based on the feedback received, appropriate estimates will be reported in the next annual submission. The ERT recommends that Belarus perform a limestone balance check for the whole time series and estimate CO<sub>2</sub> emissions applying the appropriate EF, taking account of limestone and dolomite purity to avoid underestimation.

## 4. Glass production – CO<sub>2</sub>

62. Belarus estimated CO<sub>2</sub> emissions from container glass production, but no emissions are reported for flat glass production although AD does exist in the national statistics. In response to questions raised by the ERT during the centralized review, Belarus noted that CO<sub>2</sub> emissions from glass will be estimated and reported once the response to the relevant information request is received from the institution in charge as mentioned in paragraph 61 above. The ERT reiterates the recommendation from the previous review that Belarus should estimate emissions from flat glass using the conversion factor for flat glass (1 m<sup>2</sup> weighs 5 kg) in its next annual submission.

## 5. Nitric acid production – N<sub>2</sub>O

63. The implied emission factor (IEF) for N<sub>2</sub>O emissions from nitric acid production (0.005 t/t) is within the default range for plants equipped with non-selective catalytic reduction technology (2–9 kg N<sub>2</sub>O per tonne of nitric acid produced). According to the Revised 1996 IPCC Guidelines, if no specific measurements are available, the highest value in the appropriate range should be used. In response to questions raised during by the ERT during the centralized review, Belarus noted that a request for information has been sent to the single producer of nitric acid in Belarus and that the answer is pending. Upon availability of the answer, the possibility to revise EFs will be considered. The ERT reiterates the recommendation from the previous review that Belarus should provide the rationale behind the selection of the EF and should improve transparency of the NIR by including additional information on the concentration of nitric acid produced and on plant-specific technology.



## IV. Agriculture

### A. Sector overview

64. In 2007, emissions from the agriculture sector amounted to 15,301.79 Gg CO<sub>2</sub> eq, or 19.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 30.4 per cent. The key driver for the fall in emissions is a decrease in agricultural production in the country, including a decline in livestock populations, a reduction in cropland area and a decrease in the application of nitrogen fertilizers. Within the sector, 54.2 per cent of the emissions were from agricultural soils, followed by 40.6 per cent from enteric fermentation and 5.1 per cent from manure management. The remaining 0.1 per cent was from field burning of agricultural residues. Rice cultivation and savannah burning do not occur in Belarus.

65. The reporting for the agriculture sector is complete in terms of years and categories. The transparency of the information provided in the NIR has improved compared with previous annual submissions; however, it still lacks a detail description of the assumptions used to develop national data on the following: the share of manure management systems in Belarus; the area of histosols; and the percentage of residues burned on fields. The AD and conversion factors used in estimating crop residue left on fields are not fully provided or explained in the NIR. The general methodologies used in the collection of statistical data for agriculture are not described. The ERT reiterates the recommendations from the previous review that Belarus should provide all background information on national parameters and report on all AD and EFs used in the inventory.

66. The ERT noted some inconsistencies between the NIR and the CRF tables (e.g. population of non-dairy cattle in table 6.6 of the NIR and CRF table 4.A), as well as between information provided in different sections of the NIR (e.g. table 6.4 and appendix I). The fraction of nitrogen excreted on pastures as reported in CRF table 4.D (0.02) does not correspond to the real proportion of manure left on fields (0.13 in 2007). This inconsistency was also noted during the previous review. The ERT recommends that Belarus conduct quality checks for the agriculture inventory and that it correct the inconsistencies in reporting.

67. Tier 1 methodology was applied for most key categories, except national EFs for enteric fermentation of dairy cattle. The ERT recommends that Belarus apply higher tier methodologies for key categories and provide an explanation as to why the tier 1 method suits its national circumstances for the key categories for which it continues to use tier 1 method.

68. The uncertainty analysis for agriculture is conducted in accordance with the tier 1 methodology described in the IPCC good practice guidance. However, the information on uncertainty for individual AD and EFs is not provided. The total uncertainty for EFs in agriculture is reported to be around 50 per cent, which seems too low for the default EFs when using tier 1 methodology. The ERT recommends that Belarus check uncertainty ranges for all parameters and provide detailed descriptions of the uncertainty analysis in its next annual submission.

69. In its 2009 submission, Belarus recalculated emissions from enteric fermentation of dairy cattle, owing to the development of national EFs, and corrected errors in all categories in the agriculture sector. The recalculations resulted in an increase in estimated emissions from agriculture of 8.0 per cent in 1990 and 13.1 per cent in 2006. The recalculations improved time-series consistency and accuracy of the inventory.

