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**Report for the Stage 3 in-depth review of emission
inventories submitted under the UNECE LRTAP
Convention and EU National Emissions Ceilings
Directive for:**

STAGE 3 REVIEW REPORT

BELARUS

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INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols*'⁽¹⁾ – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review, has concentrated on SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ & PM_{2.5} for the time series years 1990 – 2016 reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs have been reviewed to the extent possible.
3. This report covers the stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of Belarus coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 18th June 2018 to 21th June 2018 in Copenhagen Denmark and was hosted by the European Environment Agency (EEA). The following team of nominated experts from the roster of experts performed the review: Generalist – Aleksandra N. Krsteska (Macedonia), Energy - Marion Pinterits (EU) and Eva Krtkova (Czech Republic), Transport - Helen Heintalu (Estonia) and Magdalena Zimakowska-Laskowska (Poland), Industry and Solvents - Mirela Poljanac (Croatia), Agriculture & Nature - Jim Web (United Kingdom) and Hakam al Hanbali (Sweden), Waste - Richard Claxton (United Kingdom).
4. Kristina Saarinen was the lead reviewer. The review was coordinated by Katarina Marečková, (EMEP Centre on Emission Inventories and Projections - CEIP).

¹Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols. Note by the Task Force on Emission Inventories and Projections.
ECE/EB.AIR/GE.1/2007/16
http://www.ceip.at/fileadmin/inhalte/emep/review/RevGuid_ece.eb.air.ge.1.2007.16.e.pdf

PART A: KEY REVIEW FINDINGS

5. Belarus did not provide an IIR in the 2018 submission and therefore the ERT used in the review the latest submission of the IIR from 2016.

6. The ERT commends Belarus for improving the IIR 2016 since the previous submission and notes that the IIR reported in 2016 mainly corresponds to the template provided in the Reporting Guidelines 2014 (Annex I) and also includes a key category analysis, uncertainty analysis and projections. However the ERT also notes that the provided information in some of the chapters is limited and not transparent enough.

7. The ERT notes that the inventory is mainly in line with the EMEP/EEA Inventory Guidebook and the UNECE Reporting Guidelines.

8. The ERT unfortunately notes that the participation of Belarus in the 2018 centralised Stage 3 review was limited due to the fact that the national team did not response to the questions raised by the ERT. The ERT would have needed clarification on several issues and would have been able to provide more detailed and useful recommendations for future submissions. The ERT strongly recommend Belarus to engage more in the review process by providing answers to review experts in future Stage 3 reviews in order to enable the ERT to review the inventory in detail and to provide recommendations which will facilitate further improvement for future inventory work.

9. The ERT notes that the problem that lead to limited communication during the review as well as irregular submissions of the IIR and NFR tables might be insufficient human and financial resources. Therefore the ERT recommends Belarus to ensure human, institutional and other resources for the inventory work in order to enable the country to improve the quality of the inventory and to ensure continuity in the inventory work.

10. ERT notes that limited information on recalculations has been reported in the IIR 2016, that the Party applies Tier 1 methods and default parameters for most key categories.

11. The 2018 submission shows that further improvement in the transparency, completeness and consistency of the inventory is needed as explained in the detailed findings below.

INVENTORY SUBMISSION

12. Belarus submitted the 2018 submission on 16.02.2018, a day after the deadline of 15th February. The submission included emission data for 2014-2016 in NFR 2014-2 tables.

13. The Informative Inventory Report (IIR) was not submitted in 2018. The last IIR that was submitted in 2016 contains information for the time series 2007-2014. The ERT encourages Belarus to report an IIR on annual basis to reflect the emission data reported the same year, and to structure it according to Annex 1 of the UNECE Reporting Guidelines.

14. LCP data, gridded data and projections were not submitted in 2018.

15. The ERT notes that the Party reported projected emissions for a “With Measures” scenario in 2016. The ERT commends the Party for that. To the request of more information for the background of the projections calculations the ERT did not get any response from Belarus.

KEY CATEGORIES

16. Belarus has compiled and presented key category analysis (KCA) for the all pollutants in Annex 1 of its IIR. The ERT was not able to compare the key category analysis provided by Belarus with the one provided by the CEIP due to the fact that the Party provided the key category analysis for 2014 emissions and the key category analysis by the CEIP was for 2016 emissions.

TRANSPARENCY

17. As no IIR was provided in 2018, there was a lack of transparency regarding methodologies used and assumptions made as well as in the choice of data used to estimate 2016 emissions. In the last IIR reported in 2016 covering the years 2007-2014 there was detailed information for the methodologies and emission factors used to estimate emissions from the energy, industry, solvent and the agriculture sectors. However, for the transport and waste sector limited information is provided in the IIR. Moreover, there is lack of information on the used activity data for most subsectors, or, aggregated activity data have been used per category as it is the case for the transport sector. Belarus did not respond to the requests by the ERT to receive more data and information. The ERT notes that information on activity data are needed in order to enable the ERT to review implied emission factors and compare them to other reporting Parties and evaluate the reliability of the emission levels.

18. The ERT commends Belarus for providing justifications for the use of the notation key “NE” in the IIR, but also recommends Belarus to provide more detailed information for the reasons of the use of the notation key “IE”. Moreover, the ERT recommends Belarus to provide emission estimates instead of reporting the notation key “IE” as is explained in the recommendations for the sector chapters below.

19. The ERT noted the frequent use of notation keys in the NFR table. The ERT also recognize the effort made by Belarus to provide information on the reasons for the use of the notation key “NE” for several sources.

COMPLETENESS

20. The 2018 submission included emission data for 2014-2016. Belarus reported emissions only on yearly basis according to the n-2 year rule for the years 2013-2016. Emission data for the years from 2009 to 2012 have been provided in earlier submissions in the old NFR09 format. The ERT notes that according to the Reporting Guidelines emission data shall be reported for the whole time series from 1990. The ERT recommends Belarus to report the full time series annually since 1990 and to use the latest NFR14 format as well as to provide an IIR.

21. The ERT notes that emissions in many subcategories (listed below in part B of this report) for which there is a methodology provided in the Guidebook, are not

calculated. The TERT recommends Belarus to report all emissions for which there is a method in the 2016 EMEP/EEA Guidebook, to the next submission, or to present a detailed plan to calculate these emissions in the annual emission improvement plan provided in the IIR.

22. The ERT notes that Belarus reports emissions for all pollutants with the exception of selenium (Se), which is not a mandatory heavy metal to be reported. The ERT encourages Belarus to include estimations of Se emissions into the inventory.

23. The ERT made a technical correction (see the chapter “Industrial Processes” paragraph 114) for the missing source NFR 2K.

CONSISTENCY, INCLUDING RECALCULATIONS AND TIME-SERIES

24. In the last submitted IIR in 2016, Belarus explained that the methodology for the EMEP emission inventory preparation was changed in 2015 and that it was not based on statistical emission data as before and that this allowed to make the emission inventory more transparent. The ERT noted that the 2016 IIR did not provide information on quantitative recalculations.

25. The ERT noted that the time series submitted by Belarus is inconsistent for the period 2007-2016. The ERT recommends Belarus to improve the consistency of the time series by calculating emissions in an harmonized way for all years since 1990 and encourages Belarus to explain the drivers behind the fluctuations and justifications on the dips and jumps in the time series in the IIR

COMPARABILITY

26. Belarus' inventory is comparable to other reporting Parties in terms of the reporting format, NFR-2014-2.

27. The ERT notes that the inventory of Belarus may currently not be comparable with other reporting Parties as the information provided on data sources and methodologies applied is limited. Also, Belarus currently applies methodologies from the previous versions of the Guidebook (2009 and 2013) while according to the Reporting Guidelines, the latest version of the Guidebook, currently 2016, shall be used. However, the ERT notes that (1) the translation of Guidebook 2016 into Russian will be finalized only in summer 2018, and that (2) the methods provided in the Guidebook may not as such be directly applicable to Belarus. The ERT recommends Belarus to include a comparison between the national implied emission factors and those presented in the Guidebook, in order to provide a better understanding of the comparability of the different methodologies. Such a comparison should be included in the IIR.

