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Report of the individual review of the inventory submission of Belarus submitted in 2012*

* In the symbol for this document, 2012 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

1. This report covers the centralized review of the 2012 inventory submission of Belarus, coordinated by the UNFCCC secretariat, in accordance with decision 19/CP.8. The review took place from 3 to 8 September 2012 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Christopher Dore (United Kingdom of Great Britain and Northern Ireland) and Ms. Jolanta Merkeliene (Lithuania); energy – Ms. Carmen Teresa Meneses Lopez (Venezuela), Mr. Ioannis Sempos (Greece) and Ms. Inga Valuntiene (Lithuania); industrial processes – Ms. Laura Dawidowski (Argentina) and Ms. Valentina Idrissova (Kazakhstan); agriculture – Mr. Chang Liang (Canada) and Mr. Yuriy Pyrozhenko (Ukraine); land use, land-use change and forestry (LULUCF) – Ms. Marina Shvangiradze (Georgia) and Mr. Richard Volz (Switzerland); and waste – Mr. Chart Chiemchaisri (Thailand), Ms. Baasansuren Jamsranjav (Mongolia) and Mr. Mikael Szudy (Sweden). Ms. Dawidowski and Mr. Dore were the lead reviewers. The review was coordinated by Ms. Kyoko Miwa (UNFCCC secretariat).

2. In accordance with the "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 made no comment on it.

3. In 2010, the main greenhouse gas (GHG) in Belarus was carbon dioxide (CO_2), accounting for 65.2 per cent of total GHG emissions [1] expressed in carbon dioxide equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (17.8 per cent) and methane (CH_4) (17.0 per cent). Hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.01 per cent of the overall GHG emissions in the country. Perfluorocarbons (PFCs) are reported as not applicable ("NA"), not estimated ("NE") and not occurring ("NO") for all years of the time series. The energy sector accounted for 63.1 per cent of total GHG emissions, followed by the agriculture sector (25.2 per cent), the waste sector (6.9 per cent), the industrial processes sector (4.6 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions excluding the LULUCF sector amounted to 89,444.38 Gg CO_2 eq and decreased by 35.7 per cent between 1990 and 2010. Total GHG emissions with LULUCF amounted to 59,265.21 Gg CO_2 eq. The LULUCF sector therefore constituted an offset of 33.7 per cent of the total GHG emissions in 2010. The trend in total GHG emissions is typical of countries with economies in transition, with a rapid decline in the early 1990s, followed by a slow increase from 2000 to 2006. After 2006 the trend in total GHG emissions is more variable, with increases and decreases between consecutive years. The expert review team (ERT) noted that the national inventory report (NIR) briefly explains the main drivers of the emissions trends for CO_2.

4. Tables 1 and 2 show GHG emissions under the Convention, by gas and by sector, respectively. In table 1, CO_2, CH_4 and N_2O emissions do not include emissions and removals from the LULUCF sector.

[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.

Table 1
Greenhouse gas emissions, by gas, 1990 to 2010

	Gg CO_2 eq							
Greenhouse gas	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*Change 1990–2010 (%)*
CO_2	103 806.85	57 599.77	53 319.28	56 669.77	60 328.70	56 827.71	58 318.34	–43.8
CH_4	15 217.16	11 704.96	11 421.85	13 116.46	14 520.68	14 968.71	15 221.89	0.03
N_2O	20 155.25	13 542.08	14 422.84	14 367.85	15 719.21	16 055.49	15 888.63	–21.2
HFCs	NA, NE, NO	2.84	9.35	26.19	35.80	32.20	13.10	NA
PFCs	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	0.01	0.41	1.48	2.39	2.42	2.42	NA

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

Table 2
Greenhouse gas emissions, by sector, 1990 to 2010

	Gg CO_2 eq							
Sector	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*Change 1990–2010 (%)*
Energy	102 242.80	57 259.52	52 684.07	55 311.53	58 659.50	54 832.60	56 441.59	–44.8
Industrial processes	3 614.68	2 035.73	2 604.72	3 484.65	3 971.00	3 996.27	4 112.54	13.8
Solvent and other product use	74.40	62.33	76.04	69.19	64.09	64.06	122.44	64.6
Agriculture	30 672.65	21 354.44	20 853.32	20 696.13	22 277.86	22 788.48	22 584.68	–26.4
LULUCF	–28 574.44	–31 221.80	–30 902.78	–26 209.98	–27 138.46	–30 043.54	–30 179.18	5.6
Waste	2 574.73	2 137.64	2 955.57	4 620.24	5 634.33	6 205.10	6 183.13	140.1
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	110 604.82	51 627.87	48 270.94	57 971.76	63 468.33	57 842.98	59 265.21	–46.4
Total (without LULUCF)	139 179.26	82 849.66	79 173.72	84 181.74	90 606.78	87 886.52	89 444.38	–35.7

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

II. Technical assessment of the inventory submission

A. Overview

1. Inventory submission and other sources of information

5. The 2012 inventory submission was submitted on 14 April 2012; it contains a complete set of common reporting format (CRF) tables for 1990–2010 and an NIR. The inventory submission was submitted in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines).

6. The ERT also used the previous year's submission during the review. During the review, Belarus provided the ERT with additional information, which was not part of the inventory submission. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

7. The inventory covers most source and sink categories and gases and is complete in terms of years and geographical coverage. However, the ERT considers that the justification for reporting PFC emissions from all sources for all years as "NA", "NE" and "NO" is currently insufficient. The ERT noted that the reporting in the CRF tables is complete and notation keys are used throughout. Belarus has provided all of the CRF tables for the period 1990–2010 with the exception of CRF table 8(b), where explanatory information for the recalculations has not been filled in. The ERT reiterates the recommendation made in the previous review report that Belarus provide all the necessary information in the corresponding CRF tables, in particular CRF table 8(b), in its next inventory submission.

8. Furthermore, the ERT noted that Belarus still reports a number of categories as "NO" or "NE", including as follows: in the energy sector, CO_2, CH_4 and N_2O emissions from solid fuel transformation under fugitive emissions from solid fuels and from gas/diesel oil under international marine bunkers, and CH_4 and CO_2 emissions from oil transportation; in the industrial processes sector, CO_2 emissions from limestone and dolomite use under mineral products, CO_2 and CH_4 emissions from ferroalloys production under metal production, HFC, PFC and SF_6 emissions from most of the subcategories under consumption of halocarbons and SF_6; in the following subcategories under the LULUCF sector: land converted to forestland (CO_2 emissions), land converted to cropland (CO_2 and N_2O emissions), grassland remaining grassland (CO_2 emissions), land converted to grassland (CO_2 emissions), land converted to wetlands (CO_2 and CH_4 emissions), land converted to settlements (CH_4 and N_2O emissions), land converted to other land (CH_4 and N_2O emissions), forest land converted to other land-use categories (CH_4 and N_2O emissions) and grassland converted to other land-use categories (CH_4 and N_2O emissions); and in the waste sector, CH_4 and N_2O emissions from industrial wastewater treatment, CH_4 emissions from domestic and commercial wastewater treatment. The ERT strongly reiterates the recommendation from several previous review reports that Belarus strengthen its efforts in collecting activity data (AD) and estimate emissions for the missing categories and subcategories indicated above, by using the methods outlined in the Intergovernmental Panel on Climate Change (IPCC) *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).

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

Overview

9. The ERT concluded that the institutional arrangements established by Belarus continued to perform their functions. The NIR does not indicate any changes that may have been made to the institutional arrangements in Belarus since the Party's previous inventory submission. The legal basis for inventory preparation and the overall structure of the institutional arrangements is briefly described in the NIR. However, there is little information on how the specific legal responsibilities for GHG inventory preparation are defined for individual ministries and private companies in official governmental decrees. The ERT encourages Belarus to provide further information about the legal role of all institutions in the institutional arrangements for GHG inventory preparation in the NIR of its next inventory submission.

Inventory planning

10. The NIR provides a description of the institutional arrangements for the preparation of the inventory. The Ministry of Natural Resources and Environmental Protection (MNREP) has overall responsibility for the preparation, planning and management of the national inventory. The Belarus Scientific Research Centre "Ecology" (hereinafter referred to as SRC "Ecology") is responsible for the compilation of the GHG inventory and its reporting. Final approval of the annual GHG inventory is given by MNREP. The NIR reports that a substantial amount of AD is obtained from annual publications of the National Statistical Committee of the Republic of Belarus (Belstat).

11. Other ministries are also involved in the provision of data for the inventory, including the Ministry of Industry, the Ministry of Transportation and Communications, the Ministry of Health Protection, the Ministry of Agriculture and Food, the Ministry of Forestry and the Ministry of Housing and Communal Services. Some AD for the energy and the industrial processes sectors are received by SRC "Ecology" from other organizations such as Belarus State Consortia for Oil and Chemistry, "Beltopgas", "Beltransgas" and "Belenergo" of the Ministry of Energy, the State Committee on Aviation and the State Committee on Property. The NIR indicates that private companies provide data for the preparation of the inventory, but does not provide detailed information on their specific contributions or roles. The ERT reiterates the previous encouragement to Belarus to provide more information in the NIR of its next inventory submission on the role of private companies in providing data for the inventory.

Inventory preparation

Key categories

12. Belarus has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2012 inventory submission. Belarus has included the LULUCF sector in its key category analysis, in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. A key category analysis without LULUCF is also reported. The key category analysis performed by Belarus and that performed by the

secretariat[2] produced different results due to different levels of aggregation. The ERT noted that the results of the key category analysis reported in CRF table 7 and in the NIR show different results, which is also due to the higher level of aggregation of subcategories in the CRF reporting. The ERT reiterates the recommendation from the previous review report that Belarus ensure the consistency of reporting between the CRF tables and the NIR in its next inventory submission.