## **B. Key categories**

### **1. Enteric fermentation – CH<sub>4</sub>**

70. It is not clear from the NIR how annual average AD on livestock are derived. In response to questions raised by the ERT during the review, Belarus noted that emissions estimates are prepared based on the official livestock data provided by the National Statistical Committee. The livestock population data on farms (including private households in the countryside) are collected annually at the beginning of each reported year. The livestock population data on agricultural organizations are collected monthly. Thus Belarus considers that the seasonal changes of the livestock population are not relevant but expressed its intention to consider the possibility to use monthly data available for farms that have more than 100 heads of animals. Noting Belarus' response, the ERT recommends that Belarus revise the data for livestock populations using the annual average as required in the IPCC good practice guidance in its next annual submission, as the AD currently used could lead to an underestimate of CH<sub>4</sub> emissions, particularly from fattening animals.

71. The ERT noted that mules and asses are not included in the inventory, although the Food and Agriculture Organization of the United Nations (FAO), reports the population of mules and asses of 20.8 thousand heads in 2006. In response to questions raised by the ERT during the centralized review, Belarus noted that according to the national statistical data there is no practice of mules and asses breeding and there are no official national data for mules and asses collected in Belarus. The ERT encourages Belarus to investigate if the activity is not occurring in the country and if it is occurring, include all existing livestock in its calculations in order to avoid underestimation.

### **2. Direct soil emissions – N<sub>2</sub>O**

72. The ERT noted that the area of histosols varies across the years 2002–2004 and is constant for most other years. Explanations for this are not provided in the NIR. The ERT reiterates the recommendation of the previous review that Belarus should correct inconsistencies in the time series or provide relevant explanations in its next NIR.

73. The ERT noted that the estimate for crop residues left on fields does not include a number of crops produced in Belarus (e.g. flax, vegetables, buckwheat, millet, legumes, and one-year and perennial grasses), therefore causing an underestimation of N<sub>2</sub>O emissions for the entire time series. In response to questions raised by the ERT during the centralized review, Belarus noted that data on all types of crops produced in Belarus were collected and that direct N<sub>2</sub>O emissions from soils will be recalculated and included in the next annual submission. The ERT encourages the intention of the Party.

## **V. Land use, land-use change and forestry**

### **A. Sector overview**

74. In 2007, net removals from the LULUCF sector amounted to 24 941.85 Gg CO<sub>2</sub> eq and offset 31.2 per cent of the total GHG emissions of the country. Since the base year, net removals have increased by 13.2 per cent. The key driver for this increase is the increase in removals in forest land and a decrease in emissions from cropland. All removals in the sector are due to the carbon gains in forest land remaining forest land. The emissions are mostly generated from agricultural lime application in cropland, which represents 86.1 per cent of the total emissions from the sector. The remaining emissions are attributed to peat extraction in wetlands.

75. Belarus' inventory of the LULUCF sector remains incomplete as many of the mandatory categories are not reported. The system of land-use representation is not yet sufficiently elaborated to provide adequate, consistent, complete and transparent information on the IPCC land-use categories,

including land-use conversion. The ERT strongly recommends that Belarus develop its national system of land-use representation and land-use change identification following the IPCC good practice guidance for LULUCF and the recommendations from previous reviews in order to ensure that all mandatory emission categories are estimated and that they are transparently reported in its next annual submission.

## **B. Key categories**

### **1. Forest land remaining forest land – CO<sub>2</sub>**

76. Belarus applied a tier 1 IPCC default method to estimate biomass carbon stock change in living biomass. It used AD aggregated at country level and allocated forest land into three forest types. Belarus seems to have applied incorrect (higher) biomass expansion factors, which may contribute to a significant overestimation of removals in forest land remaining forest land. This conclusion is also supported by a comparative analysis of the data reported in the CRF tables and that from FAO, which shows a significantly lower build-up of carbon stock in living biomass in the period 1990–2005. The ERT strongly recommends that Belarus thoroughly revise its estimation approach and apply more disaggregated AD and national species-specific conversion and expansion biomass factors, qualifying for a tier 2 approach for this essential key category, in its next annual submission.

### **2. Cropland remaining cropland – CO<sub>2</sub>**

77. Only emissions from agricultural lime application are reported in this category, while all other components are reported as “NE”. Emissions from this category decreased by 60.0 per cent since the base year, reflecting the actual amounts of lime application on cropland. The ERT encourages Belarus to provide further explanation on the observed trend and recommends that the Party estimate emissions from other categories under cropland.