28. Belarus is not an EU country and as such does not report emissions under the EU National Emission Ceilings (NEC) Directive.

ACCURACY AND UNCERTAINTIES

29. Belarus uses Tier 1 methodologies for most sectors. The ERT recommends that Belarus improves the accuracy of its inventory by implementing higher tier methodologies for key categories of the inventory.

30. The ERT notes that Belarus has provided a general level of information on the methodology used and references to the sources of AD and EFs. However, due to the limited details provided, the ERT was not able to fully assess the accuracy of the inventory in all cases. Especially, in the agriculture and waste sectors, more detailed information is needed in order to carry out a proper in depth review and to be able to provide detailed and useful recommendations to the Party. Therefore the ERT encourages Belarus to include more detailed information in future submissions of the IIR.

31. To assess potential overestimations or underestimations of emissions the ERT recommends Belarus to provide a comparison between national methods and those presented in the Guidebook. Such information should be provided in the IIR. The same recommendation is provided under the title “Comparison” above, please also see the “Sub-sector specific recommendations” below.

32. The ERT commends Belarus for performing an uncertainty analysis for all pollutants as it was recommended in the 2015 review. The Party does not report on how its uncertainty analysis is used to prioritize further improvements in the inventory. The ERT recommends Belarus to use the results of the uncertainty analysis to prioritize further improvements in the inventory.

VERIFICATION AND QUALITY ASSURANCE/QUALITY CONTROL APPROACHES

33. The ERT notes that Belarus has only provided general and limited information on its quality assurance/quality control (QA/QC) activities. The ERT also notes that Belarus did not provide information in the IIR if a QA/QC plan in accordance with the Guidebook is in place or not. The ERT recommends the Party to prepare a QA/QC plan and to report upon it in the IIR of the next submission, and to provide information of the results of annual QA/QC checks in the IIR.

34. The ERT notes that Belarus does not provide information on sector specific QA/QC procedures in the IIR. The ERT recommends Belarus to add sub-sector specific chapters describing the QA/QC procedures for the validation of activity data and emission calculations at sub-sector level.

35. The ERT notes that it did not receive responses to the questions raised during the review on specific QA/QC procedures related to the planned improvement of the QA/QC.

FOLLOW-UP TO PREVIOUS REVIEWS

36. The ERT commends Belarus for including in the inventory (1) NMVOC emissions from coating processes applications and other solvent use, (2) BC emissions, (3) projections and for conducting (4) an uncertainty analysis and (5) a key category analysis.

37. The ERT commends Belarus for the improvement of its inventory and IIR by the implementing many of the recommendations proposed in the 2015 review, one of which was the replacement of zero values with proper notation keys in the energy sector.

38. The ERT recommends Belarus to implement all the recommendations which have not yet been undertaken from the previous reviews (listed below). If any of the recommendations cannot be carried out, a justification for those cases should be provided in the IIR as well as a plan with a schedule for all improvements.

a) General recommendations

- follow the IIR template (Annex II of the Revised Guidelines)
- include more details in the description of the methods, assumptions and activity data and provide the emission factors used for each emission source
- present documentation on QA/QC
- present explanations for key trends
- carry out an uncertainty analysis and present the methods and results in the IIR
- provide a full time series of emissions since 1990
- perform recalculations throughout the full time series when needed and provide the documentation on recalculations in the IIR;
- develop a QA/QC system, apply it in the next inventory and document the sector-specific QA/QC procedures and results in the IIR.
- complete the inventory by calculating not estimated emissions (reported as “NE”) to the next submission, and for those cases where this is not possible, to provide a plan with a schedule for the inclusion of these emissions in the next submission.
- disaggregate emissions under the proper NFR categories or justify the use of the notation key “IE” in the IIR
- include activity data in the NFR tables for the whole time series

b) Sector specific recommendations

Energy sector – calculate and present emissions from the following NFR categories separately:

Commercial/institutional: Mobile, (1.A.4.a.ii),
residential: household and gardening (mobile) (1A4bii),
off-road vehicles and other machinery (1A4cii),

national fishing (1A4ciii), other Mobile (1A5b)

Transport:

- Estimate missing emissions in the following NFR categories: (1A3bii): BC; (1A3biv): NH₃; (1A3dii): NO_x, SO_x, NH₃, HM, POPS, PM_{2.5} and PM₁₀; (1A3ai(i), 1A3aii(i), 1A3ai(ii), 1A3aii(ii)): all pollutants
- Recalculate emissions due to possible overestimations in the following NFR categories: (1A3bi-iv): NMVOC, (1A3bv): NMVOC
- Estimate emissions reported as "IE" and report them separately in the following NFR categories (1A3bii and 1A3biv): NH₃, heavy metals and POPS.

Industry:

- Estimate missing emissions: (2A): PMs; (2A5b): all pollutants
Provide historic activity data and the split of technologies for the category; (2H2): all pollutants
- Provide historic emission data for wood processing (2I): TSP if the process is existing.
- Calculate TSP emissions from (2D3b) and following pollutants from (2D3c): NMVOC, PM_{2.5}, PM₁₀, TSP, BC, CO.

Solvent and product use:

- Change the allocation of reporting: report oil extraction under category 2D3i instead in 2G.
- Estimate missing emissions in the following NFR categories: (2D3a): Hg; (2K): Hg, PCBs

Agriculture:

- Estimate missing emissions in the following NFR categories:
NFR 3B: NO_x,
NFR 3B4d: NH₃,
NFR 3B4h: NH₃,
NFR 3B4giii: PMs,
NFR 3B4giv: NH₃ and PMs,
NFR 3Da2a and 3Da3: NH₃.

Waste:

- Estimate missing emissions in the following NFR categories
NFR 5A: NMVOC, PMs and HMs,
NFRs 5B1 and 5B2: NMVOC, NH₃,
NFRs 5C1a, 5C1bi, 5C1biii and 5C1bv: all pollutants,
NFR 5D: NMVOC, NH₃.
- Explain use of the notation key „IE“ for the following NFR categories: NFRs 5C1bii and 5C1biv: all pollutants.

39. Results from the Stage 1 and Stage 2 reviews on the 2016 emission data have been used in this Stage 3 review. From the results of the Stage 1 and 2 reviews

the ERT noted non completeness for all pollutants during the whole reporting period, and dips and jumps in the emission trends, although there were recommendations given for these findings in the previous Stage 3 review. The ERT recommends Belarus to implement all recommendations from the previous reviews as well as those from the current review and to provide up-to-date information on the progress of the implementation of improvements in an improvement plan in the IIR.

AREAS FOR IMPROVEMENTS IDENTIFIED BY BELARUS

40. In the IIR Belarus has identified the following areas for improvement where Belarus indicates that it is working on:

- a) estimates of NO_x emissions arising from the agriculture sector;
- b) trend analysis, gaps and jumps detection, consistency improvement;
- c) a QA/QC system.

TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY THE ERT

41. The ERT noted the need and considered technical corrections for the agriculture and transport sectors. However, the review experts were not able to calculate technical corrections for these sectors because no activity data were available. The ERT therefore strongly recommends the Party to calculate the missing emissions as indicated under the sector chapters below for the next submission.

42. Regarding the significant inconsistencies in the industry and solvent use sectors of the inventory the ERT proposes the Party potential technical corrections (PTCs) for NFR category 2K consumption of POPs and heavy metals, for the pollutants Hg and PCB for the years 2005 and 2016, calculated according to the method provided in the 2016 EMEP/EEA Emission Inventory Guidebook. For more detailed information on the PTCs, please see the industry sector chapters below and the file "TC – Belarus_2K_Review2018.xlsx".