13. Belarus does not report in the NIR whether it uses the key category analysis in the prioritization of developments and improvements to its inventory. In response to questions raised by the ERT during the review, Belarus explained that the key category analysis is used as one of the inputs into the construction of the prioritized improvement programme. However, the ERT noted that there have been very few improvements made since the previous inventory submission, and that many key categories are still estimated using tier 1 methodologies and default emission factors (EFs) despite repeated recommendations to use higher tiers and country-specific EFs made in several previous review reports. Considering that Belarus has not made any significant progress in this area, the ERT strongly reiterates the recommendation from previous review reports that Belarus enhance its efforts to implement improvements to the inventory by using higher tiers and country-specific EFs for key categories, in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. In particular, the ERT recommends that Belarus report in the NIR delivery deadlines with each of the planned improvements, so that future planning is presented with improved transparency in its next inventory submission.

Uncertainties

14. In its 2012 inventory submission, Belarus provided quantitative uncertainty estimates using the tier 1 analysis recommended in the IPCC good practice guidance. Belarus uses a mixture of default and country-specific values for the uncertainties of EFs and AD. The LULUCF sector is included in Belarus's uncertainty analysis. Cumulative uncertainty of the total GHG emissions for 2010 is 32.2 per cent (level) and 11.9 per cent (trend) and both values had decreased compared with values reported for the previous submission (32.7 and 12.0 per cent, respectively). The NIR does not provide a description of the reasons for the changes in the uncertainty estimates. The ERT recommends that Belarus include an explanation for the observed changes in reported uncertainty estimates between submissions in the NIR of its next inventory submission.

15. The ERT noted that the descriptions provided in the NIR of uncertainty values used for AD and EFs in most sectors are not transparent. Many uncertainty values are obtained by expert judgement, but the NIR lacks explanations for the rationale and procedures of such judgements. The ERT reiterates the recommendations from previous review reports that Belarus use only well-documented country-specific values for parameters in the uncertainty analysis. The ERT also recommends that, in its next inventory submission, Belarus report how the uncertainty analysis is used to prioritize inventory improvements.

Recalculations and time-series consistency

16. The NIR does not include a transparent overview of recalculations. Some sectoral chapters do include a subsection called "Recalculations", but all of these, with the

[2] 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 or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

exception of the LULUCF sector and glass production in the industrial processes sector (see paras. 17 and 57 below), state that no recalculations were undertaken.

17. Recalculations undertaken in the industrial processes sector (glass production) for the years 2007 and 2009 have been performed to correct errors in the CRF tables. The magnitude of the recalculations is insignificant. However, there is no information regarding this recalculation included in the industrial processes chapter of the NIR. Section 4.4.5 of the NIR (recalculations in the industrial processes sector) simply states that recalculations were undertaken (see para. 57 below). The ERT recommends that Belarus include in the NIR a comprehensive explanation of the recalculations that were undertaken, the reasons behind the recalculations and the resulting changes to emission estimates in its future inventory submissions.

18. Information on emission trends over time is included in the NIR, and the inventory submission is consistent across the time series.

Verification and quality assurance/quality control approaches

19. A general description of quality assurance/quality control (QA/QC) procedures is provided in the NIR. The NIR explains that the QA/QC plan was adopted by order of SRC "Ecology" in February 2009. However, several key parts of the QA/QC system are not fully explained or are missing from the NIR. For example, the NIR includes information on sector-specific QA/QC procedures for the LULUCF sector, but for other sectors there is very limited or no information on the checking of input data for errors, the comparison of input data with other available data sets, checking the output from emission calculations, or checking the consistency between the NIR and the CRF tables. The ERT reiterates the recommendation from the previous review report that Belarus report complete and detailed information on sectoral QA/QC procedures in the NIR of its next inventory submission, in particular for the key categories. During the review, in response to a question raised by the ERT, Belarus provided information on internal and external reviews that had been undertaken on the inventory. The ERT recommends that Belarus use this information on internal and external reviews as a starting point for developing the section in the NIR that describes in detail the QA/QC procedures and verification studies which are undertaken (both routine annual QA/QC procedures and specific peer reviews/verification studies that are undertaken).

20. The ERT noted that the NIR does not include sufficient information on internal and external verification undertaken as part of the QA/QC system. In response to questions raised by the ERT during the review, Belarus provided information which demonstrated that independent reviews had been undertaken on some sectors of the inventory. The ERT recommends that Belarus include the information on verification procedures (including independent inventory reviews) in the NIR of its next inventory submission.

21. Inconsistencies between the NIR and the CRF tables were noted by the ERT. For example: the land-representation matrix (table 7.2 in the NIR) does not agree with the areas reported in CRF tables 5.A–5.F (sectoral background tables for LULUCF) (see para. 84 below); the NIR indicates that N_2O emissions from human sewage have been recalculated, but this is not reported in the CRF tables and during the review, Belarus confirmed that no recalculations were made (see para. 100 below). The ERT therefore strongly recommends that Belarus review its current QC procedures and strengthen them to ensure that the QC activities are sufficient to ensure that information reported in the CRF tables and the NIR is consistent in its next inventory submission.

Transparency

22. The ERT found many examples throughout the NIR where transparency was not sufficient to allow the ERT to obtain a full understanding of the inventory calculations. The ERT reiterates the recommendation from the previous review reports that Belarus make a specific effort to address the issues of transparency, such as those identified below (see paras. 23 and 24 below).

23. The description of data collection, the methodologies and EFs used for the estimation of emissions are not fully provided in the NIR to allow the ERT to reproduce the estimations. For example, there is insufficient information on AD used in estimating emissions with the reference approach in the energy sector (see paras. 35 and 37 below). This prevents the ERT from adequately considering the comparison between the reference and sectoral approaches for the energy sector. The inclusion of more tabulated AD in the NIR and clear explanations/examples of calculations (e.g. the inclusion of mathematical formulae for the more complex methodologies) would also significantly improve the transparency of the NIR, as required by the UNFCCC reporting guidelines. In the industrial processes sector, information and explanations on the methodologies and EFs applied for all non-key categories were poorly documented and non-key categories were reported together under "Other production" in the NIR (see para. 59 below). The ERT reiterates the recommendation in previous review reports that Belarus include in the NIR of its next inventory submission, in a transparent and complete manner, more comprehensive information to explain the methodologies, procedures and descriptions of the data collection process and more data tables to present the input data and EFs that have been used, as well as provide background information on all AD used in the inventory.

24. The NIR did not contain information on an inventory improvement programme, and how it is operated. The ERT recommends that Belarus include comprehensive information on the inventory improvement programme in the NIR of its next inventory submission, specifically information on how improvements were compiled and the way in which contributions from members of the inventory team and other independent experts were collated and managed, how improvements were prioritized, including the use of the key categories and uncertainty analyses (see paras. 13 and 15 above), measures taken to ensure that identified priority tasks were implemented, and improvements planned for the future with delivery deadlines.

Inventory management

25. As reported in the NIR, Belarus has a centralized archiving system (maintained by SRC "Ecology"), which includes the archiving of disaggregated EFs and AD, and documentation on how these EFs and AD have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures and verification, and documentation on the annual review of key categories and key category identification and planned inventory improvements. However, the NIR does not include a clear improvement plan, and the ERT therefore recommends that Belarus include this in the NIR of its next inventory submission (see also para. 13 above).

26. The NIR does not include any information on the personnel involved in the development and management of the inventory to demonstrate sufficient levels of capacity and expertise to undertake the various tasks and roles within the inventory team (e.g. technical expertise in different sectors, experience of operating QA/QC systems, management expertise). In response to questions raised by the ERT during the review, Belarus provided information on the inventory team members and their experience. The ERT recommends that Belarus include this type of information in the NIR of the next

inventory submission in order to clearly show that the inventory team has sufficient capacity and expertise to undertake its responsibilities.

3. Follow-up to previous reviews

27. The ERT commends Belarus for its efforts to address errors in the AD for glass production under the industrial processes sector (see para. 57 below). However, the ERT noted that the majority of the recommendations made in this report for the 2012 inventory submission of Belarus have already been identified in previous review reports. Noting that Belarus has continued to fail to address these issues, the ERT strongly recommends that Belarus take actions to improve its annual GHG inventory submission. The main specific actions recommended in previous review reports that have not been addressed by Belarus are the following:

(a) To use a tier 2 or higher methodology for all key categories;

(b) To calculate emission estimates for categories currently reported as "NE", or report them as "NO" where it is determined that the activity does not occur;

(c) To ensure consistency between the data reported in the NIR and all CRF tables;

(d) To put in place an inventory improvement plan and deliver the actions identified by the plan.

4. Areas for further improvement identified by the expert review team

28. During the review, the ERT identified several issues for improvement. These are listed in table 3 below.

29. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report and in table 3 below.

B. Energy

1. Sector overview

30. The energy sector is the main sector in the GHG inventory of Belarus. In 2010, emissions from the energy sector amounted to 56,441.59 CO_2 eq, or 63.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 44.8 per cent. The key drivers for the decrease in emissions since 1990 are: the restructuring of the national economy towards a market economy and the disintegration of the Soviet Union; an increase in energy efficiency; the switch in fuel use from residual oil and coal to natural gas; and the increased use of wood as a fuel in households. The ERT considers the trends in the energy sector to be an accurate representation of the situation in Belarus, and the ERT also considers that the trends in the energy sector are comparable with trends observed in other countries in the same geographical region of Europe.

