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Report of the individual review of the greenhouse gas inventories of Belarus submitted in 2006*

* In the symbol for this document, 2006 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Executive summary

1. This report covers the in-country review of the 2006 greenhouse gas (GHG) inventory submission of Belarus, coordinated by the UNFCCC secretariat, in accordance with decision 19/CP.8. The review took place from 13 to 18 October 2008 in Minsk, Belarus, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Marius Țăranu (Moldova); energy – Ms. Kristien Aernouts (Belgium); industrial processes – Mr. Țăranu; agriculture – Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Mr. Vladimir Korotkov (Russian Federation); and waste – Ms. Violeta Hristova (Bulgaria). Ms. Natalya Parasyuk (Ukraine) and Ms. Dong were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the UNFCCC "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention", 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.

3. In 1990, the main GHG in Belarus was carbon dioxide (CO_2), accounting for 80.0 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (11.9 per cent) and nitrous oxide (N_2O) (8.1 per cent). Emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) (hereinafter referred to as F-gases) are reported as "not applicable" ("NA"), "not estimated" ("NE") and "not occurring" ("NO") for 1990 in Belarus' common reporting format (CRF) tables. The energy sector accounted for 80.2 per cent of the total GHG emissions, agriculture for 16.0 per cent, waste for 2.0 per cent, industrial processes for 1.8 per cent) and solvent and other product use for 0.1 per cent.

4. Total GHG emissions amounted to 127,361.00 Gg CO_2 eq in 1990 (base year[2]) and decreased by 41.6 per cent between 1990 and 2004. Emissions of the main GHGs showed a decreasing trend since 1990: CO_2 by 46.1 per cent, N_2O by 34.7 per cent and CH_4 by 16.4 per cent. The waste sector showed the largest increase in emissions, 73.3 per cent (the key driver for the rise in emissions, in particular since 1995, was an increase in the generation of municipal solid wastes), followed by the solvent and other product use sector, 8.7 per cent (the key driver for the rise was an increase in use of N_2O for anaesthesia), and the industrial processes sector, 7.6 per cent (the key driver for the rise was the increase of some industrial outputs, for example, electric furnace steel production, cement production and nitric acid production). Emissions from the energy sector decreased by 46.1 per cent between 1990 and 2004 (due to structural changes in the economy, for example: an increase in the share of less energy-consuming sectors, such as services and trade; the active introduction of energy-saving technologies in almost all branches of the economy; a transition from coal and residual fuel oil to natural gas; and a more intense use of biomass in the municipal services and industrial areas). Emissions from the agriculture sector decreased by 39.5 per cent (the key driver for the fall in emissions is a drop in animal population and nitrogen fertilizer application). Removals in the LULUCF sector increased by 5.2 per cent (the key driver is the increase in removals in forest land and the decrease in emissions from cropland). The drivers for the above trends are generally poorly documented in the national inventory report (NIR). The emission trends for different gases and sectors are analysed in more detail in the relevant sections of this report.

5. The Ministry of Natural Resources and Environmental Protection (MoNREP), as the focal point for the UNFCCC, has the overall responsibility for the organization and coordination of the inventory preparation process and also oversees the annual inventory submission to the UNFCCC secretariat,

[1] In this report the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] Base year refers to the base year under the Convention.

whereas the Belarusian Research Centre "Ecology" (hereinafter referred as the BelRC "Ecology") has overall responsibility for the planning, preparation and management of the national inventory. The National Committee on Statistics (formerly the Ministry of Statistics and Analysis) and many other institutions (e.g. Ministry of Energy, Ministry of Transport and Communications, Ministry of Industry, Ministry of Housing and Communal Services, etc.) collaborate with the BelRC "Ecology" in the preparation process, mainly by providing activity data (AD).

6. The institutional framework for preparation of the inventory still needs to be enhanced in Belarus in order to maintain a sustainable inventory preparation. In this respect, Belarus may consider:

(a) Increasing the number of qualified staff in the BelRC "Ecology";

(b) Providing enough financial resources and wide support for the inventory team in order to ensure a sustainable compilation of inventories in accordance with the UNFCCC reporting requirements;

(c) Ensuring participation in the inventory preparation of highly qualified experts and institutions available in Belarus and using their recommendations in order to improve estimates of emissions and removals at sectoral and national levels;

(d) Formalizing and strengthening current procedures for the official consideration and approval of the inventory by MoNREP;

(e) Developing a solid system for collecting AD and emission factors (EFs) with a view to improving estimates and closing all gaps, including with respect to categories not yet covered;

(f) Improving, completing and enhancing the organization of the archive and paper-trail information following good practices and international standards for records;

(g) Developing and implementing a national quality assurance/quality control (QA/QC) plan that involves all institutions that participate in the inventory preparation.

7. 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 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).

8. The expert review team (ERT) noted that Belarus has, in its 2006 inventory submission, made substantial improvements since its 2005 inventory submission. The NIR has been extended to include more information on: legal and institutional arrangements and data-flow structure for the inventory preparation; references and sources of information for the AD, methodologies and EFs used; QA/QC and verification activities performed; and anticipated future improvements. Also, Belarus provided full CRF tables from 1990 to the latest year, and the new LULUCF reporting tables have been used as well. However, although the NIR has been expanded, it is not yet fully transparent. No additional information was included in the NIR with regard to explanations on the selection of methodologies, identification of EFs used, assumptions on parameters used, information on AD used for all years from 1990 onwards, the issue of AD confidentiality (e.g. energy balance for 1990), and the rationale for and impact of the recalculations performed.

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

Table 1. Greenhouse gas emissions by gas, 1990–2004

Greenhouse gas emissions	Gg CO_2 eq								Change base year–2004 (%)
	Base year	1990	1995	2000	2001	2002	2003	2004	
CO_2	101 946.79	101 946.79	56 233.42	51 910.88	50 987.98	51 231.29	51 396.28	54 919.64	–46.1
CH_4	15 125.64	15 125.64	11 725.38	11 484.01	11 300.62	11 250.45	12 135.13	12 648.50	–16.4
N_2O	10 298.86	10 298.86	4 991.87	6 408.55	5 895.25	5 690.63	6 218.28	6 727.09	–34.7
HFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	10.25	7.52	NA
PFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA
SF_6	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	74.09	74.09	NA

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

Table 2. Greenhouse gas emissions by sector, 1990–2004

Sector	Gg CO_2 eq								Change base year–2004 (%)
	Base year	1990	1995	2000	2001	2002	2003	2004	
Energy	102 097.70	102 097.70	56 962.37	52 470.90	51 603.66	51 649.35	51 638.30	55 078.92	–46.1
Industrial processes	2 249.29	2 249.29	1 206.43	1 673.25	1 646.07	1 899.33	2 179.28	2 421.31	7.6
Solvent and other product use	74.40	74.40	62.33	76.04	83.36	80.66	79.30	80.91	8.7
Agriculture	20 364.89	20 364.89	12 569.04	12 612.70	11 837.58	11 423.56	11 850.32	12 320.92	–39.5
LULUCF	–11 307.18	–11 307.18	–15 429.26	–14 126.24	–14 405.89	–13 297.83	–11 985.32	–11 900.32	5.2
Waste	2 574.73	2 574.73	2 137.64	2 955.57	3 000.88	3 092.44	4 068.05	4 461.95	73.3
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	**116 053.82**	**116 053.82**	**57 508.55**	**55 662.22**	**53 765.66**	**54 847.51**	**57 829.93**	**62 463.69**	**–46.2**
Total (without LULUCF)	**127 361.00**	**127 361.00**	**72 937.82**	**69 788.46**	**68 171.55**	**68 145.34**	**69 815.25**	**74 364.01**	**–41.6**

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

10. The inventory covers almost all source and sink categories for the period 1990–2004 and it is complete in terms of years and geographical coverage. However, Belarus did not provide CRF table 8(a) (recalculation – recalculated data) for 1991–2000 (as described in paragraph 23), CRF table 8(b) (recalculation – explanatory data) for the complete time series, or table 9(b) (completeness) for the complete time series. In 1990, Belarus has not estimated actual and potential emissions of F-gases, and in the latest reported years, only some actual emissions from the category 2.F, consumption of halocarbons and SF_6, have been estimated. Some categories were reported as "NE" (as described in paragraph 19). In some cases the notation keys were not applied consistently (as described in paragraph 20).

11. Belarus has reported a key category tier 1 analysis, both level and trend assessment. Belarus has not included the LULUCF sector in its key category analysis, which is not in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

12. Belarus has carried out a tier 1 uncertainty analysis as part of its 2006 submission; however, the documentation in the NIR regarding the analysis is limited. The uncertainty analysis is, to a great extent, based on the default uncertainties included in the IPCC good practice guidance and on expert judgment. The ERT considers many of the uncertainty values of the EFs used to be low (see paragraph 27).

13. A formal QA/QC plan in accordance with the IPCC good practice guidance is not yet available. The documentation on QA/QC procedures in the NIR is very limited; only some basic information on QA/QC procedures and verification is given for the energy, industrial processes, agriculture, and LULUCF sectors.

14. The ERT identified a need for further improvements; Belarus should consider:

(a) Improving the transparency of the inventory and the NIR structure to fully reflect the requirements of 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);

(b) Enhancing consistency between the NIR and the CRF;

(c) Preparing and reporting estimates for all the missing categories and providing in the NIR discussions of these categories and of other potential sources or sinks not addressed in the current inventory submission;

(d) Developing a solid system for collection of AD and EFs with a view to improving estimates and closing all gaps, including with respect to categories not yet covered;

(e) Using higher tier methods for key categories where appropriate;

(f) Reporting in the NIR and relevant CRF tables detailed information on recalculations performed, with explanatory information, including justification for recalculations;

(g) Improving the uncertainty analysis by using more adequate EF uncertainty values;

(h) Developing a national QA/QC plan and including descriptions of the QA/QC and verification procedures in the sectoral chapters of the NIR.

II. Overview

A. Inventory submission and other sources of information

15. The 2006 inventory was submitted on 14 April 2006; it contains a complete set of CRF tables for the period 1990–2004 and an NIR. Belarus resubmitted its CRF tables and NIR on 23 May 2006. Where necessary, the ERT also used the 2005 submission during the review.

16. During the review, Belarus provided the ERT with additional information. The documents concerned are not part of the inventory submission. The full list of materials used during the review is provided in the annex to this report. After the in-country review, Belarus informed the ERT that it will implement most of the recommendations for general and cross-cutting aspects of inventory preparation and detailed recommendations for all sectors in its next submissions. The ERT acknowledges this information and encourages Belarus to implement all these recommendations, as far as possible, in its next submission.

B. Key categories

17. Belarus has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2006 submission. The key category analyses performed by Belarus and the secretariat[3] produced different results because the categories and aggregation level used by Belarus in its analysis differ from those used by the secretariat (e.g. in the Belarus' analysis there is no distinction by fuel type for fuel combustion categories in the energy sector). Also, Belarus has not included the LULUCF sector in its key category analysis, which was not performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. In the secretariat's analysis, the following key categories were identified for the latest year in the 2006 submission but not in the 2005 submission: 1.A.3.c railways – CO_2; 5.A.1 forest land remaining forest land – CO_2; 5.A.2 land converted to forest land – CO_2; and 5.B.2 land converted to cropland – CO_2. In Belarus' analysis the following key categories were identified for the latest year in the 2006 submission but not in the 2005 submission: 1.A.5 other, and 2.B.2 nitric acid production. In the secretariat's analysis, 4.B manure management – CH_4 was identified as a key category for the latest year in the 2005 submission, but not in the 2006 submission. The ERT reiterates the recommendation of the review report of the 2005 GHG inventory submission that Belarus should perform its key category analysis at a more disaggregated level, distinguishing between fuel types for categories in the energy sector; it also recommends that Belarus include the LULUCF sector in its key category analysis and provide a more detailed discussion of its analysis in its next inventory submission. In addition, the ERT recommends that Belarus use its key category analysis as a driving factor for the preparation of the inventory, using the analysis to prioritize the development and improvement of the inventory, and, if possible, identify additional key categories using a qualitative approach.