Table 1 Summary of potential technical corrections identified by ERT for country

NFR category (s)	Pollutants	Years	Calculated by the Party/ by ERT/ not calculated	Potential contribution to national total (%)
2K	Hg	2005, 2016	ERT	48% (2016), 14.9% (2005)
2K	PCBs	2005, 2016	ERT	8146% (2016), 9454% (2005)

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

43. The ERT identified the following cross-cutting issues for improvement and recommends Belarus to implement the following recommendations:

- (a) Submit the full time series annually for all pollutants since 1990 (except for particles since 2000, if not possible to report since 1990);
- (b) Submit annually the full time series annually for the activity data since 1990 (except for particles since 2000, if not possible to report since 1990);
- (c) Always update the default EFs according to the latest Guidebook version or another source that better reflects the actual emissions, and document the method and the reference of the method in the IIR;
- (d) Recalculate emissions to ensure a consistent methodology over the whole time series;
- (e) Report emissions for the whole time series in the latest version of the NFR reporting tables;
- (f) Report LCP and gridded data in accordance with the Reporting Guidelines;
- (g) Respond to inventory review questions under the S1, S2 and S3 reviews.

44. The ERT encourages Belarus to submit an IIR in a timely manner and on a yearly basis and to:

- (a) prepare the IIR according to the structure presented in Annex 1 of the Reporting Guidelines and to update the contents of the IIR each year to correspond to the submission;
- (b) Include activity data for the whole time series since the year 1990 in the IIR;
- (c) provide more detailed information on the reasons for the use of the "IE" notation key for the activity data;
- (d) explain the used methodologies and include a comparison to the methods provided in the Guidebook to provide a better understanding of the comparability of the different methodologies;
- (e) provide more information on the use of process techniques and abatement techniques to enable a full review and verification of the calculations;
- (f) provide an analysis of data completeness, consistency, comparability, transparency and accuracy in the IIR;
- (g) provide explanations for drivers behind the emissions trends and for any dips and jumps in the time series if any outliers occur;

- (h) provide information on the rationale of the recalculations and on the impact on the sector and the implication on emission trends in the IIR;
- (i) provide more detailed information of the QA/QC system and to include sector specific OA/QC procedures;

45. The ERT recommends Belarus to revise the used notation keys for reporting in the following categories:

- (a) Fugitive emission from solid fuels (1B1), NMVOC: change the current notation key ("NA") used for activity data to "NO" if the activity does not exist;
- (b) Railways (1A3c), Hg and As: change the current notation key ("NA") used for activity data to "NE";
- (c) Wood processing (2I): TSP. consumption of POPs and heavy metals (2K): Hg, PCBs. use the notation key "NO" if the activities do not exist. Correct the notation key to "NA" – "Not applicable": iron and steel production (2C1): all pollutants;
- (d) Use the correct notation key "NE" in the category construction and demolition (2A5b): all pollutants and in (2A5a): PMs, if no estimations are possible;
- (e) Solvent and product use: Other solvent use (2D3i) change the notation key "NA" to "NE";
- (f) Manure management – turkeys (3B4giii): PM. manure management – laying hens (3B4giv): NH₃, PM; other livestock (3B4h) insert the notation key "NO" ("not occurring") or "IE" included elsewhere if the emission values are not reported. (3D2b): The notation key "NO" ("not occurring") should be used if no sewage sludge is applied to land or "IE" if the emissions are included elsewhere;
- (g) Activity data; Use the correct notation keys for the reporting of AD if values are not available

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

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5} , Cd, Hg, Pb, Dioxin, PAH		
Years		1990 – 2015		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A1a	Public electricity and heat production	X		X
1A1b	Petroleum refining	X		X
1A1c	Manufacture of solid fuels and other energy industries	X		X
1A2a	Iron and steel	X		X
1A2b	Non-ferrous metals	X		X
1A2c	Chemicals	X		X
1A2d	Pulp, Paper and Print	X		X
1A2e	Food processing, beverages and tobacco	X		X
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	X		X
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	X		X
1A3ei	Pipeline transport	X		X
1A3eii	Other	X		X
1A4ai	Commercial/institutional: Stationary	X		X
1A4bi	Residential: Stationary	X		X
1A4ci	Agriculture/Forestry/Fishing: Stationary	X		X
1A5a	Other stationary (including military)	X		X
1B1a	Fugitive emission from solid fuels: Coal mining and handling	X		X
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	X		X
1B1c	Other fugitive emissions from solid fuels	X		X
1B2ai	Fugitive emissions oil: Exploration, production, transport	X		X
1B2aiv	Fugitive emissions oil: Refining / storage	X		X
1B2av	Distribution of oil products	X		X
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	X		X
1B2c	Venting and flaring (oil, gas, combined oil and gas)	X		X
1B2d	Other fugitive emissions from energy production	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

46. Belarus did not submit an IIR in 2018. The ERT used the IIR submitted in 2016 for the review. The ERT notes that the description in the IIR for the energy sector is not transparent, since Belarus has not provided activity data in the NFR tables or in the IIR and has not provided information on the detailed methodologies used in the IIR.

47. In the IIR 2016, Table 1.4 “Sources considered as missing in the 2014 emission inventory” Belarus stated, that the reason for the notation key “NE” (“not estimated”) is that emissions are negligible. The ERT notes that the abbreviation “NE” is for “not estimated”. The notation key “NA” is for “not applicable”, which could be used in cases of non-existing emissions from an existing source. The ERT reiterates the encouragement from the previous review report (2015) and recommends Belarus to develop emission estimates for all sources, even if the emissions would be negligible.

48. The ERT commends Belarus for implementing the encouragement from the last review by taking into account sources labelled as “Other”. However, in some cases, notation keys are still used. The ERT recommends Belarus to estimate emissions also from the other sources currently reported using notation keys, in the next submission, or to provide a plan with a schedule for this improvement in the improvement plan of the next submission.

49. The ERT commends Belarus for providing extensive information about sources “included elsewhere” (“IE”) in IIR 2016, Table 1.5. However, on the sectoral level the allocation of emissions included elsewhere was not clear, neither the reason for the allocation. The ERT reiterates the encouragement from the previous review to provide information on where sources “included elsewhere” are included and to justify this reporting in its future submissions.

50. The energy sector is not transparent since Belarus has not provided activity data on the sectoral level in the NFR tables or in the IIR, thus it is not possible to calculate implied emission factors (IEF) to compare emission levels to other sources. The ERT reiterates the encouragement from the previous review to improve the transparency of the inventory.

Completeness

51. The ERT considers the energy sector to be mostly complete. However, due to lack of documentation, it was difficult to properly assess the completeness of the inventory. The ERT encourages Belarus to include information on all activities related to the energy sector in the IIR.

52. Belarus did not provide a whole time series of emission estimates. The ERT recommends Belarus to provide the whole emission time series since 1990 (for particles since 2000) in the next submission. In cases where this is not possible, the ERT encourages Belarus to include a plan with a schedule in the next submission.

Consistency including recalculation and time series

53. Since no IIR was submitted in 2018, no information about methods used over the years was available and it was not possible to review if the time series had been calculated with a consistent methodology. The ERT recommends Belarus to provide detailed information on the methods used to calculate emissions. Such information should be provided in the IIR.

54. Since no IIR was submitted in 2018, no information about recalculations was available for the ERT. The last IIR submitted in 2016 reported only very limited information about recalculations. The ERT reiterates the recommendation from the last review report to provide more details on the recalculations carried out between submissions.

Comparability

55. According to the IIR submitted in 2016 the EMEP/EEA 2013 Guidebook was applied for the emission estimation. Emission factors were taken from EMEP/EEA 2009 Guidebook. However, since no IIR was submitted in 2018, it was difficult for the ERT to assess, if EMEP/EEA 2016 Guidebook was used for emission estimation in the 2018 submission. The ERT notes that comparability among the reporting Parties is based on the use of comparable methodology, i.e. the 2016 Guidebook.

56. Since no activity data on the sectoral level was reported in NFR tables, the ERT cannot review implied emission factors that could be compared to other reporting Parties or to the Guidebook.

Accuracy and uncertainties

57. The ERT did not find uncertainty estimates for the energy sector. The ERT recommends Belarus to undertake an uncertainty analysis for the energy sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

58. According to the information in the IIR, Belarus has carried out some basic QA/QC checks, but on a very limited basis. The ERT recommends the Party to implement sector specific OA/QC procedures for the energy sector, especially for the key categories.

Improvement

59. The ERT commends the Party for its improvements since the previous review. However, a number of recommendations and encouragements from the previous reviews were not followed up, such as using appropriate notation keys instead of dashes or zero values, appropriate labelling of IIR tables and using of NFR coding.