## **C. Non-key categories**

### **1. Wetland remaining wetland – CO<sub>2</sub> and N<sub>2</sub>O**

78. Belarus estimated emissions of CO<sub>2</sub> and N<sub>2</sub>O from peat extraction on wetland remaining wetland using a tier 1 approach in accordance with the IPCC good practice guidance for LULUCF. The CRF table reports only CO<sub>2</sub> emissions from wetlands (148.03 Gg CO<sub>2</sub>); CH<sub>4</sub> and N<sub>2</sub>O emissions from this voluntary category are reported as “NE” and “NO” for 2007. The NIR additionally reports 0.002 Gg N<sub>2</sub>O emissions from wetland in 2007. Emissions from wetland remaining wetland in 2007 represents a decrease of 80.6 per cent since the base year. This decrease is due to a reduced area of peat extraction in the country.

### **2. Land converted to forest land – CO<sub>2</sub> and N<sub>2</sub>O**

79. Belarus estimated emissions from wetland converted to forest land following draining. Emissions of CO<sub>2</sub> and N<sub>2</sub>O have been increasing since 1990 and in 2007 reached 4,725.00 Gg and 0.033 Gg, respectively. This represents an increase of 415 per cent since the base year. Belarus did not include these estimates in the CRF tables, only in the NIR, and noted its intention to report on them in its next annual submission. The ERT encourages Belarus to provide transparent information in this category and to include the estimates in its next annual submission.

### **3. Biomass burning – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O**

80. The estimation of biomass is provided for in the category forest land remaining forest land. The ERT noted that IEFs of emissions from biomass burning fluctuate and that the AD data reported in the CRF tables are apparently incorrect (values are expressed in kg dry matter, but for this unit the values seems to be too low). Owing to the lack of a description of the AD and methodology used, the ERT was

unable to assess whether these estimates have been made in accordance with the IPCC good practice guidance for LULUCF. The ERT strongly recommends that Belarus revise these emission estimates and provide additional information on the methods and coefficients applied in its next annual submission.

## **VI. Waste**

### **A. Sector overview**

81. In 2007, emissions from the waste sector amounted to 5,469.3 Gg CO<sub>2</sub> eq, or 6.8 per cent of total GHG emissions. Emissions from the sector increased by 112.4 per cent from 1990 to 2007. The key driver for this rise is CH<sub>4</sub> emissions from solid waste disposal on land, owing to changes in the composition of waste and increased waste generation because of economic growth. Emissions of CH<sub>4</sub> from solid waste disposal on land have increased by 123.1 per cent in the period 1990–2007. In 2007, as reported in the 2009 submission, these emissions accounted for 95.8 per cent of the total sectoral emissions. The remaining 4.2 per cent were N<sub>2</sub>O emissions from human sewage. The ERT notes that no significant improvements have been made to the 2009 submissions since the previous submission.

82. GHG emissions from waste reported by the Party include CH<sub>4</sub> emissions from solid waste disposal on land and N<sub>2</sub>O emissions from human sewage. Other categories are “NE” or do not occur in Belarus. CH<sub>4</sub> emissions from wastewater handling are reported as “NE”; CH<sub>4</sub> emissions from managed solid waste disposal on land are reported as “NO”, implying that all landfills are unmanaged; and all GHG emissions from waste incineration are reported as “NO”, although the NIR reports on some industrial plants that are incinerating waste. The ERT recommends that Belarus enhance its efforts to estimate those emissions not currently estimated in its next annual submission.

83. The NIR provides descriptions of the methodology, AD and EFs applied, as well as the necessary information on and calculations for the parameters for the category solid waste disposal on land; the same information for N<sub>2</sub>O from human sewage is not provided. The use of notation key “NO” for waste incineration is not explained in the NIR. The Party is recommended to provide this information and an explanation for the use of all notation keys in its next annual submission.

84. During the previous review, abrupt fluctuations in CH<sub>4</sub> emission estimates from solid waste disposal on land were noted for the years 1994–1996 and 2002–2003; the Party was encouraged to specify EFs and ensure consistency across the time-series. However, no recalculations have been performed, although country-specific EFs were calculated. During the review, Belarus explained that experiments will be conducted to prove these EFs before their application. The NIR provides no explanation for further inconsistencies that were identified by the previous review. The ERT recommends that Belarus perform the necessary experiments, recalculate the data with the new parameters, and ensure consistency across the time series in its next annual submission.