C. Cross-cutting issues

1. Completeness

18. The 2006 inventory submission covers almost all source and sink categories for the period 1990–2004 and it is complete in terms of years and geographical coverage. Belarus has provided inventory data in the CRF tables for the years 1990 to 2004, but did not provide CRF table 8(a) (recalculation – recalculated data) for 1991–2000 (Belarus explained that it could not provide table 8(a) for those years because of problems with the CRF Reporter software); table 8(b) (recalculation - explanatory data), for the complete time series, and table 9(b) (completeness), for the complete time

[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 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. 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.

series. Belarus has not estimated actual and potential emissions of F-gases for 1990. Only actual emissions are reported for 2003 and 2004 for HFCs under 2.F.1 refrigeration and air conditioning equipment and SF_6 under 2.F.8 electrical equipment. The ERT encourages Belarus to estimate actual and potential emissions of F-gases for the complete time series, in particular for 1990 and for the 2.F consumption of halocarbons and SF_6 category, and to complete the reporting of CRF tables 8(a), 8(b) and 9(b) in its next inventory submission.

19. No estimates have been reported for the following categories: CO_2, CH_4 and N_2O emissions from 1.A.3.d navigation; CO_2 and CH_4 emissions from 1.B.1 fugitive emissions from solid fuels; CO_2, CH_4 and N_2O emissions from 1.B.2(c) venting and flaring for oil; CO_2, CH_4 and N_2O emissions from marine bunkers; CO_2 emissions from 2.A.7 other (e.g. bricks and ceramic production, for which there are available AD in national statistics); N_2O emissions from 2.B.5 other (e.g. fertilizer production, for which there are available AD in national statistics); CO_2 and CH_4 emissions from 2.C.2 ferroalloys production; actual emissions of F-gases from 2.F.2 foam blowing, 2.F.3 fire extinguishers, 2.F.4 aerosols/metered dose inhalers and 2.F.5 solvents; CH_4 and N_2O emissions from 5.B.2 land converted to cropland; CO_2 emissions/removals from 5.C grassland remaining grassland; CO_2 emissions/removals from 5.E settlements remaining settlements; CH_4 emissions from 6.A.3 solid waste disposal on land – other (e.g. industrial waste, for which there are available AD in national statistics); and CH_4 and N_2O emissions from 6.B wastewater handling (except N_2O emissions from 6.B.2 domestic and commercial wastewater).

20. In some cases, particularly in the CRF tables for the industrial processes, solvent and other product use and agriculture sectors, the notation keys were not applied consistently (e.g. CO_2 emissions from 2.A.3 limestone and dolomite use were reported as "included elsewhere" ("IE") instead of "NE"; CO_2 emissions from 2.A.4 soda ash use and 2.A.7 other – other non-specified (flat glass production) were reported as "NO" instead of "NE"; CO_2 emissions from 3.A-D solvent and other product use were reported as "NA" instead of "NE"; and CH_4 emissions from 4.A.7 and 4.B.7 mules and asses were reported as "NO" instead of "NE"). The ERT encourages Belarus to apply the notation keys consistently, to make appropriate use of the documentation boxes in the CRF tables, to prepare and report estimates for all missing categories, and to provide in the NIR a discussion on these categories and of other potential sources or sinks not addressed in the current inventory submission, and on the possibilities of including them in future submissions.

2. Transparency

21. Although the NIR has been expanded, compared with the 2005 submission, it is not yet fully transparent. The ERT noted that between the 2005 and 2006 submissions no additional information was included in the NIR with regard to explanations for the selection of methodologies, identification of EFs used, assumptions on parameters used, information on AD used for all years from 1990 onwards, the issue of AD confidentiality (e.g. energy balance for 1990), and the rationale and impact of the recalculations performed. The ERT reiterates the recommendation of the 2005 review report that Belarus should improve the transparency of the inventory by providing complete information in the NIR and the CRF tables, following the requirements of the UNFCCC reporting guidelines.

22. Most categories are reported at the level of detail required in the CRF tables, except for the energy sector, where the notation keys "C" (confidential) and "IE" are widely used (in particular for 1990 and for the manufacturing industries and construction category) in CRF tables 1.A(a) and 1.A.(b) because the energy balance is considered confidential in Belarus (for official use only). The issue of confidentiality has been not treated in the NIR but, during the in-country review, Belarus was able to provide the documents and information requested by the ERT, including confidential data according to national procedures. The ERT encourages Belarus to provide, in its future submission, detailed information on how confidential data are collected and how they are included in the inventory.

3. Recalculations and time-series consistency

23. Belarus reported recalculations for 1990 and 2001–2003 in CRF table 8(a), but no data are reported for 1991–2000. Table 8(b) is not reported for the complete time series. The ERT recommends that Belarus complete the reporting of CRF tables 8(a) and 8(b) in its next inventory submissions.

24. The recalculations reported by Belarus in the 2006 submission have been undertaken to take into account the updated information received from the National Committee on Statistics (formerly the Ministry of Statistics and Analysis) on fuel consumption by type and country-specific national data on fugitive emissions from natural gas. In addition, Belarus included accounting of CO_2 emissions from glass production, CO_2 emissions from steel production in electric arc furnaces, and actual emissions of F-gases; revised AD on nitrogen input to soils and average annual growth rates of woody biomass stocks; used the IPCC good practice guidance for LULUCF, instead of the Revised 1996 IPCC Guidelines; and updated information on annual municipal solid waste (MSW) at solid waste disposal sites (SWDS) and on revised degradable organic carbon (DOC) degraded values. The recalculated emissions decreased in 1990 by 2.55 per cent excluding LULUCF and increased by 4.28 per cent including LULUCF, while in 2003 the recalculated emissions decreased by 4.64 per cent excluding LULUCF and increased by 4.80 per cent including LULUCF.

25. Overall, the recalculations resulted in an improvement of the inventory. The ERT noted, however, that the rationale and impact of the recalculations are not properly addressed in the chapter on recalculations and improvements, or in the sectoral chapters of the NIR. The ERT recommends that Belarus report in the NIR and relevant CRF tables detailed information on the recalculations performed and explanatory information, including on the rationale for the recalculations.

4. Uncertainties

26. Belarus has quantitatively estimated for 2004 the uncertainties for all 60 source and sink categories included in the inventory following a tier 1 uncertainty analysis, according the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The quantitative uncertainty for the total emissions was estimated to be 14.6 per cent excluding the LULUCF sector and 27.7 per cent including the LULUCF sector, while the uncertainty of the trend was estimated to be 5.3 per cent excluding the LULUCF sector and 12.9 per cent including the LULUCF sector.

27. The uncertainty analysis is based to a great extent on the default uncertainties included in the IPCC good practice guidance and on expert judgment. The documentation in the NIR on the uncertainties is very limited. The ERT considers many of the EFs uncertainty values used to be low; for example, the tier 1 EF uncertainty of CO_2 from 2.A.7 other – glass production is taken as 10 per cent, whereas the default EF uncertainty range may be in order of ±60 per cent; the tier 1 EF uncertainty of CO_2 from 2.C.1 iron and steel production (electric furnace steel production) is taken as 15 per cent, whereas the default EF uncertainty range is ±25 per cent; the EF uncertainty of N_2O from 4.B manure management is taken as 50 per cent, whereas uncertainties associated with the default EF for this category range from –50 per cent to +100 per cent; the EF uncertainty of N_2O from 4.D.1 direct soil emissions is taken as 40 per cent, whereas uncertainties associated with the IPCC default EF_1 and EF_2 for this category are at least an order of magnitude higher; the EF uncertainty of N_2O from 4.D.2 pasture, range and paddock manure is taken as 50 per cent, whereas uncertainties associated with default EF_3 for this category range from –50 per cent to +100 per cent; the EF uncertainty of N_2O from 4.D.3 indirect soil emissions is taken as 40 per cent, whereas uncertainties associated with default EF_4, EF_5 and EF_6 for this category are at least an order of magnitude higher and volatilization fractions are about ±50 per cent.

28. The ERT reiterates the recommendation of the 2005 review report that Belarus should include more documentation on uncertainties in the NIR and to use uncertainties as a tool for setting priorities (i.e. identify sectors that are important for the overall quality of the inventory and should be given high priority for future improvements). The ERT also recommends that Belarus improve the uncertainty

analysis by using more adequate and/or country-specific uncertainty values for a range of categories, especially in the industrial processes (e.g., 2.A.7 other – glass production, 2.C.1 iron and steel production) and agriculture sectors (4.B manure management, 4.D.1 direct soil emissions, 4.D.2 pasture, range and paddock manure, 4.D.3 indirect soil emissions).

5. Verification and quality assurance/quality control approaches

29. The ERT noted certain inconsistencies between inventory data presented in the NIR (in the summary and chapters 1 and 2) and CRF tables (summary 2 and table 10). In particular, inconsistencies were identified for total GHG emissions (without LULUCF) for the complete time series. Other inconsistencies were observed between the NIR and CRF tables summary 3. The CRF reports the use of country-specific methods and EFs for CH_4 from oil and natural gas, whereas the NIR reports the use of default methods and EFs for fugitive emissions from oil and storage of natural gas; the CRF reports the use of default EFs for all gases and categories estimated from industrial processes, whereas the NIR reports the use of CORINAIR EFs for CO_2 from glass production, default CO_2 EFs and country-specific CH_4 EFs for iron and steel production and country specific/default N_2O EFs for nitric acid production; for forest land the NIR reports the use of tier 1 methods, whereas the CRF tables report the use of tier 1/tier 2 methods; and for wetlands the CRF reports the use of tier 2 methods and country-specific EFs for CO_2 and "NA" for N_2O, whereas the NIR reports the use of default and country-specific EFs for CO_2 and N_2O and gives no information on the method used. The ERT encourages Belarus to enhance the consistency of reporting between the NIR and the CRF tables and to conduct QC procedures in order to avoid these inconsistencies in its next inventory submission.

30. A formal QA/QC plan in accordance with the IPCC good practice guidance is not yet available. The documentation on QA/QC procedures in the NIR is very limited. Only some basic information on QA/QC procedures and verification is given in the NIR for the energy, industrial processes and agriculture sectors. The NIR presents an overview of the QA/QC procedures for all categories in the respective sectoral chapters. No QA/QC and verification information is reported in the NIR for the solvent and other product use and waste sectors, while for the LULUCF sector some QC and verification information is reported only for 5.A forestland category. The ERT recommended that Belarus develop, as soon as possible, a QA/QC plan to meet all the requirements for inventory planning, preparation and management, and to include more category-specific information on the QA/QC procedures and verification in all sectoral chapters of the NIR. After the in-country review, Belarus informed the ERT that a national QA/QC plan had been developed and approved. The ERT further recommends that Belarus fully implement this QA/QC plan and provide detailed information on QA/QC procedures and its implementation in its next inventory submission.

31. The QA/QC plan to be developed by Belarus for its next submission should include:

(a) General QC procedures (tier 1);

(b) Source/sink category-specific procedures (tier 2) for key categories;

(c) Identification of the QA/QC manager within the BelRC "Ecology";

(d) Requirements for the process of data collection and developing estimates;

(e) Procedures for independent review by staff who have not been involved with the inventory's preparation process;

(f) Procedures for the official consideration and approval of the inventory submission;

(g) Procedures for post-submission review;

(h) Procedures for timeliness and an annual schedule for QA/QC procedures and verification.

6. Institutional arrangements

32. Belarus included in the NIR of its 2006 submission a brief overview of the legal and institutional arrangements and data-flow structure for inventory preparation. During the in-country review, Belarus explained that a legal framework for a sustainable inventory process has been put in place in the country through Council of Ministries of the Republic of Belarus Resolution No. 485 of 10 April 2006, "On approval of the regulation on the development of the state greenhouse gas inventory", and through Resolution No. 585 of 4 May 2006, "On approval of the regulation on the national inventory system". According to Resolution No. 585, MoNREP has the overall responsibility for organization and coordination of the functioning of the system for inventory preparation. Through MoNREP Order No. 417 of 29 December 2005, the BelRC "Ecology" was appointed as a key institution responsible for the development of the annual GHG inventories, and of the national communications under the UNFCCC.

33. The ERT noted that the institutional framework for preparation of the inventory still needs to be enhanced in Belarus in order to maintain a sustainable inventory preparation. In this respect, Belarus may consider increasing the number of qualified staff in the BelRC "Ecology", providing enough financial resources and wide support for the inventory team to ensure a sustainable compilation of inventories in accordance with UNFCCC reporting requirements, and ensuring the participation in the inventory preparation of highly qualified experts and institutions available in Belarus and using their recommendations in order to improve estimates of emissions and removals at sectoral and national levels.