60. Information about improvements is limited in the IIR 2016. However, the ERT commends Belarus for its intentions to improve the inventory, but recommends that Belarus keeps addressing the encouragements and recommendations from the previous reviews.

Potential technical corrections

61. Not calculated

Sub-Sector Specific Recommendations

Category issue 1: various (sub)sectors – various pollutants

62. The ERT noted, referring to a recommendation from the previous review, that Belarus reported a complete version of emission data, which includes notation keys instead of dashes and zeros. The ERT commends Belarus on this improvement and recommends to estimate and report emissions from subcategories which are currently reported using notation keys. Further, the ERT recommends Belarus to report emissions for the whole time series since 1990 for all pollutants (except from 2000 for particles).

Category issue 6: various (sub)sectors – various pollutants

63. The ERT noted, that for most of the pollutants and most of the subcategories (i.e. 1A2g, 1A3e, 1A5, 1B) there is no description in the IIR 2016 and some pollutants are reported as “IE”, “NE”, “NA”. The ERT recommends Belarus to provide information and justifications for the used notation keys in its next submission. Such information should be included in the IIR.

Category issue 7: 1.B.1 – various pollutants

64. The ERT noted that in Belarus there are no solid fuel mines. In the NFR tables emissions and activity data are reported as “NA” (“not applicable”). However, since there are no coal mining facilities in Belarus, the notation key should be changed to “NO” (“not occurring”). The ERT recommends Belarus to correct the use of the notation keys to the next submission.

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2016		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A2gvii	Mobile Combustion in manufacturing industries and construction	X		X
1A3ai(i)	International aviation LTO (civil)	X		X
1A3ai(ii)	International aviation cruise (civil)	X		X
1A3aii(i)	Domestic aviation LTO (civil)	X		X
1A3aii(ii)	Domestic aviation cruise (civil)	X		X
1A3bi	Road transport: Passenger cars	X		X
1A3bii	Road transport: Light duty vehicles	X		X
1A3biii	Road transport: Heavy duty vehicles and buses	X		X
1A3biv	Road transport: Mopeds & motorcycles	X		X
1A3bv	Road transport: Gasoline evaporation	X		X
1A3bvi	Road transport: Automobile tyre and brake wear	X		X
1A3bvii	Road transport: Automobile road abrasion	X		X
1A3c	Railways	X		X
1A3di(ii)	International inland waterways		X	
1A3dii	National navigation (shipping)	X		X
1A4aii	Commercial/institutional: Mobile		X	X
1A4bii	Residential: Household and gardening (mobile)		X	X
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	X		X
1A4ciii	Agriculture/Forestry/Fishing: National fishing		X	X
1A5b	Other, Mobile (including military, land based and recreational boats)		X	X
1A3di(i)	International maritime navigation		X	
1A3	Transport (fuel used)		X	
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

66. The ERT notes that the transport sector inventory is not transparent, since Belarus has not submitted an IIR in 2018. The latest IIR was submitted in 2016, which covers emission estimates in limited extent for the period 2007-2014. There is a lack of information on activity data, emission factors and the methods used for the emission calculations. The ERT encourages the Party to improve the transparency of its inventory by providing all the necessary information (detailed description of the methodology, activity data and emission factors used, as well as the time series of

emissions and information on recalculations, to enable the ERT to review the data, in the next submission.

67. The ERT notes that activity data are provided at aggregated level in the NFR tables for the years 2015-2016. The ERT recommends Belarus to improve its inventory by providing all the relevant activity data by subsectors in the NFR tables.

68. The inventory contains notation keys, including “IE” – “Included Elsewhere”. An explanation regarding the sectors to which the emissions have been allocated is available in the IIR. However, the ERT recommends the Party to report the emissions more disaggregated and to allocate them to the appropriate NFR category, or to provide detailed information in the IIR on the allocation of emissions.

Completeness

69. Belarus uses zero values or the notation keys “NE” and “NA” for some occasions in the NFR tables where emissions are most likely to occur, since emission factors for these sectors are available in the EMEP/EEA Guidebook. These sectors and pollutants have been identified by the ERT and discussed further in the sub-sector specific recommendations below. The ERT cannot confirm the completeness of the Party's inventory for the most recent year due to the frequent and inconsistent use of zero values or notation keys and because of the lack of information in the IIR. The ERT recommends Belarus to complete the inventory by estimating all emissions for which there is a method available in the 2016 EMEP/EEA Guidebook or in cases where this is not possible, to provide a plan with schedule to estimate the emissions.

Consistency including recalculation and time series

70. The emission estimates are presented in an inconsistent way within the time series provided. There are differences between emissions reported in the NFR tables for previous years and presented in the IIR 2016, which presumably can occur due to recalculation of emission estimates. Regarding the previous inventory review in 2015, there were recommendations to estimate emissions based on consistent methodology used across time series. However, there is no information to be found in the IIR about recalculations carried out by the Party. The ERT recommends Belarus to recalculate emissions with consistent methods over the time series and to update the emission data in the NFR tables. The ERT also encourages Belarus to provide information on the entire time series in a consistent way in the IIR and to provide detailed explanations including the magnitude of changes and the impact of recalculations on the sector as well as on the drivers behind the trends, in the IIR.

Comparability

71. Due to the lack of transparency in the methods and lack of activity data, the relatively high usage of “IE”, and significant usage of country specific emission factors, it was difficult for the ERT to assess whether the methods used for the calculation of transport sector emissions are comparable with the 2016 EMEP/EEA Guidebook. The ERT recommends Belarus to calculate emissions using the latest version of the EMEP/EEA Guidebook and encourages Belarus to use its IIR to present clear details of the methods, data sources (including activity data and emission factors) and assumptions in the next submission.

72. As information on data sources and methodologies applied is limited, the ERT considers the transport sector inventory not to be comparable with data from other countries. The ERT encourages the Party to provide more detailed information in the IIR in order to improve transparency and comparability, in the next submission.

73. There seems to be overestimates for NMVOC emissions for the road transport sector. The ERT informed the Party about the findings, but did not receive any clarification from Belarus on this issue. Therefore, the ERT recommends the Party to check the emission estimates in order to avoid overestimations and to carry out recalculations, where necessary.

74. A few inconsistencies in the time series for certain pollutants and subcategories were identified by the ERT. These are further discussed under sub-sectoral recommendations. The ERT encourages the Party to include a more detailed description of the reasoning behind the trends in future IIRs.

Accuracy and uncertainties

75. Belarus has provided sub-sectoral uncertainty estimates for all mobile sources in the IIR 2016. The ERT recognises the level of effort undertaken by Belarus in providing an uncertainty analysis with a significant level of detail. However, the ERT recommends Belarus to update the uncertainty analysis according to the methodology provided in the 2016 EMEP/EEA Guidebook and to use the latest year's emission estimates in the calculations for the transport sector, in order to help to provide transparency on future improvements, to provide an indication of the reliability of the inventory data and to support improvement prioritisation.

76. The ERT notes that there are no uncertainty estimates for SO₂ emissions. However, there are default uncertainties provided for emission factors of SO₂ in the IIR 2016, but these are not included in the uncertainty analysis. The ERT recommends Belarus to estimate uncertainty also for SO₂ emissions, since it is one of the main pollutants in the inventory.

77. Belarus provided only a short general statement about the QA/QC system in its IIR 2016, no sector specific QA/QC procedures have been described. The ERT notes that Belarus indicates in its IIR 2016 that the Party plans to improve the QA/QC system in future. The ERT warmly welcomes this plan and recommends Belarus to implement and describe sector specific QA/QC procedures in future submissions.

Improvement

78. The ERT notes that only general information on planned improvements is provided in the IIR 2016 which includes an overview of emission trends, gaps and jumps detection and needs to improve the consistency. The ERT warmly welcomes this plan. However, the ERT encourages the Party to include a more detailed improvement plan for the transport sector to schedule the tasks for further improvement as well as to monitor the progress of the improvement.