31. Within the energy sector, 56.3 per cent of the emissions were from energy industries, followed by 15.7 per cent from the category other sectors, 14.4 per cent from manufacturing industries and construction and 9.4 per cent from transport. Fugitive emissions from fuels accounted for 3.1 per cent, which includes emissions from oil and natural gas only. The remaining 1.2 per cent were from the category other. Natural gas consumed in the country is imported from the Russian Federation and the amount consumed in the industrial and public sectors has increased by 23.5 per cent since 1990.

32. Despite recommendations made in previous review reports, there is still a lack of transparency in the NIR for the energy sector. For example, the ERT noted that the energy

balance tables in the NIR do not provide a good level of sectoral disaggregation, and also noted that there is not a sufficient explanation of the sources of the data and how they are processed for use in the inventory (see para. 34 below), or the calculations that are undertaken to estimate emissions for the different categories in the energy sector. The ERT strongly reiterates the recommendation from the previous review report that Belarus improve the transparency and detail of the information on EFs and AD reported in the NIR of its next inventory submission, for example by including in the NIR summary tables of the AD and EFs that are used in the inventory, and by providing clear explanations of the calculations performed to estimate the emissions in the inventory.

33. The ERT noted that very limited QC procedures are conducted as part of the inventory compilation process. The ERT therefore recommends that Belarus make improvements to the QA/QC system, and in particular encourages that tier 2 QC procedures are implemented for the key categories in the energy sector. The NIR includes a general description of the QA/QC system; however, there is a lack of detailed information on the handling of data. The ERT therefore recommends that Belarus includes, in the NIR of its next inventory submission, detailed information about data management and handling, as well as emission calculation.

34. As identified in previous review reports, the ERT noted that emissions from the category energy industries continue to be reported only for the subcategory public electricity and heat production, and also noted that emissions from manufacturing industries and construction continue to be reported only for the subcategory other. The notation keys included elsewhere ("IE"), "NO" and "NA" are used for other subcategories within energy industries and manufacturing industries and construction. To improve the transparency and comparability of the inventory, the ERT strongly reiterates the recommendation that Belarus report emissions for the subcategories under the energy industries and the manufacturing industries and construction categories in a disaggregated manner.

2. Reference and sectoral approaches

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

35. CO_2 emissions from fuel combustion were calculated using both the reference and sectoral approaches. In the 2012 inventory submission, there is a difference of 0.52 per cent in CO_2 emissions between the reference and sectoral approaches for 2010, the reference approach results being higher. However, the ERT noted that the percentage differences in CO_2 emissions between the reference and sectoral approaches for individual fuels are significant. For example, the percentage difference for liquid fuels is 17.70 per cent (reference approach results are lower) and 4.7 per cent for gaseous fuels (reference approach results are higher). The ERT strongly recommends that Belarus investigate and explain, in the NIR of its next inventory submission, the causes of the differences observed between the reference and sectoral approaches – and in particular the difference observed for liquid fuels, where the apparent consumption of fuel is higher in the reference approach, but the resulting CO_2 emissions are lower.

36. The ERT noted that there is no description of the reference approach or the differences between the reference and sectoral approaches in the NIR, despite a recommendation in the previous review report to include a description in the NIR. The ERT strongly reiterates the recommendation that Belarus include a description of the reference approach calculations and the differences between the reference and sectoral approaches in the NIR of its next inventory submission.

37. The ERT noted that the apparent energy consumption excluding non-energy use and feedstocks in CRF table 1.A(c), which shows the comparison between emission estimates using the reference and sectoral approaches, is reported as "NA" for all fuels. The ERT also

noted that, for all fuels in CRF table 1.A(d) reporting feedstocks and non-energy use of fuels, there is no information on the amount of carbon subtracted from the energy sector, the emissions associated with this and their sector allocation. The ERT recommends that Belarus review the non-energy use of fuels and fully report information in CRF tables 1.A(c) and 1.A(d), to improve transparency and completeness.

38. Noting that the CO_2 emissions from the reference approach are 4.7 per cent higher than the sectoral approach for gaseous fuels, the ERT recommends that Belarus investigate the inclusion of the estimates of carbon stored in the non-energy use of natural gas (268.50 Gg carbon or 984.50 Gg CO_2 not emitted in the energy sector) in the reference approach. Although this is not enough to account for the observed differences between the reference and sectoral approaches, if taken into account, it would substantially decrease the observed discrepancies for gaseous fuels.

39. During the review, Belarus indicated to the ERT that it will investigate the reasons for the observed differences between the reference and sectoral approaches, and will provide appropriate comments in the CRF tables and in the NIR for the next inventory submission. In addition to the recommendations made in paragraphs 35–38 above, the ERT recommends that Belarus report in the NIR detailed explanations of the differences that arise, as well as plans for addressing any significant shortcomings of the current methodology.

40. The ERT also noted that CO_2 emissions calculated using the sectoral and reference approaches in the 2011 inventory submission differed by 12.09 per cent for 2009. This is significantly higher than the differences observed in the 2012 inventory submission for the same year; however, there was no explanation provided for this change in the NIR. The ERT strongly recommends that, in the descriptions of the reference approach and the detailed comparison between the CO_2 emissions from the reference approach and the sectoral approach in the NIR, Belarus include an explanation of the changes that have been caused by recalculations or methodological changes that have been undertaken since the previous inventory submission.

41. The apparent fuel consumption in the Party's reference approach for 2010 was compared with data from the International Energy Agency (IEA) by the ERT. Corrections were made to the Party's data for the purposes of this comparison (e.g. production of refinery gas is reported in the CRF tables but was not included in this reference approach calculation for the comparison, and household oven fuel was moved from "other liquid fossil" to "other oil"). After these corrections, the apparent consumption of fuels calculated by the Party using the reference approach for all years of the time series corresponded with the data reported to IEA to within 6 per cent. The ERT noted discrepancies between the Belarusian and IEA fuel production data for all years (1990–2010) for each type of fuel: crude oil (0.4 per cent), peat (–15 per cent) and natural gas (3 per cent, except for the period 1990 to 1992 when it is +1 per cent). In response to a question raised by the ERT during the review week, Belarus indicated that the fuel data used in the inventory are "official and provided by the National Committee on Statistics of the Republic of Belarus. The difference with IEA data may be explained by some differences in allocation of secondary fuels in national reporting provided for IEA and that provided for GHG emissions calculations". Belarus indicated that the issue would be passed to the National Committee on Statistics. The ERT recommends that Belarus include in the NIR a comparison between the fuel data used in the inventory and the corresponding IEA data, and explain any significant differences.

International bunker fuels

42. Belarus took into consideration a recommendation from the previous review report regarding the inclusion of jet kerosene reporting in CRF table 1.A(b) for reporting CO_2

emissions from fuel combustion under the reference approach. The ERT commends Belarus for this improvement. However, the ERT noted that there was no explanation of the methodology in the NIR, or an indication of the source of the new AD. The ERT therefore recommends that Belarus include information in the NIR of its next inventory submission on how jet kerosene is allocated between domestic and international flights, and include information on the source of these AD.

Feedstocks and non-energy use of fuels

43. The ERT noted that, in CRF table 1.A(d) reporting feedstocks and non-energy use of fuels, feedstock and non-energy use of naphtha, lubricants, coal oils and tars (for these fuels carbon stored is reported as "NE") and ethane are reported as "NO" without any explanation being provided in the NIR. As indicated in the previous review report, Belarus explained that there was an incorrect use of notation keys for these fuels. However, the ERT noted that no change has been implemented by the Party in its 2012 inventory submission. The ERT therefore reiterates the recommendations made in the previous review report that Belarus review the use of the notation key "NO", report corresponding estimates or provide the necessary justification for the use of that notation key for these fuels in its next inventory submission.

3. Key categories

Stationary combustion: liquid, solid and gaseous fuels – CO_2

44. The ERT noted that for calculating CO_2 emissions, Belarus is using default IPCC EFs and country-specific net calorific values (NCVs). The ERT also notes the recommendation of the previous review report that Belarus follow the IPCC good practice guidance for key categories under stationary combustion and use a higher-tier method with country-specific carbon contents for all fuels (as well as country-specific NCVs and oxidation factors). The ERT therefore strongly recommends that the Party source and apply country-specific oxidation factors where possible, but in particular for key categories.

45. The ERT noted that, for solid fuels, the NIR incorrectly indicates that the methodology uses country-specific oxidation factors, as well as country-specific NCVs, with default carbon content of fuels from the Revised 1996 IPCC Guidelines. The ERT recommends that Belarus correct the explanation in the NIR so that it accurately describes the methodology that is used for solid fuels (in this case, indicating that the oxidation factors for solid fuels are not country-specific). The ERT also noted that there was limited detail in the NIR regarding the derivation of the country-specific NCVs for solid fuels, and in particular a lack of justification that the proposed country-specific NCVs better reflect the national circumstances than IPCC default NCV data. The ERT therefore recommends that Belarus explain in more detail the derivation of the country-specific NCVs of solid fuels, and hence provide a justification for the use of these country-specific data.

46. The ERT noted that the category disaggregation applied by Belarus in its inventory submission for manufacturing industries and construction is not disaggregated to the CRF categories (e.g. iron and steel, chemicals, etc. are reported under other (manufacturing industries and construction), which is not consistent with the UNFCCC reporting guidelines. Belarus explained in the NIR that the national statistics agency has started making improvements in this area, and that although this work is still in progress it will finish in time for the next inventory submission. The ERT recommends that Belarus complete the planned improvements to allow the reporting of disaggregated emission data by sub-category within the category of manufacturing industries and construction in the next inventory submission.