34. Legal power to request institutions to hand over data currently lies with MoNREP. Standard forms requesting data are sent annually through official letters from MoNREP to various data suppliers, of which the most important is the National Committee on Statistics. Other important data suppliers include the Ministry of Energy, the Ministry of Transport and Communications, the Ministry of Industry, the Ministry of Housing and Communal Services, and the Ministry of Agriculture and Food. The responses received, including completed data forms, are then collected and archived in the BelRC "Ecology". The ERT encourages Belarus to implement a framework *Data Supply Agreement* with data suppliers (e.g. with the National Committee on Statistics) that will formalize the type, quality and format of data to be provided and the timeline for submission, in order to make this process more sustainable.

7. Inventory management

35. Belarus has a centralized archiving system that still is under development. It contains inventory submissions, spreadsheets for individual category calculations used to compile the inventory, references, comments and responses to the peer reviews. At the end of each reporting cycle, all the documentation used for the inventory is archived. Electronic information is stored on hard disks and regularly backed up. Paper-trail information is archived and there is a simple database of all items in the archive (in some cases not for the full time series). These archived materials are available to inventory reviewers and other stakeholders upon request, with printed materials archived at the BelRC "Ecology". However, the ERT believes that the organization of the archive should be further improved, completed and enhanced following good practices and international standards for records management.

36. Belarus was able to provide archived documents requested by the ERT during the in-country review, including some confidential data according to national procedures. However, some of the primary sources of data and documentation were not present in the archive and it was necessary to request them from other institutions. The ERT recommends that Belarus extend the "paper trail" (documentation) to include data used for compilation of the inventory in order to cover all information used for the complete time series, and to develop a system for collection of AD and EFs with the goal of improving estimates and closing all gaps, including with respect to categories not yet covered.

8. Follow-up to previous reviews

37. Belarus has made substantial progress since its 2005 submission: a full set of CRF tables was provided for the whole time series; the LULUCF CRF tables were provided in accordance with decision 13/CP.9; a revised key category analysis was provided in the NIR; recalculations have been undertaken to take into account the updated information received from the National Committee on Statistics (formerly the Ministry of Statistics and Analysis) on fuel consumption by type and country-specific national data on fugitive emissions from natural gas, the accounting of CO_2 emissions from glass production, CO_2 emissions from steel production in electric arc furnaces and actual emissions of F-gases, the revised AD on nitrogen input to soils, the revised average annual growth rates of woody biomass stocks, the use of the IPCC good practice guidance for LULUCF instead of the Revised 1996 IPCC Guidelines, the updated information on annual MSW at SWDS, and the revised DOC degraded values; and the NIR included a brief overview of legal and institutional arrangements and data-flow structure for the inventory preparation. The ERT acknowledges this progress and notes Belarus' strong commitment to developing the inventory further.

D. Areas for further improvement

1. Identified by the Party

38. The NIR of the 2006 submission identifies several areas for improvement in the sectoral chapters:

(a) Improve the quality of basic information received from enterprises and organizations and enhance the collection and processing of data;

(b) Collect more detailed information on the land-use categories and on the process of conversion of lands;

(c) Collect the necessary AD for performing an evaluation of the carbon stock change in dead organic matter for forest category;

(d) Collect the necessary AD for performing an evaluation of the net carbon stock changes in mineral soils for cropland category;

(e) Use higher tier methods for key categories, in particular where appropriate within the industrial processes sector;

(f) Estimate the potential and actual F-gas emissions from the category 2.F consumption of halocarbons and SF_6;

(g) Further develop and use national EFs within the industrial processes, LULUCF and waste sectors;

(h) Include more category-specific information in the sectoral chapters of the NIR;

(i) Conduct an independent peer review of the LULUCF sector;

(j) Continue the improvement of the QA/QC system;

(k) Revise the uncertainty analysis by taking into consideration more precise uncertainty values for the AD used;

(l) Perform a key category analysis at a more disaggregated level.

2. Identified by the expert review team

39. The ERT identifies the following cross-cutting issues for improvement:

(a) Improve the NIR structure to fully reflect the requirements of the UNFCCC reporting guidelines;

(b) Enhance consistency between the NIR and the CRF tables in accordance with the UNFCCC reporting guidelines*;*

(c) Improve the transparency of the inventory by including additional information and explanations in the NIR with regard to the selection of methodologies, identification of EFs, assumptions for choosing parameters and the sources of AD for all years from 1990, and improve descriptions of individual sectors;

(d) Prepare and report estimates for all the currently missing categories and provide, in the NIR, discussions of these categories and other potential sources or sinks not addressed in the current inventory submission, and of the possibilities of including them in future submissions;

(e) Develop a system for collection of AD and EFs with the goal of improving estimates and closing all gaps, including with respect to categories not yet covered. Particular attention should be given to the availability of detailed and complete energy balances starting from 1990;

(f) Use higher tier methods for key categories where appropriate (e.g. for stationary combustion, cement production, ammonia production, enteric fermentation, agriculture soils, and solid waste disposal on land);

(g) Report in the NIR and relevant CRF tables detailed information on recalculations performed with explanatory information, and include justifications for recalculations for 1990 (base year) and all subsequent recalculated years;

(h) Improve the uncertainty analysis by using more adequate and/or country-specific uncertainty values for a range of categories, especially in the industrial processes sector (e.g. 2.A.7 other – glass production, 2.C.1 iron and steel production) and the agriculture sector (e.g. 4.B manure management, 4.D.1 direct soil emissions, 4.D.2 pasture, range and paddock manure, and 4.D.3 indirect soil emissions);

(i) Develop and implement a national QA/QC plan. After the in-country review, Belarus informed the ERT that a national QA/QC plan had been developed and approved. The ERT further recommends that Belarus fully implement the QA/QC plan and provide detailed information on QA/QC procedures and its implementation in its next inventory submission;

(j) Include descriptions of the QA/QC and verification activities and procedures in specific sections of sectoral chapters of the NIR, following the outlined structure of the NIR in the UNFCCC reporting guidelines;

(k) Increase the number of qualified staff in the BelRC “Ecology”;

(l) Ensure financial resources and wide support for the inventory team of the BelRC “Ecology” in order to ensure a sustainable compilation of inventories in accordance with the UNFCCC reporting requirements;

(m) Ensure participation in the inventory preparation of highly qualified experts and institutions available in Belarus and use their recommendations to improve estimates of emissions and removals at sectoral and national levels, in particular for the energy and LULUCF sectors;

(n) Devote particular attention, efforts, staff and resources to the planning, preparation and management of the LULUCF inventory.

40. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

III. Energy

A. Sector overview

41. The energy sector is the main sector in the GHG inventory of Belarus. In 1990, emissions from the energy sector amounted to 102,097.70 Gg CO_2 eq, or 80.2 per cent of total GHG emissions. Emissions from the sector decreased by 46.1 per cent between 1990 and 2004.

42. After the break-up of the Soviet Union, there was a reduction in almost all energy-related activities. The key driver for the fall in emissions is explained in the NIR. There were structural changes in the economy of Belarus, in particular in the energy sector; the share of less-energy consuming branches of the economy, such as services and trade, was larger in 2004 than in 1990; and there was an active introduction of energy-saving technologies in almost all branches, a transition from coal and residual fuel oil to natural gas as fuel, and a more intense use of biomass in the municipal service and industrial areas.

43. Within the sector in 1990, 64.0 per cent of the emissions were from energy industries, 14.4 per cent were from other sectors, 12.7 per cent were from transport and 7.1 per cent were from manufacturing industries and construction. Fugitive emissions from fuels accounted for 1.2 per cent and other for 0.6 per cent of sectoral emissions.

1. Completeness

44. The CRF includes estimates for most gases and categories of emissions from the energy sector, as recommended by the Revised 1996 IPCC Guidelines. Some subcategories are reported using notation keys: liquefied petroleum gas (LPG) use and related emissions in road transportation are reported as "NO", but they do occur in Belarus; CO_2, CH_4 and N_2O emissions from other fuel use in manufacturing industries and construction are reported as "NE" and "IE", but CO_2 emissions are reported in 1990; AD and CO_2, CH_4 and N_2O emissions from other fuel use in other sectors are reported as "NO", but AD and CO_2 emissions are reported for 1990; AD and emissions from aviation gasoline and jet kerosene are reported as "C" for all years from 1990 to 2000, and CH_4 and N_2O emissions for 2001 to 2004 are reported as "NA"; energy use and related emissions for navigation are reported as "NE" for all years; energy use and related emissions for natural gas transport (other transportation) are reported as "NE" for 1990 to 1999; and fugitive emissions from solid fuels – solid fuel transformation (CH_4 emissions for peat production) are reported as "NE". These issues are further discussed in the category-specific sections below.

2. Transparency

45. The information provided in the NIR on AD, EFs and methods used is general and limited. The ERT recommends that Belarus include more detailed information, references and explanations on the choice of methods and EFs, and background information on data used by categories in its next NIR, and improve transparency in the CRF tables (e.g. by making use of documentation boxes).

46. In general, Belarus used tier 1 methods and default EFs from the Revised 1996 IPCC Guidelines for estimates in the energy sector. However, in the first national communication of Belarus, information on region-specific EFs for gas and liquid fuels is reported. The ERT recommends that Belarus use higher tier methods and collect information on region- or country-specific EFs for key categories and use these in its next submission.

47. In the CRF tables some categories are aggregated at a higher level. For example, all energy use of manufacturing industries and construction is reported under category 1.A.2f other. Allocation of fuels by categories is also not always clear. Notation keys are used in the CRF tables, but are not explained; for example, petroleum refining and manufacture of solid fuels and other energy industries are reported as "IE", but no explanation is given in the NIR or CRF table 9(a). During the in-country review it became clear that these categories were included under 1.A.2f other. However, data for the years 1990, 2000 and 2003 onwards, which were shown to the ERT during the in-country review, made it clear that more detailed AD are available and the ERT recommends that Belarus use these data to provide disaggregated estimates by categories for manufacturing industries and construction in its next submission.

48. There are no clear references in the NIR to the AD used before the year 2003. Belarus made efforts to get these data during the in-country review, and energy balances for 1990 and 2000 were provided to the ERT in a confidential report (for official use only). However, a first analysis of the report showed that some data needed in order to perform a complete estimate of the emissions of the energy sector seemed to be missing, for example, a full balance for kerosene and other fuels is missing. For 1990, some balance tables seemed incomplete (residual/fuel oil and diesel oil), because there was a large difference between the apparent consumption of fuels (= import – export + production + stock changes) and the summation of the bottom-up sectoral consumption. The ERT recommends that Belarus check these data with the statisticians of the National Committee on Statistics of Belarus and make the necessary efforts to find the missing data and to obtain more details for the energy balance for 1990 to ensure completeness of the next inventory submission. Details can include, for example, a split of transport fuels into different subcategories, and a split between refineries and other facilities manufacturing fuels. The ERT also recommends that Belarus obtain full energy balances from the National Committee on Statistics for all years possible. Missing data should be estimated following the recommendations of the IPCC good practice guidance. After the in-country review, Belarus informed the ERT that energy balances for 1990–2004 have been obtained from the National Committee on Statistics. All data have been checked and some inconsistencies were found with respect to previously used data. Belarus also informed the ERT that it will continue these verification procedures and make all necessary recalculations.

3. Recalculations and time-series consistency

49. In its 2006 submission Belarus reported recalculations in all subcategories and for the complete time series. The recalculations have been conducted to take into account the updated information received from the National Committee on Statistics on fuel consumption by type and country-specific national data on fugitive emissions from natural gas transport and distribution. As a result of these recalculations, GHG emissions from the energy sector in 1990 decreased by 1,217.70 Gg CO_2 eq (1.2 per cent).

50. Time series for some categories (such as road transportation, railways, other transportation, and aviation bunkers) are not consistent. These are discussed in more detail in the category-specific sections below.

4. Uncertainties

51. The uncertainty analysis for the energy sector is, to a great extent, based on the default uncertainties included in the IPCC good practice guidance and on expert judgment. The documentation on the uncertainties in the NIR is very limited.

52. The ERT reiterates the recommendation of the 2005 review report that Belarus should conduct a more elaborate analysis, including country-specific uncertainty values as much as possible, include more documentation of uncertainties in the NIR and use them as a tool for setting priorities, and identify categories that are important for the overall quality of the inventory and that should be given high priority for future improvements.

5. Verification and quality assurance/quality control approaches

53. Belarus implemented some QC checks for the energy sector, but these were not performed in a systematic way. There have been peer reviews for the inventory in 2006 in Belarus, including a review of the energy sector. The ERT recommends that these reviews be continued and that the recommendations be taken into consideration. The ERT further recommends that Belarus formalize and implement QA/QC procedures for the energy sector.