Potential technical corrections

79. During the Stage 3 review, the ERT identified two potential issues that would require technical corrections for the road transport sector, but did not prepare any technical corrections due to the lack of activity data provided by the Party. These findings are also described in more detail in the sub-sector specific recommendations below (Category issue 3).

NFR	Pollutants	Year	Reason for not calculating technical corrections	Potential correction to national total (%)
1A3bi	NMVOC, CO	Whole time series	Not calculated by ERT due to lack of activity data	Not estimated
1A3bii	NMVOC, CO	Whole time series	Not calculated by ERT due to lack of activity data	Not estimated
1A3biii	NMVOC, CO	Whole time series	Not calculated by ERT due to lack of activity data	Not estimated
1A3biv	NMVOC, CO	Whole time series	Not calculated by ERT due to lack of activity data	Not estimated
1A3bv	NMVOC	Whole time series	Not calculated by ERT due to lack of activity data	Not estimated

Sub-Sector Specific Recommendations

Category issue 1: 1.A.2.gvii Mobile Combustion in manufacturing industries and construction – All pollutants

80. The ERT notes that only particulate matter emissions are reported for the years 2014-2016 and NMVOC emissions for 2016. Notation keys “NE”, “NA” or “IE” are used for the other pollutants. The ERT recognises the effort made by the Party to report emission estimates for this sector disaggregated. However, the ERT recommends Belarus to report all pollutants for which Tier 1 default emission factors are available in the 2016 EMEP/EEA Guidebook and encourages Belarus to include documentation of the methods in the IIR.

Category issue 2: 1.A.3.ai(i) International aviation LTO (civil), 1.A.3.ii(i) Domestic aviation LTO (civil), 1.A.3.ai(ii) International aviation cruise (civil), 1.A.3.ii(ii) Domestic aviation cruise (civil) – All pollutants

81. The ERT noted that not all pollutants are reported under these subsectors. Emissions for some pollutants are reported as “NA” or “NE” for the years 2014-2016 and zero values for the previous years, although there are emission factors and the methodology provided for estimating these in the EMEP/EEA Guidebook. The ERT

recommends Belarus to estimate the missing emissions and to report them in the future submissions.

82. Regarding the encouragement provided already during the Stage 3 review in 2015, the IIR does not include information on how the emissions for the aviation sector were estimated. The ERT encourages Belarus to provide further details in the next IIR.

Category issue 3: 1.A.3bi Passenger cars, 1.A.3.bii Light duty vehicles, 1.A.3.biii Heavy duty vehicles and buses, 1.A.3.biv Mopeds and motorcycles, 1.A.3.bv Gasoline evaporation, 1.A.3bv(i) Automobile tyre and brake wear and 1.A.3bv(ii) Automobile road abrasion – All pollutants

83. The ERT notes that activity data are provided only at the aggregated level in the NFR tables for the years 2015-2016. In addition, the ERT noticed that there are significant differences between the fuel consumption data presented in the NFR table and in the GHG Inventory reported under the UNFCCC. The ERT recommends Belarus to improve its inventory by providing all the relevant activity data by subsectors in the NFR tables and to clarify the reasons why the fuel consumption data are not comparable between these two national inventories. Such information should be provided in the IIR.

84. Activity data (annual vehicle mileage) provided for the 1A3bvi and 1A3bvii sectors for the years 2015-2016 in the NFR tables does not seem to be correct, considering the amount of fuel consumed and the amount of emissions arising from these sectors. The ERT recommends the Party to revise these values to the next submission.

85. In the IIR (2016) Belarus states that it uses emission factors for NO_x, CO, SO₂ and NMVOC from the “National Instruction on assessment of air pollution from mobile sources” (2010). Methodology and emission factors for other pollutants are taken from the EMEP/EEA Guidebook. In addition, COPERT 4 model (version 10.0) has been used for evaporative emissions of NMVOC (1A3bv). It is not known, whether there are some changes in emission estimates and methodology used, since the ERT did not get any feedback from the Party during the review. However, the ERT encourages the Party to improve the transparency of the emission calculations, by providing a description of the national methodology, detailed level activity data and emission factors that are used in the emission calculations. In addition, the ERT strongly recommends Belarus to include a comparison between national implied emission factors and those presented in the EMEP/EEA Guidebook. Such information should be included in the next IIR in order to have a better understanding of the comparability of the different methodologies.

86. The ERT notes with reference to the NFR tables that there may be an overestimate of NMVOC emissions from the road transport sector (1A3bi-iv). NMVOC emissions are two times higher than NO_x emissions for all vehicle categories in the road transport sector and the IEFs that have been used to estimate NMVOC emissions (0.998 t/TJ in 2016 and 1.148 t/TJ in 2015) are significantly higher compared to other countries. In addition, the ERT also noted a sudden dip in

NMVOC emissions in the 1A3bv sector in 2016 compared to 2015. During the review the Party did not provide any further justification or explanation on this issue. Therefore, the ERT strongly recommends Belarus to review the emission estimates and to recalculate the emissions if necessary, and encourages the Party to include detailed data of the calculation in the next IIR in order to improve the transparency of the inventory.

87. The ERT notes that there may be an overestimate of CO emissions, since there are relatively high implied emission factors used for CO emission calculations (3.544 t/TJ in 2016 and 3.676 t/TJ in 2015) compared to the other countries. The ERT recommends the Party to revise these estimates and to recalculate emissions if necessary.

88. Belarus uses zero values in a small number of cells in the NFR table for 2016, for example for BC in NFR 1A3bii and for NH₃ in NFR 1A3biv. The ERT considers that emissions of BC and NH₃ most likely do occur from these sectors and therefore recommends the Party to report the actual emission values instead of zero emissions in order to improve the completeness of the inventory. In the Stage 3 review in 2015, there was a recommendation provided by the ERT to replace the zero values presented in the 2013 NFR table with the more appropriate notation key "NA". The ERT recommends the Party to update the time series for the previous year's data in the NFR tables with the correct notation keys or values.

89. NH₃, heavy metals and POPs are reported as "IE" for 1A3bii and 1A3biv for the years 2014-2015. At the same time NO_x, NMVOC, SO_x, particulate matter and CO emissions are calculated and reported separately in each subcategory. The ERT recommends the Party to calculate separate emission estimates also for other pollutants from these subsectors and to report them separately in order to improve completeness and consistency with emissions reported in previous years.

90. The ERT notes that no estimates have been provided for Hg, As and Se, instead the notation keys "NA" or "NE" are used. However, it is most likely that emissions do arise from these sectors. The ERT notes that the Parties are requested to estimate all emissions for which calculation methods and emission factors are available in the EMEP/EEA Guidebook and recommends Belarus to provide emission estimates for these missing pollutants in the next submission.

Category issue 5: 1.A.3.ii national navigation - All pollutants

91. The ERT notes that emissions for some pollutants are reported as zero, "NA" or "NE", although there are emission factors and the methodology for estimating these in the EMEP/EEA Guidebook. For example, Belarus reports NO_x, SO_x, NH₃, heavy metals and POPs emissions from 1A3dii as "not applicable" ("NA") for some years and in some cases through the whole time series. The ERT notes that the Parties are requested to estimate all emissions for which calculation methods and emission factors are available in the EMEP/EEA Guidebook and recommends Belarus to provide emission estimates for these missing pollutants in the next submission.

92. In addition, PM_{2.5} and PM₁₀ emissions are reported as “NE” for some years although TSP emissions are reported in the NFR table. In such cases, the ERT recommends Belarus to use the same value as were reported for TSP if no detailed emission estimates are available for PM_{2.5} and PM₁₀.