85. The data verification procedures have been continued and general QA/QC procedures have been performed in the sector. Category-specific QA/QC has been carried out for the key category CH<sub>4</sub> emissions from solid waste disposal on land. The ERT reiterates the recommendation of the previous review that Belarus should elaborate a sector-specific QA/QC plan for the waste sector to be presented in its next annual submission.

### **B. Key categories**

#### Solid waste disposal on land – CH<sub>4</sub>

86. Belarus reports all CH<sub>4</sub> emissions under unmanaged solid waste disposal on land. However, as there are controlled landfills in Belarus, the ERT recommends that the Party reconsider the classification of landfills and specify managed and unmanaged landfills according to the IPCC good practice guidance

and that it use country-specific data. It is not clear if the term ‘zahoronenie’ (meaning ‘covering with land’ in Russian), used in the NIR, refers to the managing practice or to the disposal of solid waste on land. The ERT encourages Belarus to use the term ‘svalka’ (which means ‘disposal’ according to the official Russian version of the Revised 1996 IPCC Guidelines), where appropriate, in order to avoid misunderstanding.

87. The specification of the reporting of the composition of municipal solid waste is not complete as the portion of sludge from wastewater disposed of in landfills, as reported in the NIR, is not considered in the calculation of country-specific EFs and thus is not included in the emission estimates from this category. The ERT strongly recommends that Belarus include this portion of sludge in the AD and recalculate its EFs according to the Revised 1996 IPCC Guidelines, finalize the approval of its country-specific parameters, and recalculate the entire time series accordingly in order to ensure time-series consistency.

### **C. Non-key categories**

#### **1. Wastewater handling – CH<sub>4</sub> and N<sub>2</sub>O**

88. CH<sub>4</sub> emissions from industrial, and domestic and commercial wastewater handling are not estimated. The NIR explains that industrial, and domestic and commercial wastewater in the country is mainly treated biologically under aerobic conditions resulting in practically no CH<sub>4</sub> emissions. This implies that there are plants equipped with facilities for anaerobic wastewater treatment. The ERT recommends that Belarus use all available statistical data and results from the research in the country to assess the share of anaerobic wastewater treatment in Belarus, and report CH<sub>4</sub> emissions from industrial, and domestic and commercial wastewater handling accordingly in its next annual submission.

89. The NIR reports that sludge from wastewater treatment is disposed at the solid waste disposal sites. In response to question raised by the ERT during the review as regards of treatment and disposal of sludge from wastewater handling, Belarus noted its intention to estimate these CH<sub>4</sub> emissions and to report them under solid waste disposal on land in its next annual submission.

90. The estimate for N<sub>2</sub>O emissions from human sewage is made according to the recommended IPCC methodology. The country-specific parameters are taken from official statistical sources. The ERT noted that protein consumption fluctuated throughout the years 1990–2007. The ERT recommends that Belarus verify this parameter and revise it, if necessary, in its next annual submission.

#### **2. Waste incineration – CO<sub>2</sub> and N<sub>2</sub>O**

91. AD and corresponding emissions are reported as “NO” in the CRF tables, although the NIR reports that some industrial plants are incinerating waste. In response to questions raised by the ERT during the centralized review, Belarus noted its intention to use “NE” instead of “NO” for reporting of these emissions. The ERT recommends that the Party describe the state of waste incineration in the country and estimate GHG emissions from this category in its next annual submission.

## **VII. Conclusions and recommendations**

92. Belarus submitted its CRF tables for the period 1990–2007 on 15 May 2009 and its NIR on 19 May 2009. The Party indicated that the 2009 annual submission is its voluntary submission under the Kyoto Protocol. The annual submission also contains some supplementary information, provided on a voluntary basis, required under Article 7, paragraph 1, of the Kyoto Protocol, namely changes to the national system and changes to the national registry. This is in line with decision 15/CMP.1 taken that Belarus has not yet a quantified emissions reduction target.

93. The ERT concludes that the inventory submission of Belarus has been prepared and reported partly in accordance with the UNFCCC reporting guidelines, Revised 1996 IPCC Guidelines, IPCC good practice guidance and IPCC good practice guidance for LULUCF. The CRF tables and the NIR are complete in terms of geographical coverage, years, sectors and gases; however, the ERT noted that a number of subcategories are incorrectly reported as “NE”. In addition, many of the mandatory categories in the LULUCF sector are not reported. The system for land-use representation is yet to be implemented. CRF table 8(b) to be used for explaining recalculations is not filled in. Several categories are reported as “IE” without sufficient explanation on where and how they were included. The NIR generally lacks explanations about the methodologies used, rationale behind the choice of methods and descriptions of emission trends at category level. The majority of key categories are estimated using a tier 1 approach but there is no explanation on whether this is the most suitable approach for Belarus’ national circumstances. Very little improvement has been noted since the previous submission.