B. Reference and sectoral approaches

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

54. The comparison between the reference approach and sectoral approach shows no significant differences; the difference does not exceed 2 per cent for the complete time series. However, the reference approach tables are not complete. For example, crude oil production, imports and exports are reported as "NE", LPG is reported as "NO" (but it is used in Belarus), and there is a frequent use of "C". Table 1.A(d) (feedstocks and non-energy use of fuels) is filled in with notation keys "NE" and "NO". There is also an inconsistent use of notation keys, for example, naphta is reported as "NO" in table 1.A(b) and "NE" in table 1.A(d).

55. For 1990 the difference between the reference approach and sectoral approach is almost zero. The fact that some data in the reference approach are incomplete and unclear, and match with data from the sectoral approach, suggests that, for 1990 at least, the reference approach table has probably been filled in using some of the estimates from the sectoral approach; this could not be confirmed or denied during the in-country review by the Belarusian experts. The ERT suggest that Belarus check and revise both the reference approach and the sectoral approach for all years, using data in the correct way, based on energy balances from the National Committee on Statistics.

56. A comparison between the reference approach and international data is not relevant at this time. A comparison should be performed again after conducting the checks and recalculations that would be needed for the next inventory submission, as required by the Revised 1996 IPCC Guidelines. Where possible, the notation keys "NE" and "C" should be replaced with data for the estimations in the reference approach – especially for 1990, where the tables are not complete. All notation keys should be checked each year and not copied from the previous years. Belarus should attempt to identify and explain any differences between the reference approach and international data in its next inventory submission.

2. International bunker fuels

57. Belarus does not report AD or emissions for marine bunkers or navigation. However, it was confirmed during the in-country review that river-based navigation takes place in the country. In the 2005 review report it is indicated that marine bunkers also take place in the river-based navigation to the Black Sea and the Baltic Sea. In the 2006 submission, marine bunkers are reported as "NE". The ERT

recommends that Belarus collect AD for navigation, collect information on the split of fuel use between internal navigation and marine bunkers, and report emissions in its next submission, providing the relevant information in the NIR and the CRF tables.

58. Aviation bunkers have been estimated for all years except 1991. There is, however, no clear explanation in the NIR on the split between civil aviation and international aviation. During the in-country review, the ERT was shown a possible split for recent years, provided by the Ministry of Transport and Communication (prepared by the State Aviation Committee). The ERT recommends that Belarus further investigate a possible split and clearly explain the method used in its next NIR. Emissions for 1991 for aviation bunkers should also be included to complete the time series.

3. Feedstocks and non-energy use of fuels

59. Feedstocks and non-energy use of fuels have been reported as "NE" in table 1.A(d). However, during the in-country review, the ERT confirmed that some fuels are used as feedstocks and for non-energy purposes in Belarus. The ERT recommends that Belarus collect AD on non-energy use and feedstocks from energy statistics or, if necessary, from plant-specific information (e.g. for ammonia production), and include the resulting estimates in CRF table 1.A(d). The information and estimates obtained should be used to complete the reference approach and be described in the NIR and CRF tables.

C. Key categories

1. Stationary combustion: solid, liquid and gaseous fuels – CO_2, CH_4 and N_2O

60. A tier 1 method with IPCC default EFs was applied to calculate emissions from these key categories. In the first national communication of Belarus, information is provided on region-specific EFs for gaseous and liquid fuels. The ERT recommends that Belarus use higher tier methods and country-specific or, if not possible, region-specific EFs for these categories in its next submission.

61. The AD and emissions for petroleum refining are reported as "IE", but no explanation is given on where they are included in either the CRF tables or the NIR. During the in-country review, it became clear that fuels used for energy purposes in petroleum refining (in this case refinery gas) were allocated to category 1.A.2f other, under manufacturing industries and construction. The ERT recommends that Belarus allocate these emissions under the correct category for all years based on the energy statistics. If this remains impossible, the notation key "IE" should be clearly explained in the CRF and the NIR.

62. The AD and emissions for manufacture of solid fuels and other energy industries are reported as "IE", but no explanation is given on where they are included in either the CRF tables or the NIR. During the in-country review, it became clear that fuels used for manufacturing solid fuels (in this case production of peat brickets) were allocated in category 1.A.2f other manufacturing industries and construction. The ERT recommends that Belarus allocate these emissions under the correct category for all years based on the energy statistics. If this remains impossible, the notation key "IE" should be clearly explained in the CRF and the NIR.

63. The AD and emissions for all categories under manufacturing industries and construction are reported aggregated under category 1.A.2f other. Under each fuel (including other fuels) for all categories, AD and emissions are reported as "IE" but no explanation is given in the NIR or CRF tables. The ERT recommends that Belarus improve reporting and transparency by allocating AD and emissions to the corresponding categories, based on the energy statistics shown during the in-country review. This is easily possible for the latest reported years.

2. Road transportation: liquid and gaseous fuels – CO_2

64. There is a strong decline in energy use and corresponding CO_2 emissions (75.8 per cent) from road transportation in Belarus from 1990 to 2004. Inter-annual changes of energy use are also large for

some years (for example from 61,640 TJ of diesel oil in 1993 to 36,350 TJ in 1994). During the in-country review Belarusian experts explained that gasoline and diesel oil allocated to the "road transport" and "sold to the public" sectors in the energy statistics are reported under the road transportation category in the latest years of the inventory. It is unclear from discussion with the experts if the same allocation is used in the early years of the time series. The ERT recommends that Belarus check AD for all fuels used in road transportation and their allocation in the energy statistics, and apply the same allocation of fuels consistently across the complete time series in its next inventory submission. The ERT also recommends that Belarus allocate all gasoline used in the country to road transportation, and report on all these improvements, and the changes that are made, in its next submission.

65. Use of LPG for road transportation is reported in the CRF tables as "NO", for both the sectoral and reference approaches. It was confirmed during the in-country review that in Belarus there is LPG use across the whole inventory time series. The ERT recommends that Belarus include emissions from LPG use in its next submission.

D. Non-key categories

1. Stationary combustion: other fuels – CH_4 and N_2O

66. In 1990, other fuels are reported to be used in the manufacturing industries and construction category (for other years, other fuels are reported to be "IE" or "NE"); corresponding CO_2 emissions are also reported. However, estimates for CH_4 and N_2O emissions are reported as "IE" and "NE" in the CRF tables for the complete time series. The ERT recommends that Belarus include these emissions in its next submissions and explain what other fuels are used in the country.

67. Belarus reports the use of other fuels and corresponding CO_2 emissions in 1990 in the other sectors category, but CH_4 and N_2O emissions are reported as "NO" for the complete time series. The ERT recommends that Belarus include these emissions in its next submission.

2. Road transportation: liquid fuels – CH_4 and N_2O

68. The implied emission factors (IEFs) reported in the CRF tables for gasoline and diesel oil for CH_4 and N_2O are declining (gasoline – CH_4: from 20 kg/TJ in 1990 to 3,82 kg/TJ in 2004; gasoline – N_2O: from 0.6 kg/TJ in 1990 to 0.11 kg/TJ in 2004; diesel oil – CH_4: from 5.69 kg/TJ in 1990 to 3.26 kg/TJ in 2004; diesel oil – N_2O: from 0.59 kg/TJ in 1990 to 0.37 kg/TJ in 2004). It was explained during the in-country review that a tier 1 approach and default constant EFs are used for the complete time-series, so this decline is not possible. During the in-country review it became clear to the ERT that this is a mistake and it recommends that Belarus correct this mistake in its next inventory submission. During the previous in-country review (2005), the ERT was provided with detailed data collected nationally each year on the vehicle fleet. Comprehensive data on fuel consumption supporting these detailed data were not provided in 2005. However, the ERT considers that the recommendation from the previous review report – to aspire for a higher tier estimation of these emissions – is still relevant, and it recommends that Belarus make the necessary efforts to use a higher tier method for the estimates, in particular for N_2O emissions, which would probably be a key category in the latest reported years as a result of the changes in the vehicle fleet and the wide use of catalytic converters.

3. Civil aviation: liquid and gaseous fuels – CO_2, CH_4 and N_2O

69. AD (consumption of aviation gasoline and jet kerosene) for 1990 to 2000 are reported as "C". However, AD for jet kerosene aviation bunkers are reported for all years (except 1991), and AD for aviation gasoline is reported as "NE" for the complete time series. During the in-country review the ERT was shown a possible split for jet kerosene and aviation gasoline between international and civil aviation for the year 2007, prepared by the Ministry of Transport and Communication. The ERT recommends that Belarus collect detailed AD for aviation for all years, and obtain an appropriate split between civil

and international aviation, and include AD and emission estimates for these categories in its next submission, including in the NIR clear explanations on the method used for the split.

70. CH_4 and N_2O emissions for liquid fuels in this category are reported as "NA". The ERT recommends that Belarus estimate and include these estimates in its next submission

4. Railways: liquid and solid fuels – CO_2, CH_4 and N_2O

71. The trend for the use of liquid fuels in this category is unusual, as the consumption rose from 213.58 TJ in 1990 to 9,662.34 TJ in 2004 (4,423.9 per cent). The ERT recommends that Belarus check the AD and the correct allocation of fuels from energy statistics, and provide explanations in its next NIR.

72. The IEF for CO_2 from liquid fuels for 1990 (76.59 t/TJ) is higher than in other years of the time series (ranging from 73.17 to 73.33 t/TJ). The ERT recommends that Belarus check the EFs used, and correct the estimates if necessary, or provide clear explanations of this discrepancy in its next submission.

73. The IEFs for CH_4 and N_2O from solid fuels are increasing from 2001 onwards (CH_4 from 10 kg/TJ in 2000 to 11.47 kg/TJ in 2004; N_2O from 1.4 kg/TJ in 2000 to 1.61 kg/TJ in 2004). The EFs are, however, reported in the NIR and the CRF as default values, so the reported increase is incorrect. During the in-country review, it became clear to the ERT that this is a mistake and it should be corrected in the next inventory submission.

5. Navigation: liquid fuels – CO_2, CH_4 and N_2O

74. AD and emissions from navigation are reported as "NE" for all years of the time series. During the in-country review it was confirmed that there is river-based navigation in the country. In the 2005 review report it is mentioned that there may also be marine bunkers in Belarus from river-based navigation to the Black Sea and the Baltic Sea. The ERT recommends that Belarus collect AD, investigate the need for a split between navigation and marine bunker fuels, and include AD and emission estimates in its next inventory submission.

6. Other transportation: gaseous fuels – CO_2, CH_4 and N_2O

75. From 1990 to 1999 the emissions from energy used in pipeline transport of natural gas are reported as "NE". Estimates for later years are reported in the CRF tables. The ERT recommends that Belarus collect AD and include emission estimates for all years in its next submissions.

7. Solid fuel transformation: solid fuels – CH_4

76. There is peat production in Belarus, where potentially CH_4 fugitive emissions can be associated with this activity. These are currently reported as "NE". In the 2005 review report, the ERT clarified that these emissions occur in the country, but have not been estimated so far. There is no guidance on a methodological approach in the Revised 1996 IPCC Guidelines and the ERT encourages Belarus to make the necessary efforts to report these emissions in future submissions, if possible, using the experiences of other countries.

8. Oil and natural gas: liquid and gaseous fuels – CO_2 and CH_4

77. The default EF for production/processing (natural gas) for the complete time series used by Belarus (288,000 kg/PJ) seems to be low and should be corrected in accordance with the tier 1 default EF recommended in table I-58 of the Revised 1996 IPCC Guidelines for all years of the time series.

78. CH_4 fugitive emissions from natural gas transport are allocated under 1.B.2.d other, whereas the correct allocation for these emissions is under 1.B.2.b.iii transmission. No explanations on data or

methods are reported in the NIR. The ERT recommends that Belarus contact the data supplier (Beltransgas) to obtain AD for all years of the time series and explanations on the methods used to calculate these emissions, and reallocate these data to 1.B.2.b.iii transmission category. These explanations should be included in the NIR of the next submission and, where relevant, in the CRF tables.

79. CH_4 fugitive emissions from natural gas distribution are currently reported as "IE" and should be reallocated to 1.B.2.iv distribution in the next inventory submission.

80. It is not clear to the ERT which AD are reported in the CRF tables referring to gas production used by Belarus for estimating CH_4 emissions from venting. The AD reported are much lower than the gas production reported in the CRF tables under the production/processing category. The ERT recommends that Belarus revise these data and, if necessary, clearly explain this discrepancy in its next NIR and, where relevant, in the CRF tables.