Road transportation: liquid fuels – CO_2

47. For estimating emissions from road transportation using liquid fuels, Belarus uses default EFs from the Revised 1996 IPCC Guidelines. According to the NIR, this is because information on the fuels used for road transportation is not available in a format that is disaggregated into fuel used by each type of vehicle (cars, heavy-duty and light-duty trucks, buses and other). The ERT noted that, in response to a recommendation from the previous review report, Belarus explained in the NIR that national statistics provide only aggregated data for stationary and mobile fuel consumption and it is assumed that most of these fuels are used for transportation needs. For example, the ERT noted that Belarus uses the IPCC default EF for estimating CO_2 emissions from gasoline in this category. This is a key category and therefore, in accordance with the IPCC good practice guidance, country-specific EFs should be used to estimate emissions from gasoline. In response to a question raised by the ERT during the review, Belarus explained that it is using a country-specific NCV for this fuel. However, the ERT does not consider that this supports the current choice of EF for gasoline. The ERT recommends that Belarus include any additional information in the NIR of its next inventory submission to support the choice of EFs.

48. The ERT strongly reiterates the recommendation from the previous review report that Belarus use country-specific EFs to estimate emissions for this key category, in line with the IPCC good practice guidance. The ERT encourages Belarus to make efforts to obtain detailed data on fuel use, disaggregated by type of vehicle, with a view to estimating CO_2 emissions using a tier 2 approach as a quality check, and with a view to making available the necessary AD for the calculation of CH_4 and N_2O emissions for this category using a more reliable bottom-up approach and taking into account EFs for different pollution control technologies (see paras. 53 and 54 below).

Fugitive emissions from fuels: oil and natural gas – CH_4

49. The ERT noted that fugitive CH_4 emissions from natural gas leakage at industrial plants and power plants in 2009 are unusually low when placed in the context of the whole time series of emissions. However, the causes of this relatively low value in 2009 are not described in the NIR or CRF tables, and cannot be deduced from the table of data provided in the NIR. The ERT recommends that Belarus check and correct the estimated CH_4 emissions for 2009 from natural gas fugitive sources and, if no errors are present, that the Party add an explanation of the data to the NIR of its next inventory submission. The ERT also strongly reiterates the recommendation from the previous review report that Belarus include in the NIR detailed descriptions of the activities associated with oil and natural gas that would give rise to fugitive emissions, as well as the data used in the emission estimates. Furthermore, Belarus currently uses a tier 1 method when estimating CH_4 fugitive emissions, which is not in line with the IPCC good practice guidance, because this is a key category. Consequently, the ERT recommends that Belarus use a tier 2 or higher-tier method in accordance with the IPCC good practice guidance for its next inventory submission.

50. The ERT notes that natural gas transport through the territory of Belarus is considerable (more than three times the volume of the domestic consumption). Therefore, the ERT strongly reiterates the recommendation from the previous review report that Belarus develop and use a country-specific CH_4 EF based on the length of the transmission pipelines (similar to those recommended by the IPCC good practice guidance), and include fugitive and venting emissions (including CO_2) from this activity in its next inventory submission. Furthermore, fugitive CH_4 emissions from natural gas transport are currently reported under the subcategory other (oil and natural gas) instead of the category transmission. The ERT reiterates the recommendation from the previous review report that Belarus either reallocate these emissions to the transmission subcategory in the CRF tables,

or transparently describe in the NIR the reasons for the current allocation in the CRF tables. In addition, the ERT noted that distribution CH_4 emissions are reported as "IE" and allocated under the transmission subcategory. The ERT strongly reiterates the recommendation of the previous review report that Belarus explore ways to report the distribution of CH_4 emissions under the distribution of natural gas in order to improve the comparability of its inventory.

51. Emissions of CH_4 from venting of oil and gas are reported as "IE" in CRF table 1.B.2 for fugitive emissions from oil, natural gas and other sources, with the explanation that they are reported under the subcategory combined venting. However, CH_4 emissions from combined venting are reported as "NO". CH_4 emissions from flaring of oil and gas are also reported as "IE" with a similar explanation that emissions are reported under combined flaring, and an emission estimate is included in the CRF table. The ERT notes that Belarus processes significant volumes of crude oil, and therefore recommends that Belarus make an estimate of CH_4 emissions (also of CO_2, if relevant) from venting activities in the oil industry and include the emission estimate in its next inventory submission. The ERT further recommends that Belarus clarify and revise its use of notation keys for the reporting of fugitive emissions from venting and flaring, and more transparently document their use (e.g. the use of the notation key "IE" for CH_4 from oil and natural gas venting, and "NA" for CO_2 from flaring of gas) in both the CRF tables and the NIR.

52. In the CRF tables, Belarus reports CH_4 emissions (as well as CO_2 emissions) from oil transport as "NO". However, the ERT noted that Belarus reports oil imports, oil production and oil refinement in CRF table 1.A(b). As indicated in the previous review report, Belarus clarified that the correct notation key is "NE". The ERT strongly recommends that Belarus estimate emissions from this category in its next inventory submission. If it is not possible to obtain data to estimate emissions for the next inventory submission, then the ERT strongly recommends that Belarus use the notation key "NE" until emission estimates are available.

4. Non-key categories

Road transportation: liquid fuels – CH_4 and N_2O

53. In the 2012 inventory submission, Belarus reported the use of default CH_4 EFs from the Revised 1996 IPCC Guidelines for estimating CH_4 and N_2O emissions from road transportation. The ERT noted that the CH_4 EF for liquefied petroleum gas (LPG) in road transportation used by Belarus appears to be the default EF for natural gas in table 1-7 of volume 3 of the Revised 1996 IPCC Guidelines (50 kg/TJ). This is not the correct EF for estimating CH_4 emissions from LPG use for road transportation. The ERT also noted that this issue was raised in the previous review report. The ERT therefore strongly reiterates the recommendation from the previous review report that Belarus use the CH_4 EF for LPG as listed in table 1-45 of volume 3 of the Revised 1996 IPCC Guidelines (20 kg/TJ) for estimating emissions for its next inventory submission, if a country-specific EF is not available for this fuel (comments on the use of country-specific EFs for estimating emissions from road transportation are also included in para. 48 above).

54. The N_2O implied emission factor (IEF) reported for gasoline (0.6 kg/TJ) for the complete time series is below the IPCC default range for European vehicles (1–20 kg/TJ). The N_2O IEF reported for diesel cars (0.6 kg/TJ) for the complete time series is also below the IPCC default range for European vehicles (3–4 kg/TJ). These EFs may be appropriate for older cars without catalytic converters; however, as noted in the previous review report, Belarus's vehicle fleet is expected to include a significant number of cars equipped with catalytic converters, which have significantly higher N_2O emissions. The use of 0.6 kg/TJ as the EF in the calculation may therefore not give estimates which are accurate and

representative of the current vehicle fleet. The ERT therefore strongly reiterates the recommendation from the previous review report that Belarus estimate the amount of fuel used by vehicle type and, in particular, consider the number of vehicles equipped with catalytic converters and revise its N_2O emission estimates using appropriate N_2O EFs for its next inventory submission (comments on the use of country-specific EFs in the road transportation category are also included in para. 48 above).

Fugitive emissions from fuels: solid fuels – CO_2, CH_4 and N_2O

55. Belarus has reported "NE" for emissions of CO_2, CH_4 and N_2O from solid fuel transformation for all years, and cites "no available data" as the reason for reporting the notation key "NE". The ERT recommends that Belarus collect data to allow emission estimates to be made and report these emissions in its next inventory submission.

C. Industrial processes and solvent and other product use

1. Sector overview

56. In 2010, emissions from the industrial processes sector amounted to 4,112.54 Gg CO_2 eq, or 4.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 122.44 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since 1990, emissions have increased by 13.8 per cent in the industrial processes sector, and increased by 64.6 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector is an increase in cement production by 98.1 per cent due to growth in the construction industry. Growth in the emissions from the solvent and other product use sector is due to the increased emissions of N_2O from anaesthesia (because this is the only subcategory that is reported for that sector). Within the industrial processes sector, 65.7 per cent of the emissions were from mineral products, followed by 32.4 per cent from chemical industry and 1.6 per cent from metal production. The remaining 0.4 per cent were from consumption of halocarbons and SF_6.

57. The Party has made minor recalculations for the industrial processes sector (CO_2 from glass production) between the 2011 and 2012 inventory submissions in order to rectify errors in the AD identified in the 2011 inventory submission for the years 2007 and 2009. These recalculations gave rise to only insignificant changes. The NIR states that recalculations were undertaken, but does not provide information on the improvements that were made, or the errors that were corrected. In addition, CRF table 8(b), which is for explanatory information on recalculations, lists the sectors and categories, and gases in relation to which recalculations have been made, does not include information on the recalculations. To improve transparency, the ERT strongly recommends that, in its next inventory submission, Belarus include in the NIR a justification and explanation of any recalculation made to the reported emission estimates, explain the impacts on the emission estimates and report this information in CRF table 8(b).

58. The ERT noted that Belarus has included only minor changes in the text of the industrial processes chapter in the NIR for the last three submissions, and none of the recommendations of the previous ERTs were followed. The ERT considers that improvements are required to the QA/QC system to ensure that inventory improvements are planned and delivered in a timely manner. The ERT therefore strongly recommends that Belarus implement additional sectoral QA/QC procedures to ensure that improvements to the transparency and completeness of the inventory are delivered in line with the recommendations from this and previous review reports. In particular, the ERT recommends that improvement actions include a delivery deadline to aid the improvement planning process (see para. 24 above).