94. The ERT recommends that Belarus ensure, to the extent possible, the inclusion in its next annual submission of emissions for categories currently reported as “NE” and for which methods are provided in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance. If emissions for a given category cannot be estimated, the Party should provide sufficient explanation in the NIR as to why such an estimate cannot be made.

95. The national system continues to perform its required functions. The significant improvement of the national system since the previous submission is due to the approval of the QA/QC plan. However, the ERT noted that the data collection and management system, and the QA/QC procedures need further development. Also, the ability of the national system to respond to questions raised during the review in a timely manner should be further enhanced, particularly in the LULUCF sector.

96. In the course of the review, the ERT formulated a number of recommendations<sup>5</sup> relating to the performance of the national system and the completeness and transparency of Belarus’ annual submission. The key recommendations are that Belarus should:

- (a) Consequently implement the national QA/QC plan and provide detailed information on QA/QC procedures and their implementation. Improve descriptions of QA/QC and verification activities and procedures for individual sectors in the NIR, following the structure outlined in the UNFCCC reporting guidelines;
- (b) Use country-specific EFs and higher tier methods for key categories, and explain why the default EFs suit Belarus’ national circumstances for the key categories for which the tier 1 methods continue to be used;
- (c) Improve AD and EFs collection system in order to enhance the quality of the emission estimates. Particular attention should be given to the availability and use of detailed and complete energy balances; and the improvement of land-use representation and land-use change identification systems;
- (d) Improve the completeness of the inventory in all sectors. Belarus may wish to focus on the categories currently not estimated and on emission categories where potential underestimations exist, such as: CO<sub>2</sub> emissions from limestone and dolomite use; CO<sub>2</sub> from NH<sub>3</sub> production; N<sub>2</sub>O from nitric acid production; CO<sub>2</sub> from glass production; CH<sub>4</sub> from enteric fermentation; and CH<sub>4</sub> from solid waste disposal on land;
- (e) Improve the transparency of the inventory by: including in the NIR additional information and explanations on the selection of methodologies, identification of EFs,

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<sup>5</sup> For a complete list of recommendations, the relevant chapters of this report should be consulted.

assumptions for choosing parameters and sources of AD; providing information on recalculations in both the NIR and the CRF tables; and providing sufficient explanations of trends and the drivers behind them;

- (f) The ERT encourages Belarus to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, which can be found on the UNFCCC website.

## Annex I

### **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/lulucf/gp/lulucf.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 Belarus 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/blr.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <<http://unfccc.int/resource/webdocs/sai/2009.pdf>>.

FCCC/ARR/2008/BLR. Report of the individual review of the greenhouse gas inventory of Belarus submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/blr.pdf>>.

UNFCCC. Standard independent assessment report, Parts I and II. Unpublished document.

#### **B. Additional information provided by the Party**

Responses to questions during the review were received from Mr. Denis Rudov (National GHG Inventory Compiler, Department of International Conventions and Agreements, SRC “Ecology”, including additional material on the methodology and assumptions used.



Annex II**Acronyms and abbreviations**

AD	activity data	IE	included elsewhere
CH <sub>4</sub>	methane	IEF	implied emission factor
CO <sub>2</sub>	carbon dioxide	IPCC	Intergovernmental Panel on Climate Change
CO <sub>2</sub> eq	carbon dioxide equivalent	kg	kilogram (1 kg = 1 thousand grams)
CaO	calcium oxide	LULUCF	land use, land-use change and forestry
CKD	cement kiln dust	LPG	liquefied petroleum gas
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	NA	not applicable
CRF	common reporting format	NCV	net calorific value
EF	emission factor	NE	not estimated
ERT	expert review team	NH <sub>3</sub>	ammonia
FAO	Food and Agriculture Organization of the United Nations	NIR	national inventory report
F-gas	fluorinated gas	NO	not occurring
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF	PFCs	perfluorocarbons
HFCs	hydrofluorocarbons	QA/QC	quality assurance/quality control
		SF <sub>6</sub>	sulphur hexafluoride
		UNFCCC	United Nations Framework Convention on Climate Change

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