81. Belarus reports emission estimates for venting and flaring from oil production or oil refining under the oil category as "NE" and CO_2 emissions from natural gas production and processing under the gas category as "NA". Because flaring in refineries and natural gas production probably occurs in the country, the ERT recommends that Belarus contact the companies involved in these activities or the Belarus State Oil and Chemical Industry Alliance to obtain the relevant data on their activities, and include estimates of these emissions in its next submission. .

E. Areas for further improvement

1. Identified by the Party

82. The NIR identifies the following planned improvements in the energy sector: conducting more detailed analysis of all sources of GHG emissions and, first of all, key categories; refining the methodology for defining fuel use in different subcategories, in particular for transport; developing methodologies for identifying national EFs; and continuing improvements of quality estimation and QC procedures.

2. Identified by the expert review team

83. The ERT recommends that Belarus revise its emissions for the energy sector for its next submission, covering both the reference approach and sectoral approach, using solid documented national data. Belarusian experts should therefore gather all information available on energy balances from the National Committee on Statistics for all years of the time series, in particular for 1990. Some assumptions might be necessary relating to, for example, the split of fuels used between aviation bunkers and civil aviation or the allocation of fuels between subcategories, but the basis and rationale for these assumptions should be clearly explained and documented in the NIR and, where relevant, in the CRF tables.

84. Besides the energy statistics, the ERT considers that specific and detailed information is needed and should be collected for emission estimates of some categories under fugitive emissions and non-energy use of fuels, such as emissions relating to transmission of natural gas. The ERT encourages Belarus to obtain this information from individual companies or industrial alliances in the country, and to report estimates in its next submission.

85. The ERT recommends that Belarus explore the possibility of using country-specific or regional EFs, in particular for key categories, in its future inventory submissions. Explanations should be provided in the NIR and, where relevant, in the CRF tables on AD, EFs, methods and assumptions that are used in the inventory estimates to improve transparency, in accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance.

86. The ERT considers that recommendations from previous review reports or peer reviews performed in the country should be taken into account when preparing the next inventory submission.

IV. Industrial processes and solvent and other product use

A. Sector overview

87. In 1990, emissions from the industrial processes sector amounted to 2,249.29 Gg CO_2 eq, or 1.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 74.40 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Between 1990 and 2004 emissions from the industrial processes sector increased by 7.6 per cent and emissions from the solvent and other product use sector increased by 8.7 per cent. The key driver for the rise in emissions between 1990 and 2004 is the increase of some industrial outputs (e.g. electric furnace steel production increased by 72.6 per cent, cement production by 30.6 per cent and nitric acid production by 18.2 per cent).

88. In 1990, CO_2 was the most prominent GHG from the sector, accounting for 83.4 per cent of sectoral emissions. The contributions of CH_4 and N_2O emissions were 1.1 per cent and 15.5 per cent, respectively. Within the industrial processes sector, 83.1 per cent of GHG emissions were from mineral products, 15.7 per cent were from chemical industry and 1.2 per cent were from metal production. Most of the CO_2 emissions came from cement production, which accounted for 51.5 per cent of all CO_2 sectoral emissions; lime production accounted for 45.9 per cent, glass production for 2.3 per cent and iron and steel production for 0.3 per cent. CH_4 emissions from iron and steel production accounted for 87.3 per cent of all CH_4 sectoral emissions and ethylene production accounted for the rest. N_2O emissions were generated only from nitric acid production.

1. Completeness

89. The CRF tables include estimates of emissions for most gases and categories from the industrial processes sector, as recommended by the Revised 1996 IPCC Guidelines. However, some categories are reported as "IE", "NE" or "NO"; in particular, the ERT noted that the following were not provided: GHG emissions from limestone and dolomite use, soda ash use, asphalt roofing, bricks, ceramics, and fertilizer production (for which there are no methodologies in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, although AD are available in national statistics); CO_2 and CH_4 emissions from ferroalloys production; actual and potential emissions of HFCs, PFCs and SF_6 for 1990 (base year), emissions from consumption of HFCs, PFCs and SF_6 for other years of the time series (potential HFCs and actual PFCs and SF_6 from refrigeration and air conditioning equipment; potential and actual HFCs, PFCs and SF_6 from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents; potential and actual HFCs and PFCs and potential SF_6 from electric equipment); emissions from solvent and other product use (CO_2 from paint application, degreasing and dry cleaning and chemical products, manufacture and processing; and N_2O from other, except use of N_2O for anaesthesia (for which there are no methodologies in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, although AD are available in national statistics)).

90. In some cases, the ERT believes that the notation keys used were not applied consistently, for example, "NO" is used instead of "NE" for CO_2 emissions from soda ash use, 2.A.7 other (e.g. bricks and ceramics production), as well as for N_2O emissions from 2.B.5 other (e.g. fertilizer production); "IE" is used instead of "NE" for CO_2 emissions from limestone and dolomite use, and asphalt roofing; and "NA" is used instead of "NE" for CO_2 emissions from solvents and other product use. The ERT encourages Belarus to apply the notation keys consistently and make appropriate use of the documentation boxes in the CRF tables; to prepare and report estimates for all the missing categories; and to provide in the NIR a discussion of these categories and of other potential sources not addressed in the current inventory submission, and of the possibilities of including them in future submissions. In the case of categories for which there are no methodologies in the Revised 1996 IPCC Guidelines or the IPCC good practice

guidance, the ERT encourages Belarus to review the experiences of other Parties reporting emissions for these categories, and make the necessary efforts to report them in its next inventory submission.

2. Transparency

91. The inventory information provided by Belarus is not fully detailed and transparent in either the NIR or the CRF. For example, AD used are provided only in the CRF tables, but no explanations are included in the NIR; no discussion is provided on the missing categories and other potential categories not currently addressed in the inventory; methodologies applied are poorly documented; it is not clear for the ammonia production category whether the volume of natural gas used as a feedstock is subtracted in the energy sector; and the rationale for selection of the EF used by Belarus for nitric acid production is not provided in the NIR. The ERT encourages Belarus to improve the transparency of the inventory by including clear and concise information on methods, EFs and AD in the NIR, as well as other information, in order to fully reflect the requirements of the UNFCCC reporting guidelines.

3. Recalculations and time-series consistency

92. In its 2006 submission, Belarus reported, in the NIR, recalculations only for HFCs and SF_6 (category 2.F consumption of halocarbons and SF_6). The ERT noted, however, that according to the information included in CRF table 8(a) (recalculation – recalculated data), recalculations have been undertaken for 1990 and/or 2003 also for CO_2 emissions from glass production (2.A.7 other), CO_2 and CH_4 emissions from steel production in electric arc furnaces (2.C.1 iron and steel production), CH_4 emissions from ethylene (2.B.5 other) and N_2O emissions from nitric acid production (2.B.2). The ERT recommends that Belarus enhance the consistency of reporting between the NIR and the CRF tables in its next submission.

4. Uncertainties

93. The NIR provided very limited documentation on uncertainties. The ERT considers many of the EF uncertainty values used by Belarus to be low. For example, the EF uncertainty value for CO_2 emissions from 2.A.7 other – glass production is taken as 10 per cent, which would be reasonable only if emissions are calculated according to a tier 2 methodology, based on the quantity of melted glass in each manufacturing process, and taking into consideration the cullet ratio for different glass types produced, otherwise the uncertainty associated with use of the tier 1 EF may be in order of ±60 per cent; the tier 1 EF uncertainty value for CO_2 from 2.C.1 iron and steel production – other – electric furnace steel production is taken as 15 per cent, whereas the default EF uncertainty range is ±25 per cent; simultaneously, the EF uncertainty value for CH_4 was taken as 5 per cent, which corresponds to a tier 3 methodology EF uncertainty range, but Belarus reported the use of a default EF for CH_4 in CRF table 3. The ERT recommends that Belarus properly support its choices of uncertainty values and include more documentation on uncertainties in the sectoral chapter of the NIR. The ERT also recommends that Belarus improve the uncertainty analysis by using more adequate and/or country-specific uncertainty values for the above-mentioned range of categories in the industrial processes sector.

5. Verification and quality assurance/quality control approaches

94. The documentation on QA/QC procedures in the NIR is very limited for this sector; for example, chapter 4 “Industrial processes” presents only an overview of the QA/QC procedures for all categories, whereas in chapter 5 “Solvent and other product use”, no QA/QC and verification information is reported. The ERT recommends that Belarus implement QA/QC procedures and include more category-specific information on QA/QC and verification measures in theist next NIR.

B. Key categories

Cement production – CO_2

95. Belarus has used the IPCC tier 1 methodology and the default IPCC value for calcium oxide (CaO) content by weight in clinker (64.6 per cent). The ERT noted, however, that in Belarus lime content in clinker may be in the range of 60–67 per cent, and that a certain fraction of magnesium oxide (MgO) is also used (MgO content in clinker would be around 2 per cent). The EF used (0.5071 t CO_2/t clinker) does not take into consideration the cement kiln dust (CKD) correction factor (the default value is 2 per cent, but in some countries in the region this value is within the range of 3–5 per cent). As this category is a key category in Belarus, the ERT recommends that Belarus use a tier 2 methodology for estimating CO_2 emissions from cement production, take into account the country-specific data on CaO and MgO content in clinker, use a CKD correction factor, and recalculate CO_2 emissions for the complete time series in its next submission.

C. Non-key categories

1. Ammonia production – CO_2

96. In its 2006 submission Belarus reported CO_2 emissions from 2.B.1 ammonia production as "recovered" for the complete time series. Explanations on this are provided in the NIR of the 2005 submission, indicating that "the only ammonia manufacturer in Belarus, which is "AZOT" Production Association in Grodno, is recovering all the emitted CO_2, using it as a raw material for urea production". This explanation is not provided in this submission. However, according to the Revised 1996 IPCC Guidelines, this carbon will be stored only for a short time, so no adjustment should be made for the intermediate binding of CO_2 in downstream manufacturing processes and products. For this reason the ERT recommends that Belarus, in its next submission, estimate and report CO_2 emissions from this category for the complete time series using the most accurate methodology (tier 1a), based on natural gas input and applying plant-specific EFs based on the carbon content of natural gas.

2. Lime production – CO_2

97. Belarus did not disaggregate the AD by lime types for its estimates of lime production. This is required by the IPCC good practice guidance, which provides default values for high calcium/dolomitic lime with a default breakdown of lime types of 85/15. The ERT recommends that Belarus use the default IPCC value for the breakdown of lime types if no country-specific value is available, and provide revised calculations for the category lime production for the entire time series for its next submission.

98. Both high-calcium and dolomitic limes can be slaked and converted to hydrated lime ($Ca(OH)_2$ or $Ca(OH)_2$ $Mg(OH)_2$). The ERT recommends that Belarus, in its next submission, take into consideration the correction for the proportion of hydrated lime by multiplying the production data by the IPCC default correction factor of 0.97.

99. The default EFs in the Revised 1996 IPCC Guidelines correspond to 100 per cent of CaO or CaO·MgO in lime (stoichiometric ratio) and can lead to an overestimation of emissions because the CaO and MgO (if present) content may be less than 100 per cent according to the lime purity. The ERT recommends that Belarus adjust the EFs and account for the CaO or the CaO·MgO content in its next submission.

3. Limestone and dolomite use – CO_2

100. Belarus reported CO_2 emissions from limestone and dolomite use as "IE", explaining that emissions of liming soils were estimated in the LULUCF sector and limestone used for cement and lime production was taken into account in the categories cement production and lime production. However, according to the Revised 1996 IPCC Guidelines, all other uses of limestone and dolomite should also be

reported (e.g. a certain amount of limestone and dolomite is used in glass production, sugar production, metallurgy (e.g. iron and steel), agriculture, construction and environmental pollution control). The ERT recommends that Belarus report, in its next submission, the CO_2 emissions from limestone and dolomite use.

4. Soda ash use – CO_2

101. Belarus reported CO_2 emissions from soda ash use as "NO". However, sodium carbonate (Na_2CO_3) is used as a raw material in a large number of industries, including glass manufacture, soap and detergent manufacture, pulp and paper production, and water treatment. According to the 2007 Statistical Yearbook, all these industries operate in Belarus. The ERT recommends that Belarus, in its next submission, report CO_2 emissions from soda ash use.

5. Asphalt roofing – CO_2

102. Belarus reported CO_2 emissions from asphalt roofing as "IE", but no explanations are provided in the NIR or CRF tables on where these emissions have been included. The ERT encourages Belarus to estimate and report the CO_2 emissions from asphalt roofing under the corresponding category in the CRF tables; if this is not possible the notation key "NE" should be used in the next submission.