59. The ERT noted lack of transparency in the information and explanations for all non-key categories of this sector reported in the NIR, as they were aggregated under the "Other production" section of the NIR. Although it is possible to understand from the CRF tables that IPCC default EFs were used for almost all of these categories (by comparing the IEFs reported in the CRF tables with IPCC default values), the methodologies, AD and EFs applied are poorly documented in the NIR. In order to ensure that Belarus fully adheres to the transparency requirements of the UNFCCC reporting guidelines in its next inventory submission, the ERT strongly recommends that the Party improve the overall transparency of this sector by including clear and concise information in the NIR on the methods, EFs and AD used to estimate emissions for each category, as well as other additional information considered relevant.

60. Belarus continues to report actual HFC emissions from refrigeration and air-conditioning equipment only and reports actual SF_6 emissions from electrical equipment under the category consumption of halocarbons and SF_6 for 1995 to 2010. Other subcategories and some species of HFCs, PFCs and SF_6 emissions are reported as "NE" due to lack of AD, or "NO". The ERT considers that this may represent an underestimation of the emissions from these subcategories, and therefore recommends that Belarus collect AD and estimate emissions from the missing subcategories to allow more complete reporting of emissions in its next inventory submission. The ERT noted that the NIR indicates that estimating potential emissions of HFCs from refrigeration equipment is included in the planned improvements. The ERT encourages Belarus to undertake this improvement and report potential emissions.

61. Belarus reported CO_2 emissions from limestone and dolomite use as "NE", due to a lack of AD for the complete time series, despite the recommendation of the previous ERT for the Party to collect AD and report emission estimates for this category. In its response to a question raised by the ERT during the review, Belarus explained that data were collected only partly and there was "no possibility" to use these data in the calculations. The ERT recommends that Belarus collect all the required AD and estimate CO_2 emissions from limestone and dolomite use to improve the completeness of its inventory.

2. Key categories

Cement production – CO_2

62. Belarus used the IPCC tier 2 methodology from the IPCC good practice guidance for estimating emissions from cement production. Belarus used the clinker production volumes as the AD and default values from the IPCC good practice guidance for calcium oxide content (0.65) and cement kiln dust correction factor (1.02). In the NIR, Belarus stated that it intends to collect and use plant-specific data from three active plants existing in the country. The ERT encourages Belarus to strengthen its efforts to collect plant-specific AD and EFs and use these data for its calculations for its next inventory submission.

3. Non-key categories

Ferroalloys production – CO_2

63. In response to a question raised by the ERT during the previous review, Belarus confirmed that ferroalloys production does not occur in the country and that the notation key "NO" should be used to report this category. However, emissions from ferroalloys production were still reported as "NE" for the complete time series in CRF tables 2(I) and 2(II) in the Party's 2012 inventory submission. The ERT reiterates the recommendation from the previous review report that Belarus clarify the situation regarding ferroalloys

production in the country and use the appropriate notation key in its next inventory submission.

Iron and steel production – CO_2

64. Emissions from steel and pig iron production are reported as "IE" in the subcategory other under iron and steel production. In response to a question raised by the ERT during the review, Belarus explained that metal is imported to the country and that the metal industry in the country uses scrap metal. The technological basis of these metallurgical processes is the electric arc furnace. The ERT considers that in this case "NO" should be used for pig iron production and emissions from steel production should be reported under the steel subcategory. The ERT therefore recommends that Belarus make proper use of the notation keys and documentation boxes in the CRF tables and include relevant information in the corresponding sections of the NIR of its next inventory submission.

D. Agriculture

1. Sector overview

65. In 2010, emissions from the agriculture sector amounted to 22,584.68 Gg CO_2 eq, or 25.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 26.4 per cent. The key driver for the fall in emissions is the reduction in the country's livestock population since the early 1990s. In the former Soviet Union the fodder for cattle was generally imported from Kazakhstan and, after the dissolution of the Soviet Union, the export of fodder from Asia to Belarus became economically unprofitable and large populations of animals were slaughtered. Another significant factor influencing the emissions trend is the decrease by 22.5 per cent in the nitrogen fertilizer consumption for the reporting period. Within the sector, 60.4 per cent of the emissions were from agricultural soils, 28.5 per cent were from enteric fermentation and 11.1 per cent were from manure management.

66. The ERT undertook comparisons of the livestock numbers used in the inventory with data provided by the Food and Agriculture Organization of the United Nations (FAO) and found significant differences between the two data sets. In response to a question raised by the ERT during the review, Belarus indicated that the differences in livestock numbers are caused by the differences in the reporting periods used by these two sources. The data presented in the NIR report average annual livestock population, while the FAO data sets report data from the beginning of the year for all types of farms, including agricultural organizations, household plots and private farms. Belarus also confirmed that national data on the amount of nitrogen (N) fertilizer applied do agree with the corresponding FAO data. The ERT noted that Belarus had not presented in the NIR a comparison of the livestock numbers or nitrogenous fertilizer consumption used in the inventory with data from FAO. The ERT considers this to be a useful comparison for QC purposes, which follows the IPCC good practice guidance. The ERT therefore encourages Belarus to undertake this comparison and report the findings in the NIR.

67. The NIR does not completely follow the structure outlined in the UNFCCC reporting guidelines. In particular, the ERT noted that the following sections are not available in the NIR: category-specific QA/QC and verification, and category-specific planned improvements. The ERT recommends that Belarus follow the structure outlined in the UNFCCC reporting guidelines and report the necessary information in the above mentioned sections in the NIR of its next inventory submission.

68. For emissions from enteric fermentation and manure management, some country-specific data are used in the methodology. However, the ERT noted that a large amount of

these country-specific data that are used (e.g. milk production, average weight of all animal species and digestibility of feed) are not supported by references, which reduces the transparency of the estimates. The ERT recommends that Belarus provide clear references for all the data used in the emission estimates in its next and subsequent inventory submissions.

69. Country-specific EFs for enteric fermentation and manure management per subcategory of non-dairy cattle are only presented in the NIR at the aggregated level (agricultural enterprises and households). In response to a question raised by the ERT during the review, Belarus provided tabulated information on the country-specific EFs at a disaggregated level. The ERT is of the view that this EF database is generally reliable and encourages Belarus to include this information in the NIR of its next inventory submission to aid transparency.

70. The ERT noted that, in CRF tables 4.A for enteric fermentation and 4.B for manure management, related information, such as average gross energy intake, average CH_4 conversion rate and methane conversion factor for sheep, goats, horses, swine and poultry, are reported as "NE". The ERT notes that the notation key "NE" is used when a parameter is not estimated and is related to the completeness of an emission estimate in the GHG inventory. Belarus, however, did report CH_4 emissions for these animal categories in the CRF tables. Therefore, the ERT considers that the correct notation key to be used for sheep, goats, horses and swine is "NA", because it is not necessary to report these parameters in the light of the method that has been used. For poultry, there is no IPCC methodology for estimating enteric fermentation, and therefore the current use of "NE" is considered by the ERT to be appropriate.

71. The NIR indicates that an uncertainty analysis of national EFs for cattle enteric fermentation as well as cattle and swine manure management has not been undertaken, and consequently default IPCC uncertainty values have been chosen. This means that it is not possible to judge whether the tier 2 methods used by Belarus increased the accuracy of the emission estimates. The ERT recommends that Belarus calculate uncertainties for these categories following the procedure described in the IPCC good practice guidance (chapter 6) and report the results in its next inventory submission, together with references to literature or other sources to support the country-specific uncertainty values used in the calculations.

72. The ERT noted that no recommendations relating to the agriculture sector from the previous review report had been implemented in the 2012 inventory submission. The ERT recommends that Belarus address all of the issues raised by the current and previous review reports, and also recommends that the Party put in place an inventory improvement plan which ensures that recommendations made in review reports can be implemented in a timely and effective manner, following specific delivery deadlines for each improvement activity (see para. 24 above).

2. Key categories

Enteric fermentation – CH_4

73. CH_4 emissions from cattle is the dominant source of emissions in the enteric fermentation category in 2010, contributing 97.1 per cent of the total emissions of the category. A tier 2 method is utilized for the estimation of emissions from dairy and non-dairy cattle. This is in line with the IPCC good practice guidance.

74. For calculating gross energy intake, data are required on feed digestibility, and the ERT noted that reference to the feed digestibility data for cattle (60 per cent) was not provided in the NIR. During the review, in response to a question raised by the ERT, Belarus explained that Eastern European default data for feed digestibility were used for the

calculations of gross energy intake and referred to the Revised 1996 IPCC Guidelines (volume 3, tables A1 and A2, pp. 4.31 and 4.32). Belarus further explained that there was an underlying assumption that feed was of a low quality. The ERT reiterates the recommendation from the previous review report that Belarus include descriptions of underlying data, assumptions and corresponding references in the NIR of its next inventory submission to ensure transparency of the parameters used in calculating gross energy intake.

Manure management – CH_4 and N_2O[3]

75. Cattle and swine are the main sources of CH_4 emissions under manure management, contributing approximately 90.8 per cent of the total CH_4 emissions from manure management. Solid storage systems are responsible for 99.5 per cent of N_2O emissions within the category. A tier 2 approach is used for emission estimates from cattle and swine, and a tier 1 methodology is used for other animal species. The ERT commends Belarus for using appropriate tier methodologies for this category.