Category issue 6: 1.A.4.a.ii Commercial/institutional: Mobile, 1.A.4.b.ii, 1.A.4.bii Residential: Household and gardening (mobile), 1.A.4.cii Off-road vehicles and other machinery, 1.A.4.ciii National fishing, 1.A.5.b Other Mobile - All pollutants

93. The ERT notes that Belarus uses “IE” for a number of source categories including 1A4cii, 1A4bii, 1A4ciii and 1A5b, which are allocated to the source 1A4cii. The ERT recommends Belarus to present these emissions separately in the NFR tables and encourages the Party to provide detailed activity data and the emission factors used in the IIR in order to improve the transparency of the inventory for mobile sources.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2015 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2A1	Cement production	IE		X
2A2	Lime production	IE		X
2A3	Glass production	IE		X
2A5a	Quarrying and mining of minerals other than coal	NA		X
2A5b	Construction and demolition	X		X
2A5c	Storage, handling and transport of mineral products	NA		
2A6	Other mineral products	NA		
2B1	Ammonia production	X		
2B2	Nitric acid production	X		X
2B3	Adipic acid production	NO		
2B5	Carbide production	NO		
2B6	Titanium dioxide production	NO		
2B7	Soda ash production	NO		
2B10a	Chemical industry: Other	X		X
2B10b	Storage, handling and transport of chemical products	IE		
2C1	Iron and steel production	X		X
2C2	Ferroalloys production	NO		
2C3	Aluminium production	NE		
2C4	Magnesium production	NO		
2C5	Lead production	NO		
2C6	Zinc production	NO		
2C7a	Copper production	NE		
2C7b	Nickel production	NO		
2C7c	Other metal production	NO		
2C7d	Storage, handling and transport of metal products	IE		
2D3b	Road paving with asphalt	X		X
2D3c	Asphalt roofing	X		X
2H1	Pulp and paper industry	X		
2H2	Food and beverages industry	X		X
2H3	Other industrial processes	NA/NE		
2I	Wood processing	NA/NE		X
2J	Production of POPs	NO		X
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	NA		X
2L	Other production, consumption, storage, transportation or handling of bulk products	X		

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.

General recommendations on cross cutting issues

94. In the 2018 submission, Belarus has reported emissions for the industrial processes sector only for 2016 in the latest NFR14 format. The ERT notes that the years from 2013 to 2015 have been provided in previous submissions also in NFR14 format. In addition, the years from 2009 to 2012 have been provided in earlier submissions in the old NFR09 format.

95. The ERT notes that Belarus has not reported emissions for the industrial processes sector for the years from 1990 to 2008. The ERT recommends Belarus to complete the time series of emissions for the industrial processes sector for all historic years in the NFR14 format to the next submission or to justify why the emissions are not reported. Such information should be provided in the IIR.

96. Belarus has not reported the activity data rates used in the calculations for categories in the scope of the Industrial processes sector neither in NFR14 tables nor in the IIR. The ERT recommends Belarus to include activity rates in the NFR tables to the next submission.

97. Belarus has provided a generally transparent emission inventory for the industrial processes sector. Estimates are provided for almost all categories in the scope of the industrial processes sector. Belarus's methodology and emission factors in the IIR are considered by the ERT to be generally transparent.

Transparency

98. Belarus occasionally uses notation keys in the reporting tables for the industrial processes sector. The ERT recommends Belarus to check the use of notation keys especially when reporting activity data (e.g. "NO" where emissions and activity data are "Not Occurring", "NE" where emissions and activity data are "Not Estimates" and "IE" where emissions and activity data are "Included Elsewhere").

99. As previously noted, Belarus occasionally uses notation keys in the reporting tables for the industrial processes sector and for a few categories, Belarus uses the notation key "IE". The ERT recommends Belarus to provide an emission estimate rather than to use notation key IE as explained under the "Sub-Sector Specific Recommendations".

100. The ERT found the reported estimates to be generally transparent. Belarus uses the EMEP/EEA 2013 methodology for estimating emissions from the industrial processes sector. Methodology and emission factors in the IIR are considered by the ERT to be transparent and well described for the industrial processes sector. The ERT encourages Belarus to study the relevance of the methodology of the most recent EMEP/EEA Emission Inventory Guidebook 2016 for estimating emissions from the industrial processes sector.

Completeness

101. The ERT considers the industrial processes sector to be complete and comprehensive with good levels of detail in the methodology descriptions. However, there is place for additional improvements as explained under the "Sub-sector specific recommendations".

Consistency including recalculation and time series

102. The ERT considers that pollutants emission trends are consistent for the period 2009 to 2012 (submitted in NFR09) and for the period 2013 to 2016 (submitted in NFR14), if these two periods are reviewed separately. However, for the whole reported period from 2009 to 2016 the time series for the emissions is not consistent. The ERT recommends Belarus to report emissions for the historic trend in the new NFR14 format and to provide explanations in its IIR, if any outliers occur.

103. There is general information on recalculations in the IIR of Belarus. The ERT recommends Belarus to provide more information on recalculations made for the Industrial processes sector regarding the rationale, the impact on the sector and implication on emission trends in its IIR.

Comparability

104. The ERT notes that the inventory of Belarus may currently not be comparable with other reporting Parties as Belarus has not yet implemented the methods from the latest version of the Guidebook (currently Guidebook 2016) as requested by the Reporting Guidelines. However, the ERT notes that (1) the translation of the Guidebook 2016 into Russian will only be finalized in summer 2018, and that (2) the methods provided in the Guidebook may not as such be directly applicable to Belarus. The ERT recommends to Belarus to include a comparison between national implied emission factors and those presented in the Guidebook, in order to provide a better understanding of the comparability of the different methodologies. Such a comparison should be included in the IIR.

Accuracy and uncertainties

105. The ERT considers that the methods used for the emission calculation are consistent with those proposed in the EMEP/EEA Guidebook 2013. However, to assess potential overestimations or underestimations of emissions the ERT recommends Belarus to provide a comparison between national methods and those presented in the Guidebook (the same recommendation is provided under the title “Comparison” above). Please see also the “Sub-sector specific recommendations below”.

106. Belarus has provided a quantitative uncertainty analysis for the industrial processes sector for reported emissions. However, Belarus does not report on how its uncertainty analysis is used to prioritize further improvements in the inventory. The ERT recommends Belarus to use the results of the uncertainty analysis to prioritize further improvements in the inventory.

107. Belarus has provided information on some basic QA/QC checks. The ERT recommends Belarus to implement sector specific QA/QC procedures for the industrial processes sector.

Improvement

108. Belarus does not include information on improvements already done for the industrial processes sector in its IIR. Such information should be included in the IIR.

109. Belarus has provided information on planned improvements in the IIR but not for the industrial processes sector. The ERT recommends Belarus to review the completeness and methods used in the industrial processes sector, to complete missing sources and to revise outdated methods. Where improvements cannot be carried out to the next submission, the ERT recommends Belarus to include them in an inventory improvement plan.

110. The ERT notes that Belarus uses Tier 1 methods for key categories while the Reporting Guidelines request the use of higher tier methods for key categories.

Potential Technical Corrections

111. The ERT notes that Belarus did not report Hg and PCB emissions for NFR 2K for the year 2016. For technical correction, the ERT has used the activity data reported by Belarus in its NFR14 tables for 2016 and The World Bank data (<https://data.worldbank.org/indicator>) for population statistics for 2005 and 2016, along with default Tier 1 emission factors from the EMEP/EEA Guidebook 2016.

2.K Consumption of POPs and heavy metals	EF [g/capita]	Unit	2005	2016
Population	-	capita	9663915	9501534
Hg	0.01	t	0.097	0.095
PCBs	0.1	kg	966.39	950.15

Sub-Sector Specific Recommendations

Category issue 1: 2 Industrial processes - all

112. On p.28 of the IIR, submitted in 2016, Belarus states, that the methodology used for estimating emissions from this sector are based on and comply with the EMEP/EEA Guidebook (EMEP/EEA, 2013) and the GAINS/RAINS model. The ERT recommend Belarus to revise the methodology to be consistent with the Guidebook 2016 where applicable, in order to achieve comparability, accuracy and transparency, or to document and justify other methods used. Such information should be provided in the IIR.