6. Glass production – CO_2

103. Belarus reported CO_2 emissions from 2.A.7 other – glass production (container glass production), but it used the notation key "NO" for CO_2 emissions from 2.A.7 other – other non-specified (flat glass production). AD for flat glass production are available in national statistics, expressed in thousands of m^2 (according to the National Committee on Statistics, one conventional m^2 of flat glass weighs 5 kg). Belarus is encouraged to estimate CO_2 emissions from flat glass production; if this is not possible these emissions should be reported as "NE".

104. The EF used by Belarus for estimating CO_2 emissions from container glass production (140 kg CO_2/t of glass produced) comes from the CORINAIR emission inventory guidebook, but it was reported in CRF table summary 3 as an IPCC default EF. The ERT encourages Belarus to apply the notation keys more consistently in the CRF tables.

D. Areas for further improvement

1. Identified by the Party

105. Belarus identified, in its NIR, the need to improve its emissions estimates and to apply higher tier methodologies for key categories; to use country-specific EFs for a range of categories; to collect new data on exports and imports of HFCs, and on exports and imports of equipment containing F-gases; and to recalculate the emission estimates of F-gases under the category consumption of halocarbons and SF_6.

2. Identified by the expert review team

106. The ERT identifies the following issues for improvement in Belarus' GHG inventory within the industrial processes sector:

(a) Improve the transparency of the inventory by including in the NIR additional information on the selection of methodologies, on the identification of EFs used, on assumptions on parameters used, and on the sources of AD for all years of the time series, and improved descriptions of individual categories, and by reporting in the NIR and relevant CRF tables detailed information on recalculations performed, with explanatory information including the rationale for recalculations made;

(b) Collect AD and EFs with the goal of improving estimates and using higher tier methods for key categories, and prepare and report estimates for all the missing categories, providing, in the NIR, discussions of these categories and of other potential categories not addressed in the current inventory submission, and of the possibilities of including them in future submissions;

(c) Improve the uncertainty analysis by using more adequate and/or country-specific uncertainty values and include descriptions of the QA/QC and verification activities and procedures in specific sections of chapter 4 "Industrial processes" and chapter 5 "Solvent and other product use" of the NIR;

(d) Enhance consistency between the NIR and the CRF tables.

V. Agriculture

A. Sector overview

107. In 1990, emissions from the agriculture sector amounted to 20,364.89 Gg CO_2 eq, or 16.0 per cent of total GHG emissions; in 2004 it accounted for 12,320.92 Gg CO_2 eq, or 16.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 39.5 per cent. The key driver for the fall in emissions is the decline in animal populations and nitrogen fertilizer application, due to the change in the political and economic situation in Belarus in the early 1990s.

108. In 1990, 47.9 per cent of the emissions within the sector resulted from enteric fermentation and 46.1 per cent came from agricultural soils. Manure management accounted for 5.9 per cent and the remaining 0.1 per cent were contributed by field burning of agriculture residues.

1. Completeness

109. In general the information contained in the CRF tables is complete and includes estimates of emissions of most gases and categories from the agriculture sector, as recommended by the Revised 1996 IPCC Guidelines. There is no rice production and no savanna burning in Belarus, so CH_4 emissions from rice cultivation and CH_4 and N_2O emissions from prescribed burning of savannas are reported as "NO". In the CRF tables, CH_4 emissions for some small categories, such as mules and asses, are reported as "NO", but the ERT noted that population data for these animals are reported on the website for the Food and Agriculture Organization of the United Nations (FAO). After the in-country review, Belarus informed the ERT that there is no mules and asses population within the country's the territory. This fact was confirmed by the National Committee on Statistics. Some notation keys in the CRF tables need to be revised, in particular "NE", and the ERT recommends that Belarus make efforts to submit those emission estimates in its next submission.

2. Transparency

110. The NIR provides basic information on the inventory estimates, such as methodologies, EFs and AD used. This information was helpful for the review of Belarus' inventory, but the ERT noted that the transparency of the NIR could be further improved by providing information or explanations for the choice of methods and EFs; for example, tier 1 methods with IPCC default EFs were applied to all categories in the sector, but the NIR does not provide any information to support this selection. The ERT recommends that Belarus follow closely the UNFCCC reporting guidelines and the IPCC good practice guidance, and provide information on the assumptions for the selection of methodologies, parameters, EFs and AD in its next submission

111. The information provided in the NIR on AD for agricultural soils and manure management categories is not sufficient to support the inventory review. Improvements are required in the documentation provided for manure management usage in waste management systems for different

animal species, for AD of harvested organic soil area and for AD and parameters for calculating emissions from nitrogen (N) input for manure applied to soil and pasture. The ERT recommends that Belarus, in its next NIR submission, improve the information on and documentation of AD for all categories in the agriculture sector.

3. Recalculations and time-series consistency

112. In the 2006 submission, emissions from all categories in the agriculture sector for 1990 and 2003 were recalculated. The recalculations resulted in a decrease of sectoral emissions by 9.3 per cent in 1990 and 12.6 per cent in 2003. There is no explanation on the rationale for these recalculations in the NIR. The ERT recommends that Belarus provide clear explanations on the rationale and impact of recalculations in the NIR of its next inventory submission.

4. Uncertainties

113. Belarus has estimated quantitatively the uncertainties in the agriculture sector following a tier 1 uncertainty analysis. The uncertainty analysis is largely based on the default values of uncertainties included in the IPCC good practice guidance and expert judgment. Given the wide range of IPCC default uncertainty values, the documentation provided in the NIR on the rationale for choosing the respective uncertainty value is very limited. The ERT recommends that Belarus include explanations on the rationale for using certain uncertainty values in its future submissions. The ERT also recommends that Belarus improve the uncertainty analysis by using more adequate and/or country-specific uncertainty values, in particular for key categories.

5. Verification and quality assurance/quality control approaches

114. The documentation on QA/QC implementation in the sector is very limited. The ERT recommends that Belarus establish and implement QA/QC procedures for the sector in accordance with the IPCC good practice guidance, and document the implementation of these procedures in its future submissions.

B. Key categories

1. Enteric fermentation – CH_4

115. The CH_4 emissions from enteric fermentation were estimated based on a tier 1 methodology and IPCC default EFs for Eastern Europe that were constant for the complete time series. There is no explanation in the NIR of the choice of methodology and EFs, or background information on AD used. During the in-country review, Belarus provided the ERT with the table format for statistical data collection. The ERT noted that Belarus has extensive data on animal production, including detailed animal population data for different ages and milk production per cow. Data on animal production are collected monthly by the National Committee on Statistics, but those data have not been considered when developing the inventory. The ERT believes that those data could be of great help in developing future inventories. According to the IPCC good practice guidance, the frequency of data collection and assumptions on AD development should be documented, and if data are available or can be collected without excessive cost, the tier 2 method should be applied to significant subcategories. The ERT encourages Belarus to make efforts, in its next submission, to apply a higher-tier method for estimating emissions from dairy and non-dairy cattle according to the IPCC good practice guidance.

116. The NIR stated that the detailed data on the animal populations come from official annual statistics of the National Committee on Statistics. During the in-country review, the ERT noticed that there was some confusion on cattle population numbers; the total number of dairy cows and beef cows was used as the total for dairy cattle population for the estimates, and the non-dairy cattle population was calculated by subtracting the dairy and beef cow populations from the total number of cattle. The ERT

recommends that Belarus correct the population numbers for dairy cattle and non-dairy cattle, and consider recalculating CH_4 emissions from this category for the whole time series in its next submission.

117. As indicated above, default EF values for Eastern Europe that were constant for the complete time series were applied for CH_4 estimates from dairy cattle, but no information on milk yield and other related animal productivity parameters are provided in the NIR to justify this choice. During the in-country review, Belarus provided related information on these parameters. To improve transparency, the ERT recommends that Belarus include in its next submission milk production information in the NIR for all years. The ERT also noted that milk production per cow has increased from 3,058 kg/year in 1990 to 4,007 kg/year in 2004, and it encourages Belarus to develop country-specific EFs by applying tier 2 methodology to reflect these country-specific circumstances in its future submissions.

118. In the period 1990–2004, CH_4 emissions from non-dairy cattle decreased by 49.1 per cent, and large inter-annual changes for 1990–1991, 1992–1995 and 1998–1999 (ranging from –11.7 to –7.6 per cent) were identified. The NIR stated that these inter-annual changes are a result of the decline in the non-dairy cattle population. During the in-country review, Belarus further explained that these changes are due to a deficit of fodder for animals; the fodder was brought from Kazakhstan and became very expensive after the disintegration of the Soviet Union. The ERT recommends that Belarus include this information in the NIR of its next submission, and make a comparison of the beef and milk production to support its explanation.

2. Direct soil emissions – N_2O

119. N_2O from direct soil emissions is one of the largest key categories in the agriculture sector. There is no clear description in the NIR on choice of methodology, so it is unclear if Belarus used a tier 1a or a tier 1b method for its calculations, although both tier 1a and tier 1b are reported in CRF table summary 3. During the in-country review, Belarus clarified that the tier 1 method of the Revised 1996 IPCC Guidelines was applied, and also that it plans to use the tier 1b method according to the IPCC good practice guidance in its future submissions. The ERT recommends that Belarus include detailed information on the choice of methodology in its future NIRs, and encourages Belarus to make efforts to apply the tier 1b method in its next submission.

120. The NIR provided limited information on AD; there is no information on AD and related parameters on N input from manure applied to soils, no information on the N-excretion rate for pasture of animals, and no information on area of cultivated organic soils. The ERT recommends that Belarus include in the NIR of its next submission all AD and related parameters according to the IPCC good practice guidance.

121. The NIR stated that sources of data on area of cultivated organic soils are the first national communication of Belarus and the National Academy of Sciences of Belarus. During the in-country review, Belarus clarified that there are no statistical data in the country on area of harvested organic soils for the complete time series, and that the only published data are for 2000. The reported data are based on expert assessment in conjunction with the published data for 2000. In addition, Belarus provided a spreadsheet containing data on area of harvested organic soils for 1990, 1995, 1999, 2000 and 2005, but these data differ from the reported data on area in the CRF tables. Belarus also provided the document "Soils of agricultural land", which includes detailed data on area of harvested organic soils for 2000. In addition, during the in-country review an invited expert from the National Academy of Sciences of Belarus introduced the approach to calculate this area, based on the available data for 2000, but this information was not included in the NIR. The ERT recommends that Belarus improve the time-series consistency of its estimates of N_2O emissions from organic soils by consistently using the same data sources and approach, and provide, in the NIR of its next submission, data on area of harvested organic soils for the complete time series and information on the approach used to estimate the area.

122. The ERT identified an inconsistency between the N excretion on pasture and the fraction of N input from manure applied to soils. In the calculation of N input from manure applied to soils, the value of $Frac_{PRP}$ (or $Frac_{GRAZ}$) used is 0.02, but the N excretion on pasture as reported in CRF table 4.B(b) does not match the N excretion calculated by multiplying total N excretion from manure by 0.02; the fraction of N excretion on pasture from the total N input from manure should be around 0.14. The ERT recommends that Belarus make efforts to obtain appropriate data on N from manure application and keep consistency between related categories in its next submission.

123. In the 2006 submission, the EF value of 5 kg N_2O-N/ha-year taken from the Revised 1996 IPCC Guidelines is used instead of the updated values of 8 kg N_2O-N/ha-year from the IPCC good practice guidance to calculate N_2O emissions from organic soils. The ERT recommends that Belarus use the updated EF in its next submission.

3. Indirect emissions – N_2O

124. In the 2006 submission, no information on the methods and AD used for estimations of indirect N_2O emissions from agricultural soils was provided in the NIR. During the in-country review, Belarus provided the ERT with the spreadsheet with calculations. The ERT noticed that the calculation of N_2O emissions from N leaching and run-off in 1990 was probably overestimated through using the equation in the Revised 1996 IPCC Guidelines instead of the equation in the IPCC good practice guidance. It recommends that Belarus consider revising and recalculating emission estimates according to the updated equation in the IPCC good practice guidance, and provide, in its next submission, detailed information on the methodology, AD and parameters.

C. Non-key categories

Manure management – CH_4 and N_2O

125. Belarus used the tier 1 method for its estimates for this category. There is not sufficient information in the NIR on AD and percentage of manure management usage available for estimation of CH_4 emissions for this category or on the EFs and AD used for N_2O emission estimates. The ERT recommends that Belarus include this information in the NIR of its next submission.