76. Some data for non-dairy cattle as well as swine are reported as "NE" in CRF table 4.B(a) for CH_4 emissions from manure management, with the explanation that detailed data are provided in the NIR (e.g. volatile solids, maximum methane producing potential (B_o), body weight and allocation of manure per animal waste management system). Assuming that data on the population of non-dairy cattle per subgroup are available, the ERT recommends that Belarus calculate the average-weighted values of volatile solids and the animal weight and manure allocation, and report these in CRF tables 4.A for enteric fermentation and 4.B for manure management, to improve the transparency and comparability of its next inventory submission. The ERT also recommends that Belarus report B_o values for the corresponding animal categories in CRF table 4.B for manure management.

77. According to the data from NIR table 6.16, poultry in households are not pastured and 100 per cent of poultry droppings are stored in the solid form. However, the ERT noted that paddocks near the sheds are likely to be used and that use of these paddocks can be classified as manure on pastures. During the review, Belarus explained that this issue will be investigated before the next inventory submission and noted that the population of poultry in households is approximately 15–17 per cent of the total population on all types of farm. The ERT recommends that Belarus collect and document the data necessary for the derivation of a more accurate distribution of poultry droppings to the different animal waste management systems, and estimate and report emissions accordingly in its next inventory submission.

Agricultural soils – N_2O

78. Agricultural soils are the largest source of N_2O emissions in Belarus. IPCC tier 1a and 1b methodologies and default parameters and EFs are used for emission estimates in this category. Considering that the emissions from soils make a large contribution to the Party's total emissions, the ERT is of the view that Belarus has the potential for significant improvement in this category. The ERT recognizes that using country-specific parameters and EFs for estimating emissions from agricultural soils may not be possible at this stage, due to the absence of the necessary data; however, Belarus could obtain and use data and assumptions from neighbouring countries with similar farming practices. This would improve the current emission estimates. The ERT therefore encourages Belarus to take

[3] CH_4 emissions from manure management is not a key category, but comments relating to CH_4 and N_2O emissions are presented together here because N_2O emissions from manure management is a key category and some comments concern issues relating to the estimation of emissions of both CH_4 and N_2O.

steps to collect data that would support the use of country-specific parameters and EFs for future inventory submissions.

79. The ERT noted that there is a lack of explanatory information in the NIR regarding the data used for the calculation of N_2O emissions from the cultivation of organic soils. This issue had already been raised in the previous review report. During the review, in response to a question raised by the ERT, Belarus informed the ERT that data on organic soils are provided by the National Statistical Committee on an annual basis, which confirm that organic soils are associated with peatlands drained for agricultural purposes. The ERT strongly encourages Belarus to provide more information in the NIR of its next inventory submission on the areas and types of organic soils that are cultivated in the country under different crops per natural zones, and include references to relevant data sources.

80. The fraction of total above-ground biomass of N-fixing crop that is N, the fraction of residue dry biomass that is N and the fraction of total above-ground crop biomass that is removed from the field as a crop product are reported in CRF table 4.D for agricultural soils using the notation key "NA". Assuming that gross yield and specific fractions per crop are known, the ERT concludes that Belarus would be able to calculate the average-weighted fractions of total above-ground biomass, residue dry biomass that is N and total above-ground crop biomass that is removed from the field as a crop product. The ERT recommends that Belarus report these data in CRF table 4.D in its next inventory submission.

81. Belarus does not include forage crops (annual and perennial grasses) in the calculations of N_2O emissions from N-fixation and crops residues returned to soils. This is not in line with the IPCC good practice guidance. Methodologies for the estimation of the N fixed by N-fixing forage crops and returned to soils with residues are available in the IPCC good practice guidance (equations 4.27 and 4.29, respectively). Consequently, the ERT strongly recommends that Belarus include annual and perennial grasses in the calculations for its next inventory submission, to improve the completeness of the estimates of N_2O emissions arising from N-fixation.

E. Land use, land-use change and forestry

1. Sector overview

82. In 2010, net removals from the LULUCF sector amounted to 30,179.18 Gg CO_2 eq. The sector constitutes an offset of 33.7 per cent of the total GHG emissions in 2010. Since 1990, net removals have increased by 5.6 per cent. The key drivers for the increase in net removals are an increase in forest areas, a decrease in forest harvesting for the last two years and a decrease in the areas of managed fires. Within the sector, net removals of 30,106.46 Gg CO_2 eq were from forest land, net removals of 109.85 Gg CO_2 eq were from cropland (CO_2 emissions of 830 Gg CO_2 eq from lime application on cropland were deducted from the removals from cropland of 940.17 Gg CO_2 eq) and emissions of 37.13 Gg CO_2 eq were from wetlands (drainage). Emissions and removals from grasslands, settlements and other land were all reported as "NE", "NO". Emissions and removals from other – harvested wood products were reported as "NE".

83. The ERT noted that many recommendations from the previous review report have not been addressed by Belarus in its 2012 inventory submission. The following are examples of pending issues that have to be addressed by Belarus in its next inventory submission: carbon stock changes for living biomass, dead organic matter, litter and soil organic matter for forest land conversion to other land uses have been reported in the NIR but not reported in the CRF tables; in all relevant CRF tables forest land conversions to other land uses are reported as "NO"; an uncertainty analysis has not been performed in a

way that is consistent with the IPCC good practice guidance for LULUCF; and no information is provided on independent verification. In addition, the ERT recommends that Belarus provide in the NIR and the CRF tables information on estimates of carbon stock changes and emissions for all mandatory categories. Furthermore, the ERT reiterates in particular the recommendations that Belarus provide a consistent uncertainty analysis for each estimated category and enhance the QA/QC procedures that are used in the LULUCF sector and, as a minimum, undertake an internal technical review to ensure consistency between the NIR and the CRF tables.

84. The ERT noted that the inconsistencies that had been identified in the previous review report still exist between the land-representation matrix (table 7.2 of the NIR) and the areas reported in CRF tables 5.A–5.F (sectoral background tables for the LULUCF sector) for the same land categories. For example, for 2010, the NIR reports 8,566.7 kha for forest land, while CRF table 5.A reports 8,010 kha. The ERT recommends that Belarus provide a consistent and accurate time series of annual land use and land-use change matrices which cover the whole national territory and all land use and land-use categories and subcategories. The ERT also recommends that Belarus ensure that data reported in the NIR are completely consistent with the data reported in the CRF tables.

85. Belarus has stated in the NIR that it made recalculations for the LULUCF sector between the 2011 and 2012 inventory submissions in order to rectify identified errors and apply updated AD and EF in the forest land category. However, these recalculations are not reported in CRF tables 8(a) and 8(b) for recalculations. If recalculations have been performed, then the ERT recommends that Belarus provide relevant explanatory information and the results of the recalculations in the CRF tables and in the NIR of its next and subsequent inventory submissions.

2. Key categories

Forest land remaining forest land – CO_2

86. Belarus applied a tier 1 method (default method) in accordance with the IPCC good practice guidance for LULUCF to estimate carbon stock changes for living biomass by using country-specific data. However, net carbon stock changes for dead organic matter and soils are reported as "NE" in CRF table 5.A for forest land. The ERT recommends that Belarus report carbon stock changes for dead organic matter, mineral soils and organic soils in its next inventory submission.

Cropland remaining cropland – CO_2

87. The ERT noted that the area reported in table 4.20 of annex 4 to the NIR for 2010 (5,632.6 kha) does not correspond with any of the areas reported in CRF table 5.B for cropland (total cropland, 1,389.70 kha; cropland remaining cropland, 122.10 kha; and land converted to cropland, 1,267.60 kha). The ERT therefore recommends that Belarus clearly explain in the NIR the sources of the data that are reported in that CRF table and, where necessary, correct any inconsistencies between the NIR and the CRF table.

88. The ERT noted that carbon stock changes for living biomass (perennials) are reported in the CRF tables, but that for carbon stock changes for dead organic matter and soils "NO", "NE" is reported in CRF table 5.B. The ERT recommends that Belarus estimate carbon stock changes for dead organic matter and soils using a tier 2 or higher methodology, as recommended by the IPCC good practice guidance for LULUCF, and report all estimates consistently in the NIR and the CRF tables in its next inventory submission.

3. Non-key categories

Land converted to forest land – CO_2 and N_2O

89. In the NIR, Belarus provided estimates of emissions from wetlands converted to forest land following drainage and reported increasing emissions of CO_2 and N_2O from 1990 to 2009. The emissions of both gases have increased by 43.0 per cent since 1990. Belarus reported the area of wetlands converted to forest land as "NE" in CRF table 5.A for forest land, but also reported drainage of wetlands (13.56 kha in 2010) in CRF table 5(II) for non-CO_2 emissions from drainage of soils and wetlands. The ERT recommends that Belarus improve the transparency of the reporting of land converted to forest land in the NIR and ensure consistency with the reporting in the CRF tables.

Land converted to cropland – CO_2

90. The ERT noted that emissions of CO_2 from wetlands converted to cropland are reported in the NIR (table 7.19). However, in CRF table 5.B an area is reported (1,267.6 kha) but carbon stock changes are reported as "NE", and the Party indicates that this is because no information is available on the change to the biomass that accompanies the land-use change. The ERT recommends that Belarus ensure consistency between the data in the NIR and the CRF tables by including estimates of CO_2 emissions from wetlands converted to cropland in the CRF tables in its next inventory submission.