Category issue 2: 2.A.1, 2.A.2, 2.A.3 - TSP, PM₁₀, PM_{2.5}, BC

113. In the NFR14 tables, Belarus uses the notation key "IE" for the source categories 2A1, 2A2, 2A3 for TSP, PM₁₀, PM_{2.5}, BC emissions. In Table 1.5, on page 7 of the IIR, those emissions are included in source category 1A2f. Additionally, on page 13 of Belarus' IIR, it is stated that sector NFR 1A2 includes the emissions from fuel used for the generation of electricity and heat in industry (industrial cogeneration plants and industrial heating plants), and that all the emissions from fuel combustion in the manufacturing industry are provided within the 1A2a subsector. According to the EMEP/EEA Guidebook 2016 and also in the 2013 version, particulate matter (PM) emissions from combustion processes should be included in chapter 1A2f, and particulate matter (PM) emissions resulting from the handling and processing of the product and raw materials should be included in the chapters 2A1, 2A2, 2A3. The

ERT recommends Belarus to use clinker production data along with Tier 1 emission factors to calculate emissions and to report them in its IIR and NFR tables.

Category issue 3: 2.A.5.a - TSP, PM₁₀, PM_{2.5}

114. In NFR14 tables, Belarus uses the notation key “NA” – “Not applicable” for the source category 2A5a for TSP, PM₁₀, PM_{2.5} emissions. According to EMEP/EEA Guidebook 2016 (and EMEP/EEA Guidebook 2013), chapter 2A5a quarrying and mining of minerals results in emissions of particulates. The ERT concludes that the Party uses an incorrect notation key in case this activity exist in Belarus, the ERT recommends to calculate the emissions or to use the correct notation key “NE” – “Not estimated”.

Category issue 4: 2.A.5.b - all

115. In the NFR14 tables, Belarus uses the notation key “NE” – “Not estimated” for source category 2A5b construction and demolition for NO_x, CO, SO_x, NH₃, NMVOC, BC, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, HCH, PCBs, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene and HCB. According to EMEP/EEA Guidebook 2016 (and EMEP/EEA Guidebook 2013), chapter 2A5b construction and demolition results only in emissions of particulates. The ERT concludes that the Party uses an incorrect notation key and that the correct one is “NA” – “Not applicable”.

116. During the review, the ERT noticed that there is no information on the methodology used for the emission calculation from 2A5b construction and demolition in Belarus’ IIR submitted in 2016. Additionally, in the NFR14 tables there is no information on the activity rates used for the calculation. The ERT recommends Belarus to provide information on methodology and emission factor used for TSP, PM₁₀, PM_{2.5} emission calculations as well as the values for historic activity data for the next submission.

Category issue 5: 2.B.2 - NO_x, NH₃

117. During the review, the ERT noticed that there is no information on the methodology used for the emission calculation for the category 2B2 nitric acid production. The ERT recommends Belarus to provide information on the methodology along with emission factors and values of activity data for the source category 2B2 nitric acid production in the next submission.

Category issue 6: 2.B.10.a - all

118. In the IIR submitted in 2016, in the chapter chemical industry (2B) there is information on activities included under category 2B, except for ammonia and nitric acid production. The ERT recommends Belarus to document in the IIR whether or not the following activities occur in Belarus: NPK, urea and phosphate fertilizer production. The ERT recommends Belarus to provide information on the emission factors and activity data used for the calculation of emissions from each of the activities included in the source category 2B10a other chemical industry (NPK, urea and phosphate fertilizer production).

119. In the IIR submitted in 2016 there is no information on the existence of the following activities in Belarus: sulphuric acid, ammonium sulphate, ammonium

nitrate, ammonium phosphate, carbon black, chlorine, ethylene, propylene, 1,2 dichloroethane + vinylchloride (balanced process), polyethylene low density, polyethylene high density, polyvinylchloride, polypropylene, styrene, polystyrene, styrene butadiene, styrene-butadiene latex, styrene-butadiene rubber (SBR), acrylonitrile butadiene styrene (ABS) resins, ethylene oxide, formaldehyde, ethylbenzene, phthalic anhydride, acrylonitrile, glyoxylic acid. The ERT recommends Belarus to revise the documentation of the source category 2B10a other chemical industry to provide information on activities existing and not existing in Belarus, and if listed activities exist, to collect activity data on the production, to calculate all relevant emissions and to report resulting emissions, and activity rates in the IIR and NFR tables and to report about this improvement in the IIR.

Category issue 7: 2.C.1 - all

120. In the IIR submitted in 2016, in chapter metal production (2C) there is information on “the main processes involved in iron and steel production are those related to electric furnaces and cupola furnaces in machine-building industry”. The ERT recommends Belarus to complete the information by providing details on methodology along with emission factors and values for the activity data used for source category 2C1 iron and steel production in its IIR. The ERT recommends Belarus to provide values for historic activity data used for emission calculations split by technologies that exist in Belarus (electric furnaces and cupola furnaces).

121. The ERT recommends Belarus to also provide information on the existence of activities related with iron production (ie. sinter production, pellet production, pig iron production) and rolling mills in iron and steel production in Belarus. Moreover, if some of the listed activities exist in Belarus, to collect activity data, calculate relevant emissions according to EMEP/EEA 2016 methodology and to report about this in its IIR and NFR tables.

Category issue 8: 2.H.2 - all

122. During the review, the ERT found in Belarus' NFR14 tables the information that in the scope of source category 2H2 food and beverages industry there are the following activities: bread, wine, beer and spirits production. The ERT recommends Belarus to provide historic production trends of each of these activities in its IIR in the next submission.

123. Moreover, the ERT believes that in Belarus, like in other countries, there are probably other activities (besides bread, wine, beer and spirits production) related to the food and beverages industry, such as sugar production, coffee roasting, animal feed production, margarine and solid cooking fats production, meat, fish and poultry frying/curing and cakes, biscuits and breakfast cereals production. The ERT recommends Belarus to revise category 2H2 food and beverages industry and if some of the listed activities exist in Belarus, to collect activity data, calculate relevant emissions according to EMEP/EEA 2016 methodology or document and justify other methodology used, and to report about this improvement in its IIR and NFR tables.

Category issue 9: 2.I - all

124. In the NFR14 tables, Belarus uses the notation keys “NA” – “Not applicable” or “NE” – “Not estimated” for all pollutants. According to the EMEP/EEA Guidebook

2016 source category 2I wood processing leads to emissions of particulate matter and the emission factor for TSP is provided. Additionally, there is no information on this activity in Belarus' IIR. The ERT recommends Belarus to provide in its IIR the information on the existence of wood processing activity in the Belarus. Moreover, if this activity exists in Belarus, the ERT recommends collecting activity data, to calculate relevant emissions according to EMEP/EEA 2016 methodology and to report about this improvement in its IIR and NFR tables, or if this activity doesn't exist in Belarus using the appropriate notation key, "NO" – "Not occurring".

Category issue 10: 2.K - Hg, PCBs

125. In the NFR14 tables, Belarus uses the notation key "NA" – "Not applicable" for Hg and PCB emissions. Additionally, there is no information on this activity in the IIR. According to the 2016 EMEP/EEA Guidebook, the source category 2K consumption of persistent organic pollutants and heavy metals, leads to emissions of PCB which arise from capacitors and transformers use and from leaks of dielectric fluid containing PCBs from transformers and capacitors that are in poor condition and Hg emissions which arise from the use of batteries, measuring and control equipment (including laboratory and hospital equipment), electrical equipment and lighting. The 2016 Guidebook provides Tier 1 emission factors for Hg and PCBs and the activity data are the country's total population. The ERT recommends Belarus to include information in the IIR on the possible existence of activities under category 2K consumption of persistent organic pollutants and heavy metals in Belarus. If activities falling under NFR 2K exist in Belarus, the ERT recommends documenting these in the IIR and collecting activity data, to calculate relevant emissions according to EMEP/EEA 2016 methodology and to report about this improvement in its IIR and NFR tables. In case these activities do not exist in Belarus to use the appropriate notation key, "NO" – "Not occurring". However, the ERT believes that activities under category 2K are present in almost all countries. Because of that, the ERT calculated a first estimate of these emissions according to the Tier 1 methodology from the 2016 EMEP/EEA Guidebook. The calculation is provided under the chapter "Potential Technical Corrections".