126. The ERT identified a mistake in the additional information table of CFR table 4.B(a); the total percentage of different manure management systems for several animal categories equals more than 100 per cent. During the in-country review, the correct sheet for calculations on manure management usage for different animal species was provided to the ERT. The ERT noticed that there is an inconsistency between data in this sheet and the calculations reported in the 2006 inventory submission. The ERT recommends that Belarus correct this and recalculate estimates using appropriate data on manure management usage in its next submission.

D. Areas for further improvement

1. Identified by the Party

127. Belarus identified in its NIR some improvements for the inventory of the sector, including application of tier 2 methods for estimating emissions from key categories, obtaining national parameters and EFs, collecting more precise and detailed data for different activities used in calculations, using agreed values and parameters for activities for different agricultural sources, and improving the QC system and independent review of estimates.

2. Identified by the expert review team

128. The ERT encourages Belarus to follow the UNFCCC reporting guidelines and the IPCC good practice guidance in the preparation of its inventories. In addition, the ERT recommends that Belarus implement the following improvements in its next submission:

(a) Improve the NIR in accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance;

(b) Improve consistency between the NIR and the CRF tables;

(c) Revise and perform recalculations of CH_4 emissions from enteric fermentation and N_2O emissions from agricultural soils, based on appropriate and detailed AD;

(d) Improve the transparency of the inventory by including detailed information, descriptions and assumptions used for selection of methods, EFs, AD, and related parameters;

(e) Make efforts to apply higher tier methods for key categories.

VI. Land use, land-use change and forestry

A. Sector overview

129. In 1990, the LULUCF sector was a net sink of 11,307.18 Gg CO_2 eq, offsetting 8.9 per cent of total GHG emissions. Removals from the sector increased by 5.2 per cent between 1990 and 2004. The key driver for the rise in removals is the relative small decrease in removals from forest land and the decrease in emissions from cropland. According to the 2006 inventory submission the forest land remaining forest land category was a net sink in 1990 of 25,095.50 Gg CO_2, whereas land converted to cropland and wetlands remaining wetlands were sources of 9,579.46 and 762.74 Gg CO_2, respectively. Based on these figures the secretariat identified CO_2 emissions from forest land remaining forest land and CO_2 emissions from land converted to cropland, as well as agricultural lime application (under cropland) as key categories for the level assessment in 1990. The ERT noticed that Belarus still does not have in its inventory an adequate, consistent, complete and transparent approach to representing land areas or a land-use conversion matrix in accordance with the IPCC good practice guidance for LULUCF. The ERT strongly recommends that Belarus develop these and provide detailed information in the NIR of its next submission.

1. Completeness

130. The CRF tables include estimates for all gases, but only some sources and sinks, from the LULUCF sector, which is not completely in line with the IPCC good practice guidance for LULUCF. Belarus reports CO_2 emissions/removals for 1990–2004 for mandatory category 5.A.1 forest land remaining forest land, 5.A.2 land converted to forest land and 5.B.2 land converted to cropland, and for optional categories 5.D.1 wetlands remaining wetlands, 5(IV) CO_2 emissions from agricultural lime application (in cropland) and 5(II) N_2O emissions from drainage of soils (forest land and wetlands). The CRF tables do not report emission and removal estimates from categories 5.B.1 cropland remaining cropland, 5.C grassland, 5.D.2 land converted to wetlands, 5.E settlements or 5.F.2 land converted to other land, as these categories are reported as "IE", "NA", "NE" and "NO". Direct N_2O emissions from N fertilization are reported as "NO". N_2O emissions from disturbance associated with land-use conversion to cropland are reported as "IE", "NE" and "NO". Biomass burning for 5.B cropland, 5.C grassland and 5.D.2 land converted to wetlands are reported as "NE" and "NO". As a whole, the LULUCF sector reporting is not complete and the ERT recommends that Belarus make the necessary efforts to include, in its next inventory submission, missing categories that are likely to be relevant for the country.

2. Transparency

131. The NIR of Belarus provides only limited information on the inventory estimates for the LULUCF sector. Some parts of the emission/removal estimates were not documented at all in the NIR. Descriptions provided were not sufficiently detailed for all categories with regard to methods, AD, EFs and data sources. Large parts of the information needed in order to understand the inventory estimates were provided only orally by invited external experts during the in-country review. The ERT recommends that Belarus include in the NIR of its next submission all relevant information on methods, assumptions and parameters for the estimation of emissions and removals.

3. Recalculations and time-series consistency

132. Belarus recalculated its estimates for the LULUCF sector for 1990–2003 as a result of using, for the first time, the IPCC good practice guidance for LULUCF instead of the Revised 1996 IPCC Guidelines. These recalculations have resulted in decreases of the removals by 41.7 per cent in 1990 and by 33.5 per cent in 2003. The ERT recommends that Belarus, in its next inventory submissions, explain and clarify the reasons for recalculations and report on changes made to methods and/or parameters used in recalculations, including clear explanations on the large decreases or increases of removals/emissions.

4. Uncertainties

133. Belarus has provided in the NIR few details and descriptions on data used for the tier 1 uncertainty analysis for the LULUCF sector. It is unclear to the ERT whether Belarus has provided the uncertainty analysis for the sector fully in accordance with the IPCC good practice guidance for LULUCF. The ERT recommends that Belarus include in the NIR of its next submission all the relevant information on assumptions and parameters used for the uncertainty analysis.

5. Verification and quality assurance/quality control approaches

134. In its 2006 submission Belarus reports the implementation of QC procedures for the forest land category. A QA/QC plan for the LULUCF sector is not yet in place. The ERT recommends that Belarus develop and implement QA/QC procedures for the sector within the framework of a QA/QC plan, and provide information of these procedures in its next inventory submissions.

B. Key categories

1. Forest land remaining forest land – CO_2

135. The calculation of annual increase in carbon stocks due to biomass increment the in forest land remaining forest land category is based on the IPCC good practice guidance for LULUCF tier 1 method. References for conversion and expansion factors used in the estimates are not provided in the NIR. The forest area data that were used to develop emission and removal estimates were taken from aggregated national forestry statistics (data of the State Forest Fund Account of Belarus for 1988, 1994 and 2001), and are reported for only three types of forests (coniferous, hard-wooded broad-leaved, and soft-wooded broad-leaved) without differentiation on the tree species and age groups. The ERT considers that it is possible to improve the estimates and to make more precise calculations of carbon stocks in forest land by using existing disaggregated data of the national forest cadastre (area of forest stands with differentiation on dominant tree species and age groups) and by using specific conversion factors for tree species and age groups. During the in-country review, the Belarusian external experts informed the ERT that there are possibilities to improve the inventory estimates, using national conversion and expansion factors according to the tier 2 or tier 3 approaches. The ERT welcomes this initiative and recommends that Belarus, in its next submission, further develop its inventory using the tier 2 or tier 3 approaches, using disaggregated data available from national forestry statistics.

136. All forest areas in Belarus seems to be included in the estimates, including unmanaged forests in natural reserves where timber is not harvested or that are in a natural state. According to the IPCC good practice guidance for LULUCF only the areas of managed forests need to be included in calculations of carbon stock changes. The ERT recommends that Belarus, in its next submission, divide forests into managed and unmanaged for its emission/removal estimates, in accordance with the IPCC good practice guidance for LULUCF. After the in-country review, Belarus informed the ERT that all forest areas in Belarus are managed, that human activities are taking place on territory of forest reserves, and that online monitoring is being performed on the whole territory of forest reserves.

137. Estimates of annual decrease of carbon stocks due to biomass loss in forest land remaining forest land included losses from commercial fellings, fuelwood gathering and forest fires. The ERT considers that this calculation of annual decrease in carbon stocks is incomplete and does not correspond to the recommendations of the IPCC good practice guidance for LULUCF. The calculation of annual carbon losses due to forest fires is based on timber volume of dead stands and does not include areas of different types of fires (e.g., emissions from ground fires in living stands were not estimated). Data on annual carbon losses due to other factors (e.g. pest and disease, windstorms, etc.) are not included in the calculations. According to the IPCC good practice guidance for LULUCF, the calculation of annual decrease in carbon stocks should be based on the data on forest areas affected by different types of disturbances. For example, the ERT considers that Belarus may use available national statistical data on different types of forest fires (crowning, ground, underground) for its calculations. During the in-country review, Belarusian external experts indicated that there are possibilities to improve calculations of carbon stocks decreases using either the tier 2 or tier 3 approach. The ERT welcomes this initiative and recommends that Belarus use available statistical data on areas of forests subject to different types of disturbance in its calculations, and fully implement the IPCC good practice guidance for LULUCF for its next inventory submission.

138. For the forest land remaining forest land category, the net carbon stock change in dead organic matter (DOM) and the net carbon stock change in soils are reported as "NE". Some of these carbon pools may be subject to significant changes due to human activities (e.g. erosion due to forest operations) and thus they may be significant sources or sinks. The ERT recommends that Belarus estimate and report these emissions and removals in its next submission.

2. Land converted to cropland – CO_2

139. In CRF table 5.B for the complete time series emissions/removals and carbon stock changes are reported as "NE" for 5.B.1 cropland remaining cropland. Only CO_2 soils emissions from 5.B.2.3 wetlands converted to croplands under 5.B.2 land converted to cropland are reported in the CRF tables. These data show a decrease of 16.8 per cent in CO_2 emissions (from 9,579.46 to 7,974.00 Gg) between 1990 and 2004. In the NIR, Belarus explained that statistical data on carbon content in arable soils for the past 20 years are not available, and it was assumed that the change in soil carbon for cropland is zero. The ERT would like to remind the Party that "0" change in soil carbon is an estimation and could not be an assumption, owing to the absence of AD. Moreover, because of the large decrease in lime application in the period 1990–2006, the ERT concludes that the input of organic fertilizers in the country also decreased. In that situation, the balance of soil carbon on cropland should be negative and CO_2 emissions from soils should be reported. The ERT encourages Belarus to make efforts to estimate and report these emissions in its next inventory submission.

3. CO_2 emissions from agricultural lime application (cropland) – CO_2

140. CO_2 emissions from agricultural lime application category (CO_2 emissions from liming in cropland), reported in CRF table 5(IV), show a decrease of 57.6 per cent between 1990 and 2004. The trend of these emissions is unstable (from 2,297.33 Gg in 1990 to 641.21 Gg in 2000 and to 974.34 Gg in

2004). The ERT was not able to find explanations for this trend in the NIR, and recommends that they be included in the next submission.

C. Non-key categories

Biomass burning – CH_4 and N_2O

141. Belarus reports non-CO_2 emissions from forest fires. The ERT acknowledges this effort because significant emissions can occur from forest fires, especially in certain years when the frequency of fires is high. The methodology for the estimate used by Belarus conforms with the recommendations of the IPCC good practice guidance for LULUCF. However, the ERT suggests that Belarus, in its next submission, further verify the area of forest fires and the EFs used, and develop uncertainty estimates for this category to assess the accuracy of the reported emissions. Moreover, the ERT noted some inconsistencies in CRF table 5(V), where the values reported for CO_2, CH_4 and N_2O emissions from controlled burning and wildfires under forest land remaining forest land do not add up to the totals given. The ERT recommends that Belarus improve in general its QC procedures for the LULUCF sector.

D. Areas for further improvement

1. Identified by the Party

142. The NIR of the 2008 inventory submission of Belarus identifies several areas for improvement in the LULUCF sector, although in some cases the indicated improvements are very general, or insufficient details are given. The improvements identified are:

(a) To obtain national forest inventory data;

(b) To develop country-specific parameters and improve the methodology used to calculate emissions/removals in the LULUCF sector;

(c) To collect more precise data on land use and land-use change;

(d) To collect the AD necessary to calculate changes in the deadwood carbon pool in forest land;

(e) To collect the AD necessary to calculate changes on carbon content in mineral soils;

(f) To develop and use QA/QC procedures for the LULUCF sector, and to ensure independent review and assessment of the LULUCF estimates.

2. Identified by the ERT

143. The ERT encourages Belarus to make efforts to adopt an adequate, consistent, complete and transparent approach for representing land areas in its LULUCF inventory, in accordance with the IPCC good practice guidance for LULUCF. The ERT recommends that aggregated data from regional or lower level statistics available in Belarus be used to develop a consistent land representation in the form of a land-use change matrix and to report on all the mandatory land-conversion categories. The ERT noted that the existing procedures for inventory preparation in the LULUCF sector should be further developed and enhanced in order to provide accurate information on land areas subject to activities such as deforestation, reforestation, afforestation and forest management, and to meet future reporting needs.