F. Waste

1. Sector overview

91. In 2010, emissions from the waste sector amounted to 6,183.13 Gg CO_2 eq, or 6.9 per cent of total GHG emissions. Since 1990, emissions have increased by 140.1 per cent. The key driver for the rise in emissions is the increase in the amount of municipal solid waste (MSW) disposed on land due to an increase in production and consumption of goods and food in the country. Within the sector, 96.6 per cent of the emissions were CH_4 emissions from solid waste disposal and the remaining 3.4 per cent were N_2O emissions from wastewater handling. CH_4 emissions from wastewater handling are reported as "NE" and emissions from waste incineration are reported as "NO".

92. Belarus implemented general QC procedures in the waste sector and category-specific procedures for solid waste disposal on land (trend analysis of AD and emissions, comparison of waste composition data obtained from different sources and comparison of AD and EF with other countries). However, the ERT identified errors and inconsistencies in the CRF tables and the NIR (see paras. 97 and 100 below). The ERT further noted that the recommendations from previous review reports for the waste sector are not addressed in the 2012 inventory submission (examples are included in paras. 94–96 and 98 below). The ERT strongly recommends that Belarus address the recommendations from this and previous review reports and, to achieve this, the ERT recommends in particular that Belarus take steps to improve the planning of its inventory improvement plan, in order to ensure the timely delivery of each action in the improvement plan.

93. The NIR states that incineration of both MSW and industrial solid waste (ISW) does not occur in Belarus. However, the NIR also indicates that ISW is treated in thermal treatment plants. During the review, in response to a question raised by the ERT, Belarus explained that plasma technology is used in the thermal treatment plants. However, the information provided to the ERT did not fully detail the treatment of the waste (e.g. whether the process involves destruction of the waste, combustion of waste as fuel, or is a form of pre-processing the waste) and, importantly, did not specify whether emissions arise

from this process. The ERT therefore recommends that Belarus provide more information in the NIR on the thermal treatment of industrial waste, and in particular that the Party estimate any resulting emissions from the thermal treatment of waste and report such emissions in its next inventory submission.

2. Key categories

Solid waste disposal on land – CH_4

94. An IPCC tier 1 default method and default parameters with a country-specific degradable organic carbon value (lignin carbon is excluded from the calculation of degradable organic carbon) were used in the estimation of CH_4 emissions from solid waste disposal sites (SWDS). This is not in accordance with the IPCC good practice guidance. The ERT strongly recommends that Belarus use the IPCC tier 2 first order decay method to estimate CH_4 emissions for this key category for its next inventory submission.

95. Belarus reported in the NIR that all SWDS in the country are unmanaged. The ERT considers that the explanation on the classification of the SWDS is not sufficient in the NIR. The ERT therefore recommends that Belarus provide a more comprehensive explanation on the classification of SWDS in the NIR of its next inventory submission.

96. According to the NIR, CH_4 emissions from wastewater sludge are included in the estimation of CH_4 emissions from SWDS. It was also reported that ISW is disposed of at SWDS (however, see also comments in para. 93 above). However, there is no information provided in the NIR on the estimation of CH_4 emissions from ISW and wastewater sludge disposed of at SWDS. The ERT recommends that Belarus provide more detailed information in the NIR of its next inventory submission on the amount of MSW, ISW and wastewater sludge that is landfilled and the resulting emission estimates.

97. The ERT noted that a CH_4 oxidation factor of 0.50 is reported in the additional information table of CRF table 6.A for solid waste disposal; however, no explanation was provided in the NIR regarding the basis for the selection or calculation of this value. In response to a question raised by the ERT during the review, Belarus informed the ERT that a default value of zero is used in the estimation. The ERT recommends that Belarus rectify this error in the CRF table in its next inventory submission.

98. In the NIR, Belarus provided information on future improvements which included activities such as moving to a tier 2 first order decay method and the consideration of a revision of classification of SWDS. The ERT welcomes these planned improvements, and recommends that Belarus implement and complete these activities in its next inventory submission.

3. Non-key categories

Wastewater handling – CH_4 and N_2O

99. The CH_4 emissions from wastewater handling are reported as "NE". The NIR explained that the common method of wastewater treatment in Belarus is aerobic treatment and CH_4 emissions are negligible or zero. However, the ERT considers that this statement requires a more robust justification than is provided in the NIR, for example by including a reference to a report or data on the wastewater treatment in Belarus. The ERT therefore recommends that Belarus provide more information on wastewater treatment systems and discharge pathways (e.g. the wastewater fractions that are discharged into the sewage system and those that are treated on site) in its next inventory submission.

100. According to the NIR, N_2O emissions from human sewage have been recalculated due to the update of the protein consumption data for the period 2007–2010 and the update

of the population data. However, the recalculation is not reported in the CRF tables. In response to questions raised by the ERT during the review, Belarus explained that no recalculation was made for the 2012 inventory submission. The ERT recommends that Belarus revise and implement its QC procedures and also recommends that the Party ensure that there is consistency between the reporting in CRF table 8 for recalculations and the NIR in its next inventory submission.

III. Conclusions and recommendations

A. Conclusions

101. Belarus made its inventory submission on 14 April 2012. The inventory submission contains the GHG inventory (comprising CRF tables and an NIR). This is in line with the UNFCCC reporting guidelines.

102. The ERT concludes that, in general, the inventory submission of Belarus has been prepared and reported in accordance with the UNFCCC reporting guidelines. A complete set of CRF tables for the years 1990–2010 and an NIR have been submitted. The inventory submission is complete in terms of geographical coverage, years and sectors, but only generally complete in terms of categories and gases. Belarus still reports a number of categories as "NE", including: in the energy sector, carbon stored in the feedstock and non-energy use of naphtha, lubricants, coal oils and tars, CO_2, CH_4 and N_2O emissions from solid fuel transformation, and CO_2, CH_4 and N_2O emissions from international marine bunkers; in the industrial processes sector, CO_2 emissions from limestone and dolomite use, CO_2 and CH_4 emissions from ferroalloys production, HFCs, PFCs and SF_6 from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents, HFCs from semiconductor manufacture, and PFCs and SF_6 from refrigeration and air-conditioning equipment; in the LULUCF sector, CO_2 and N_2O emissions from forest land converted to forest land and cropland converted to cropland, CO_2 emissions from grassland, and CO_2, CH_4 and N_2O emissions from wetlands, settlements and other land; and in the waste sector, CH_4 and N_2O emissions from industrial wastewater and CH_4 emissions from domestic and commercial wastewater.

103. Belarus's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the ERT noted that almost all recommendations made in the previous review reports relating to improving the emission estimates have not been addressed. In particular, previous review reports have noted numerous examples where emissions from key categories are estimated using a tier 1 methodology and default EFs, where categories are reported using notation keys rather than emission estimates, and have also noted inconsistencies between the NIR and the CRF tables. Examples of all three of these types of issue have been detailed throughout this report and are summarized in table 3 below.

104. Belarus has reported minimal recalculations for the inventory between the 2011 and 2012 submissions in order to rectify identified errors for CO_2 emissions from glass production in the industrial processes sector for 2007 and 2009. The ERT noted that CRF table 8(b) includes a list of sectors and categories, and gases in relation to which recalculations have been undertaken, but the table does not include explanatory information for the recalculations (see para. 57 above).

105. The institutional arrangements implemented by Belarus for the preparation of the inventory continue to perform their required functions for most aspects of inventory preparation. However, the ERT identified some elements of the institutional arrangements that need to be addressed by Belarus; for example, the ERT found that an inventory

improvement programme, of key importance, is completely lacking and therefore most recommendations made in the review reports from the last several years have not been addressed. In addition, the ERT noted that descriptions of the institutional arrangements provided in the NIR need to be improved in relation to the legal responsibilities of ministries and private companies involved in the inventory management.

B. Recommendations

106. The ERT has identified a significant number of issues for improvement, which are detailed throughout this report. These issues for improvement are listed in table 3 below.

Table 3
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph reference*
Overview	Completeness	Report all necessary information regarding recalculations in the common reporting format (CRF) tables.	7
		Make efforts to collect activity data (AD) and estimate emissions for categories and subcategories that are currently reported as not estimated ("NE").	8
	Key categories	Ensure consistency of reporting between the CRF tables and the national inventory report (NIR).	12
		Enhance efforts to implement improvements to the inventory by using higher-tier methods and country-specific emission factors (EFs) for key categories.	13
		Report in the NIR delivery deadlines for each of the planned improvements.	13
	Uncertainties	Include in the NIR an explanation for observed changes in the reported uncertainty estimates between inventory submissions.	14
		Use only well-documented category-specific values for parameters in the uncertainty analysis.	15
		Include in the NIR information on how the uncertainty analysis is used to prioritize inventory improvements.	15
	Recalculations	Include in the NIR a comprehensive explanation of the recalculations undertaken, the reasons behind the recalculations and the resulting changes to emission estimates.	17
	Quality assurance/ quality control (QA/QC)	Report complete and detailed information on sectoral QA/QC procedures (in particular for the key categories).	19
		Use the information on internal and external reviews presented during the review in the section of the NIR that describes in detail the QA/QC procedures and verification studies undertaken.	19 and 20

Sector	*Category*	*Recommendation*	*Paragraph reference*
		Review the current QC procedures and strengthen them to ensure that the QC activities are sufficient to ensure that the information reported in the CRF tables and the NIR is consistent in the next inventory submission.	21
	Transparency	Include in the NIR more comprehensive information to explain the methodologies, procedures and descriptions of the data collection process and more data tables to present the input data and EFs that have been used, as well as provide background information on all AD used in the inventory.	23
		Include comprehensive information in the NIR on the inventory improvement programme.	24
	Inventory management	Include information on QA/QC procedures and verification in the NIR.	25
		Include information on the capacity and expertise of the inventory team in the NIR.	26
	Cross-cutting	Address recommendations from previous review reports, in order to improve the inventory submission.	27
Energy	Sector overview	Improve the transparency and detail of the information on EFs and AD reported in the NIR.	32
		Implement tier 2 QC procedures for the key categories in the energy sector.	33
		Include detailed information about data management and handling, as well as emission calculation, in the NIR.	33
		Report emissions for the subcategories under the energy industries and manufacturing industries and construction categories in a disaggregated manner.	34
	Reference and sectoral approach	Include a description of the reference approach calculations and the differences between the reference and sectoral approaches in the NIR.	35
		Investigate and explain the causes of the differences observed between the reference and sectoral approaches in the NIR.	36
		Review the non-energy use of fuels and fully report information in CRF tables 1.A(c) and 1.A(d).	37
		Include the estimates of carbon stored in the non-energy use of natural gas in the reference approach.	38
		Report in the NIR detailed explanations of the differences that arise between the reference and sectoral approaches, as well as plans for addressing any significant shortcomings in the current methodology.	39
		Include in the NIR an explanation of the changes that have been caused by recalculations or methodological changes	40

Sector	*Category*	*Recommendation*	*Paragraph reference*
		since the previous inventory submission.	
	Reference approach and international statistics	Include in the NIR a comparison between the fuel data used in the inventory and the corresponding International Energy Agency data, with explanations for any significant differences.	41
	International bunker fuels	Include in the NIR information on how jet kerosene is allocated between domestic and international flights and the source of these AD.	42
	Feedstocks and non-energy use of fuels	Review the use of the notation key for not occurring and report either emission estimates or a justification for the use of that notation key.	43
	Stationary combustion: liquid, solid and gaseous fuels – CO_2	Source and apply country-specific oxidation factors where possible, in particular for key categories.	44
		Correct the description of the methodology used for solid fuels.	45
		Explain in more detail the derivation of the country-specific net calorific values for solid fuels and justify their use.	45
		Implement the planned improvements and report disaggregated emission data by subcategory under the category manufacturing industries and construction.	46
	Road transportation: liquid fuels – CO_2	Include additional information in the NIR to support the choice of EFs.	47
		Use country-specific EFs to estimate emissions for this key category.	48
	Fugitive emissions from fuels: oil and natural gas – CH_4	Check and correct the estimated CH_4 emissions for 2009, or, if no errors are present, add an explanation in the NIR for the time series trend.	49
		Provide in the NIR detailed descriptions of the activities associated with oil and natural gas that would give rise to fugitive emissions, as well as the data used to calculate the emission estimates.	49
		Use a tier 2 or higher method to estimate emissions for this category.	49
		Develop and use country-specific CH_4 EFs based on the length of the transmission pipelines, and include fugitive and venting emissions (including CO_2) from this activity.	50
		Either reallocate emissions from natural gas transport from the subcategory other to the subcategory transmission in the CRF tables, or describe the reasons for the current allocation transparently in the NIR.	50

Sector	*Category*	*Recommendation*	*Paragraph reference*
		Explore ways to better report CH_4 emissions from the distribution of natural gas.	50
		Estimate CH_4 emissions (and CO_2 emissions, if relevant) from venting activities in the oil industry.	51
		Revise the use of the notation keys for the reporting of fugitive emissions from venting and flaring and more transparently document them in both the CRF tables and the NIR.	51
		Estimate and report CH_4 emissions (as well as CO_2 emissions) from oil transport, or use the notation key "NE" until emission estimates are available.	52
	Road transportation: liquid fuels – CH_4 and N_2O	If no country-specific EF for liquefied petroleum gas (LPG) is available, use the CH_4 EF for LPG as listed in table 1-45 of volume 3 of the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (20 kg/TJ) for estimating emissions.	53
		Estimate the amount of fuel used by vehicle type and consider the number of vehicles equipped with catalytic converters, and revise the N_2O emission estimates using appropriate N_2O EFs.	54
	Fugitive emissions from fuels: solid fuels – CO_2, CH_4 and N_2O	Collect data and report emission estimates for solid fuel transformation.	55
Industrial processes	Sector Overview	Include in the NIR a justification for and explanation of any recalculations and report this information in CRF table 8(b).	57
		Implement additional sectoral QA/QC procedures and include a delivery deadline for actions, to ensure the implementation of improvements.	58
		Provide clear and concise information on the methods, EFs and AD used to estimate emissions from each source in the NIR, to improve the overall transparency of this sector.	59
		Collect AD and estimate and report emissions for the subcategories of HFCs, PFCs and SF_6, which are currently reported as "NE".	60
		Collect all the required AD and estimate CO_2 emissions from limestone and dolomite use.	61
	Ferroalloys production – CO_2	Clarify the situation regarding ferroalloys production in the country and use the appropriate notation key to report thereon.	63
	Iron and steel production – CO_2	Use the notation keys and documentation boxes in the CRF tables properly and explain the use of the notation keys in the NIR.	64

Sector	*Category*	*Recommendation*	*Paragraph reference*
Agriculture	Sector overview	Follow the NIR structure outlined in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".	67
		Provide clear references for all the data used in the calculation of the emission estimates.	68
		Calculate uncertainties for enteric fermentation for cattle and manure management for cattle and swine.	71
		Put an inventory improvement plan in place, with delivery deadlines for each improvement activity.	72
	Enteric fermentation – CH_4	Include in the NIR descriptions of underlying data, assumptions and corresponding references used for estimating gross energy intake.	74
	Manure management – CH_4 and N_2O	Calculate and report the average-weighted values for volatile solids, animal weight and manure allocation in CRF tables 4.A and 4.B.	76
		Report CH_4 producing potential values for the animal categories in CRF table 4.B.	76
		Collect and document the data necessary for the derivation of a more accurate distribution of poultry droppings to the different animal waste management systems, and estimate and report emissions accordingly.	77
	Agricultural soils – N_2O	Collect data that would support the use of country-specific parameters and EFs for estimating N_2O emissions from this source.	78
		Report the following in CRF table 4.D: the fraction of total above-ground biomass that is nitrogen (N), the fraction of residue dry biomass that is N and the fraction of total above-ground biomass that is removed from the field as a crop product.	80
		Include annual and perennial grasses in the calculation of N_2O emissions arising from N-fixation.	81
Land use, land-use change and forestry (LULUCF)	Sector overview	Provide information on the estimates of carbon stock changes and emissions for all mandatory categories in the NIR and the CRF tables.	83
		Provide a consistent uncertainty analysis for each estimated category.	83
		Enhance the QA/QC procedures that are used for the LULUCF sector, including, as a minimum, an internal technical review to ensure consistency between the NIR and the CRF tables.	83
		Provide a consistent and accurate time series of annual land	84

Sector	*Category*	*Recommendation*	*Paragraph reference*
		use and land-use change matrices which cover the whole national territory and all land use and land-use categories and subcategories.	
		Ensure that the data reported in the NIR are completely consistent with the data reported in the CRF tables.	84
		Provide relevant explanatory information in the CRF tables and in the NIR (if recalculations have been performed).	85
	Forest land remaining forest land – CO_2	Report carbon stock changes for dead organic matter, mineral soils and organic soils.	86
	Cropland remaining cropland – CO_2	Explain the sources of the data used in the CRF tables in the NIR, and correct any inconsistencies between the NIR and the CRF tables.	87
		Estimate carbon stock changes for dead organic matter and soils using a tier 2 or higher methodology.	88
	Land converted to forest land – CO_2 and N_2O	Improve the transparency of the reporting on land converted to forest land in the NIR and ensure consistency with the reporting in the CRF tables.	89
	Land converted to cropland – CO_2	Ensure consistency between the data in the NIR and the CRF tables by including estimates of CO_2 emissions from wetlands converted to cropland in the CRF tables.	90
Waste	Sector overview	Take steps to improve the planning of the inventory improvement plan, providing delivery deadlines for each action in the improvement plan.	92
		Provide more information on the thermal treatment of industrial waste (in particular any resulting emissions) in the NIR.	93
	Solid waste disposal on land – CH_4	Use the IPCC tier 2 first order decay method to estimate CH_4 emissions from solid waste disposal on land.	94
		Provide a more comprehensive explanation of the classification of solid waste disposal sites in the NIR.	95
		Provide more detailed information in the NIR on the amount of municipal solid waste, industrial solid waste and wastewater sludge that is landfilled and also provide the resulting emission estimates.	96
		Correct the erroneous reporting of the CH_4 oxidation factor in the NIR.	97
		Implement and complete the planned improvements.	98
	Wastewater handling – CH_4 and N_2O	Provide more information on wastewater treatment systems and discharge pathways in the NIR.	99
		Revise and implement QC procedures and ensure consistency between the reporting in the CRF tables and the NIR.	100

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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FCCC/ARR/2011/BLR. Report of the individual review of the inventory submission of Belarus submitted in 2011. Available at <http://unfccc.int/resource/docs/2012/arr/blr.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Evgenia Bertosh (Department of International Scientific Cooperation RUE Bel SRC "Ecology"), including additional information on the net calorific values and fuel consumption form provided by the National Statistical Committee of Belarus.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
Gg	gigagram
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ISW	industrial solid waste
kg	kilogram (1 kg = 1,000 grams)
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
Mg	megagram
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NCV	net calorific value
NE	not estimated
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
SWDS	solid waste disposal site
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change