144. The ERT recommends that Belarus investigate and clarify the existence of areas of managed and unmanaged forest in the country, and report the estimates for the forest land category, in accordance with the IPCC good practice guidance for LULUCF, in its next inventory submission.

145. The ERT recommends that Belarus use disaggregated data from forestry statistics (with areas of forest stands differentiated by dominant tree species and age classes) for estimating annual increase in

carbon stocks due to biomass increment in forest land remaining forest land, and use country-specific conversion and expansion factors according to the tier 2 or tier 3 approaches of the IPCC good practice guidance for LULUCF.

146. The ERT recommends that Belarus use complete statistical data on area of forests subject to different types of disturbances, and report estimates in accordance with the IPCC good practice guidance for LULUCF in its next inventory submission.

147. The ERT recommends that Belarus include dead organic matter and soil pools in its LULUCF estimates, and provide estimates of change of soil carbon in cropland in its next inventory submission. The ERT would like to note that a modelling approach may be applied for these estimates if other data are unavailable

VII. Waste

A. Sector overview

148. Emissions reported by Belarus in the waste sector include CH_4 emissions from solid waste disposal on land and N_2O emissions from human sewage. The other categories in the sector are not estimated or do not occur in Belarus.

149. In 1990 emissions from the waste sector amounted to 2,574.73 Gg CO_2 eq, or 2.0 per cent of total GHG emissions. Overall emissions from the sector increased by 73.3 per cent between 1990 and 2004. The key driver for the rise in emissions in the sector is the increase of emissions in the solid waste disposal on land category due to changes in the composition of waste and an increase in waste production by the population (due to changes in the economy). In 1990, CH_4 emissions from solid waste disposal on land constituted 91.2 per cent of total emissions of the sector. The remaining 8.8 per cent were N_2O emissions from human sewage.

1. Completeness

150. The CRF tables include estimates of most gases and categories of emissions from the waste sector, as recommended by the Revised 1996 IPCC Guidelines. The categories CH_4 emissions from wastewater handling and N_2O emissions from wastewater handling, excluding N_2O from human sewage, are reported as "NE". CH_4 emissions from managed waste disposal on land and emissions from waste incineration are reported as "NO". The ERT recommends that Belarus, in its next inventory submission, make the necessary efforts to report emissions from the categories that are currently not estimated.

2. Transparency

151. The NIR does not provide sufficient information on methodologies, AD and EFs applied in estimating emissions from the waste sector, and in some cases it is not consistent with data reported in the CRF tables. For example, Belarus did not provide explanations for the calculations of DOC, and N_2O emissions from human sewage reported in the NIR, which are inconsistent in some respects with the CRF tables. The ERT recommends that Belarus provide more detailed information on methodologies, AD and EFs, and related background information such as estimation of DOC, in the NIR of its next inventory submission, and correct all inconsistencies between the NIR and the CRF tables to improve transparency of the inventory.

3. Time-series consistency

152. There are some large inter-annual variations in the estimates of CH_4 emissions from solid waste disposal on land. For the period 1990–2004, Belarus reports an increase in CH_4 emissions from 111.83 to 201.55 Gg (80.2 per cent), but it reports an unusual decrease of 19.9 per cent for 1993–1994, an increase of 22.6 per cent for 1995–1996, and an increase of 34.5 per cent for 2002–2003. During the in-

country review, Belarus provided acceptable explanations for these inter-annual variations based on statistical data and DOC analysis. Belarus explained that DOC is analysed once every five years. The ERT recommends that Belarus ensure time-series consistency for the inventory estimates, using available data and country-specific parameters, and that it include information on inter-annual variations in its next inventory submission.

4. Uncertainties

153. In the 2006 submission the uncertainty for emission estimates in the waste sector is reported as ±33.5 per cent. The ERT considers that uncertainties for the sector could be higher than reported. The ERT recommends that Belarus provide more accurate estimates, possibly based on country-specific values, for its uncertainty estimates and provide a more detailed explanation on the calculation of uncertainties (e.g. tier, parameters, etc.) in the NIR of its next submission.

5. Verification and quality assurance/quality control approaches

154. No QA/QC plan or verification procedures are reported in the NIR. The ERT recommends that Belarus establish a QA/QC plan for the waste sector and implement QA/QC procedures, including continuation of the verification activities, and that it report on these in its next submission.

B. Key categories

Solid waste disposal on land – CH_4

155. Belarus has defined all SWDS as unmanaged for the complete time series because there is no control of scavenging at landfill sites, but it informed the ERT during the in-country review that all other control and management measures are implemented. The ERT recommends that Belarus reconsider the current classification of SWDS and use for its estimates all available statistical data and results from research available in the country, including country-specific data and definitions and recommendations of the IPCC good practice guidance.

156. Belarus reports that the IPCC tier 1 methodology is used for estimates in this category. The ERT notes that it is good practice to apply the tier 2 methodology (first order decay) for key categories and it recommends that Belarus, in its next inventory submission, apply a higher tier for estimating CH_4 emissions from solid waste disposal on land.

C. Non-key categories

1. Wastewater handling – CH_4

157. CH_4 emissions and recovery from industrial, domestic and commercial wastewater handling are reported as "NE". Belarus explained in the NIR that the basic way of treating domestic and industrial sewage in the country is biological treatment under aerobic conditions. The ERT recommends that Belarus use all available statistical data and results from research in the country, which indicate that a small amount of anaerobic wastewater treatment exists, and report emissions from industrial, domestic and commercial wastewater handling accordingly in its next inventory submission.

2. Wastewater handling – N_2O from human sewage – N_2O

158. N_2O emissions from human sewage reported in the NIR are inconsistent in some respects with CRF table 6.B. In table 8.6 of the NIR the N fraction reported is 0.61, whereas Belarus calculated the N_2O emissions with an N fraction of 0.16 (CRF table 6.B). During the in-country review, Belarus indicated that the correct value of 0.16 is used in calculations. Also in table 8.6 of the NIR, the protein consumption reported is 29.346 kg/person/year, whereas Belarus calculated the N_2O emissions from human sewage using a value of 30.00 kg/person/year (CRF table 6.B). During the in-country review, Belarus indicated that the correct value of 29.346 kg/person/year is used in calculations. The ERT

recommends that Belarus fully implement QA/QC procedures and improve consistency between the NIR and the CRF tables in its next inventory submissions.

159. Belarus reports an increase in protein consumption of 3.7 per cent for the period 1990–2004 (28.30 kg/person/year in 1990 and 29.35 kg/person/year in 2004), which could be an unusual trend for a country with an economy in transition. The ERT recommends that Belarus investigate and explain the reported changes of protein consumption in the period from 1990 to 2004 in its next inventory submission.

D. Areas for further improvement

1. Identified by the Party

160. Belarus has identified some areas for improvement in the waste sector in its 2006 NIR, such as the need to develop country-specific EFs, and to collect detailed data for estimates of CO_2 and other GHG emissions from industrial and domestic wastewater handling. Belarus also identified the need to improve the QA/QC procedures and implement independent verification activities.

2. Identified by the expert review team

161. The ERT recommends that Belarus revise and recalculate estimates for solid waste disposal on land and wastewater handling for its next submission, to take into account the waste management practices in the country and to be in accordance with the IPCC good practice guidance. In addition, the ERT recommends that Belarus provide more detailed information on methodologies, AD and EFs in the NIR of its next inventory submission, in order to improve transparency of the estimates, that it implement QA/QC procedures, including consistency checks for the input data and calculation results, in order to avoid mistakes and omissions, and that it implement verification activities using external experts.

VIII. Conclusions and recommendations

162. Belarus has made substantial improvements since its 2005 inventory submission. The 2006 inventory submission covers almost all source and sink categories for the period 1990–2004 and it is complete in terms of years and geographical coverage. The NIR has been extended to include more information on legal and institutional arrangements and the data-flow structure for inventory compilation and reporting; it also includes more references and sources of information for AD, methodologies and EFs used, information on QA/QC and verification activities performed, and anticipated future improvements. Belarus has provided inventory data in the CRF tables for the years 1990 to 2004 and used the new LULUCF reporting tables, but it did not provide CRF table 8(a) (with the exception of 1990 and 2003), table 8(b) or table 9(b). Belarus has not estimated actual and potential emissions of F-gases for 1990 and the latest years from the category 2.F consumption of halocarbons and SF_6 or some probable minor categories. The ERT recommends that Belarus report in the NIR and relevant CRF tables detailed information on recalculations performed, including the rationale for recalculations, and estimates for all missing categories, in particular actual and potential emissions of F-gases for the complete time series, and provide in the NIR discussions of these categories and other potential sources or sinks not yet addressed.

163. Emissions from all categories were estimated mainly using a tier 1 methodology and IPCC default EFs that are constant for the complete time series. The ERT encourages Belarus to make efforts to apply higher tier methodologies for key categories according to the IPCC good practice guidance and, in particular, to make use of country-specific parameters in its next inventory submission.

164. The ERT also encourages Belarus to implement the following key recommendations:

(a) Increase the number of qualified staff in the BelRC “Ecology” and ensure financial resources and wide support for the inventory team of the BelRC “Ecology” in order to

ensure a sustainable compilation of inventories in accordance with the UNFCCC reporting requirements;

(b) Ensure participation in the inventory preparation of highly qualified experts and institutions available in Belarus and use their recommendations in order to improve estimates of emissions and removals at sectoral and national levels, in particular for the energy and LULUCF sectors;

(c) Improve the structure of the NIR and transparency of the inventory by including additional information and explanations with regards to methodologies, EFs, assumptions for choosing parameters, and sources of AD, as well as better descriptions of individual sectors, and by enhancing consistency between the NIR and the CRF, to fully reflect the requirements of the UNFCCC reporting guidelines;

(d) Develop and implement a national QA/QC plan and include descriptions of the QA/QC and verification activities and procedures in appropriate sections of sectoral chapters of the NIR;

(e) Develop a system for the collection of AD and EFs with the goal of improving estimates and closing all gaps. Particular attention should be given to the availability of detailed and complete energy balances starting from 1990;

(f) Devote particular attention, efforts, staff and resources to the planning, preparation and management of the LULUCF inventory.

165. After the in-country review, Belarus informed the ERT that it will implement most of the recommendations for general and cross-cutting aspects of inventory preparation and detailed recommendations for all sectors in its next submissions. The ERT acknowledges this information and encourages Belarus to implement all these recommendations, as far as possible, in its next submission.

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/gpglulucf/gpglulucf.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>.

Status report for Belarus 2006. Available at <http://unfccc.int/resource/docs/2006/asr/blr.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2006. Available at <http://unfccc.int/resource/webdocs/sai/2006.pdf>.

FCCC/ARR/2006/BLR. Report of the individual review of the greenhouse gas inventory of Belarus submitted in 2005. Available at <http://unfccc.int/resource/docs/2006/arr/blr.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Ivan Narkevitch (Belarusian Research Centre "Ecology"), including additional material on the methodology and assumptions used. The following documents were also provided by Belarus:

Republic of Belarus, 2007. Statistical Yearbook. [Minsk, 2007], 620 p. ISBN 978 985 6858 17 1.

Republic of Belarus, 2008. Agriculture in the Republic of Belarus. Statistical Yearbook. [Minsk, 2008], 150 p. ISBN 978 985 6858 04 1.

Spreadsheet on areas of organic soil, which included data for 1990, 1995, 1999 and 2000, and a spreadsheet for 2005 (officially provided by the Ministry of Agriculture of Belarus).

Spreadsheet of data on manure management system usage for 1990, 2005, 2006 (officially provided by the Ministry of Agriculture of Belarus).

Spreadsheets of data on N fertilizer for 2005 and 2006 (officially provided by the Ministry of Agriculture of Belarus).

State Property Committee of the Republic of Belarus, 2001. *Soils of agricultural land*. Includes data on harvested organic soil area for 2000.

Ministry of Statistics and Analysis of the Republic of Belarus, 2008. *Agriculture of the Republic of Belarus.* Includes data on fertilizer and animal production.

World Bank and Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, 2003. *First National Communication in Response to Belarus' Commitment under the UN Framework Convention on Climate Change*.

Ministry of Statistics and Analysis of the Republic of Belarus. Table formats for collecting statistical data for monthly livestock farming, yearly livestock farming and mineral and organic fertilizer application.

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