Category issue 11: 2.D.3.b, 2.D.3.c - NMVOC, PM_{2.5}, PM₁₀, TSP, BC, CO

126. In Belarus' IIR, submitted in 2016, there is information on source categories under 2D3b road paving with asphalt and 2D3c asphalt roofing but this information is added under the solvent chapter instead in the industrial processes chapter. Moreover, in the submitted NFR14 tables, there is information on relevant pollutant emissions. The ERT commends Belarus for calculating all relevant pollutants emissions for the listed sectors. However, the ERT recommends Belarus to merge all information from the solvent chapter 6 with chapter 4: "Industrial processes and product use". Moreover, the ERT recommends Belarus to provide information on values for activity data for road paving and asphalt roofing in the next submission. Such information should be included in the IIR.

SOLVENTS

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , TSP, PM ₁₀ , PM _{2.5} , BC, CO, Hg		
Years		2009 – 2016		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2D3a	Domestic solvent use including fungicides	X		X
2D3d	Coating applications	X		X
2D3e	Degreasing	X		X
2D3f	Dry cleaning	X		X
2D3g	Chemical products	X		X
2D3h	Printing	X		X
2D3i	Other solvent use	X		X
2G	Other product use	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

127. In the 2018 submission, Belarus has reported emissions for the solvent sector only for 2016 in the latest NFR14 format. The years from 2013 to 2015 have been provided in the previous submissions also in NFR14 format. Years from 2009 to 2012 have been provided in the previous years but in the old NFR09 format. Belarus has not reported emissions for solvent sector for the years from 1990 to 2008. The ERT recommends Belarus to report emissions for the solvent sector for all historic years since 1990 in the NFR14 format in the next submission

Transparency

128. Belarus has not reported activity data rates for categories in the scope of the solvent sector neither in NFR14 tables nor in the IIR. The ERT recommends Belarus to include activity rates in the NFR tables in the next submission.

129. Belarus occasionally uses notation keys in the reporting tables for the solvent sector. The ERT recommends Belarus to revise the use of notation keys especially when reporting activity data (e.g. “NO” where emissions and activity data are “Not Occurring”, “NE” where emissions and activity data are “Not Estimates” and “IE” where emissions and activity data are “Included Elsewhere”).

130. Reported estimates are generally transparent. Belarus uses EMEP/EEA 2013 methodology for estimating emissions from the solvent sector. The Methodology and emission factors in the IIR are considered by the ERT to be transparent and well described for the solvent sector. The ERT encourages Belarus to use most recent EMEP/EEA methodology 2016 for estimating emissions from the solvent sector or to document and justify the use of other methods.

Completeness

131. The ERT considers the solvent sector to be complete and comprehensive with good levels of detail in the methodology description.

Consistency including recalculation and time series

132. The ERT considers that NMVOC emission trends, by each of source category, are consistent for period the 2009 to 2012 (submitted in NFR09) and for the period 2013 to 2016 (submitted in NFR14), if these two periods are reviewed separately. However, for the whole reported period from 2009 to 2016 for NMVOC emissions aren't consistent. The ERT recommends Belarus to report historic emissions in the new NFR14 format and to provide explanation in its IIR, if any outliers occur.

133. There is general information in Belarus' IIR on the recalculations carried out. The ERT encourages Belarus to provide more information on recalculations calculated for the solvent sector including the rationale, the impact on the sector and implication on emission trends in its IIR.

Comparability

134. The ERT considers that the methods used for the emission calculation are consistent with those proposed in the EMEP/EEA Guidebook 2013. However, the methods used aren't consistent with those proposed in the EMEP/EEA Guidebook 2016 and thus not comparable with other reporting Parties that use the 2016 version of the Guidebook. The ERT recommends Belarus to document and justify the use of other methods. Such information should be included in the IIR.

Accuracy and uncertainties

135. The Belarus has provided a quantitative uncertainty analysis for the solvent sector for the reported emissions. However, Belarus does not report on how its uncertainty analysis is used to prioritize further improvements in the inventory. The ERT recommends Belarus to use the results of the uncertainty analysis to prioritize further improvements in the inventory.

136. According to the IIR Belarus has carried out some basic QA/QC checks. The ERT recommends Belarus to implement sector specific OA/QC procedures for the solvent sector and encourages the Party to include information on these in the IIR.

Improvement

137. Belarus has elaborated recalculations and improvements done for the solvent sector in its IIR. The ERT commends Belarus for its improvement in the solvent sector.

138. Belarus has provided information on planned improvements but not for the solvent sector. The ERT encourages Belarus to check/review the solvent sector, include new information, and prepare a plan to implement a higher tier method for key categories, plan to harmonize the methodology for pollutant emission calculations according to EMEP/EEA Guidebook 2016.

Potential Technical Corrections

None.

Sub-Sector Specific Recommendations

Category issue 1: 2.D.3.a, 2.D.3.d, 2.D.3.e, 2.D.3.f, 2.D.3.g, 2.D.3.h – NMVOC

139. During the review, the ERT noted that Belarus reports emissions from the categories listed in the title, but that activity data has not been presented. The ERT recommends Belarus to submit values for historic activity data since 1990 in the NFR tables and also encourages to include this information in the IIR.

Category issue 2: 2.D.3.a – Hg

140. During the review, the ERT noted that Belarus reports NMVOC emission from category 2D3a using the Tier 1 method to calculate the emissions. According to the EMEP/EEA Guidebook 2016 (also 2013) activity data for Tier 1 emission calculation is the population rate. The EMEP/EEA Guidebook provides Tier 1 emission factor for calculation of Hg emissions. The ERT recommends Belarus to use population data along with Tier 1 emission factor for Hg to calculate Hg emissions from fluorescent tubes and to report about these emissions.

Category issue 3: 2.D.3.i, 2.G – all

141. During the review, the ERT noted that Belarus reports emissions from 2D3i other solvent use with the notation key “NA” – “Not applicable”. Moreover, on p.30 of the IIR, submitted in 2016, Belarus states that 2G sector includes NMVOC emissions from oil extraction. According to the mapping table (ConversionTableReportingCodes_October2015) available on link: http://www.ceip.at/ms/ceip_home1/ceip_home/reporting_instructions/, oil extraction is under category 2D3i along with glass wool enduction, mineral wool enduction, application of glues and adhesives, preservation of wood, underseal treatment and conservation of vehicles, vehicles dewaxing and other (preservation of seeds etc.). The ERT recommends Belarus to report emissions from oil extraction under category 2D3i instead in 2G for the next submission. The ERT recommends Belarus to revise the use of the notation key “NA” to “NE” for category 2D3i.

142. According to the Guidebook 2016 (2013), chapter 2D3i, 2G other solvent and product use includes various activities like glass wool enduction, mineral wool enduction, preservation of wood (with creosote, solvent borne and waterborne preservatives), vehicles dewaxing, treatment of vehicles, industrial application of adhesives (glues), use of fireworks, tobacco combustion, use of shoes, use of concrete additive, cooling lubricant, lubricant, pesticide, aeroplane de-icing agent). The ERT considers that most of these activities exist in Belarus. The ERT recommends Belarus to collect statistical data for activities listed, to stratify activities according to mapping table (ConversionTableReportingCodes_October2015) available on link: http://www.ceip.at/reporting_instructions/ and to calculate all relevant emissions for category 2G and 2D3i to the next submission, and to provide a plan with a schedule for these improvements in the next submission..

Category issue 4: 2.D.3.g Chemical Products – NMVOC

143. On p.35 of the IIR, submitted in 2016, Belarus states that the category 2D3g chemical products covers the emissions from the use of chemical products such as polyurethane and polystyrene foam processing, manufacture of paints, inks and glues, textile finishing and leather tanning. The ERT recommends Belarus to provide values of activity data for polyurethane and polystyrene foam processing, manufacture of paints, inks and glues, textile finishing and leather tanning by activity for all reported years for the next submission. Such information should be reported in the IIR.

AGRICULTURE

Review Scope

Pollutants Reviewed		NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2016 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
3B1a	Dairy cattle	X		X
3B1b	Non-dairy cattle	X		X
3B2	Sheep	X		X
3B3	Swine	X		X
3B4a	Buffalo	NO		
3B4d	Goats	X		X
3B4e	Horses	X		X
3B4f	Mules and asses	NO		
3B4gi	Laying hens	X		X
3B4gii	Broilers	IE		X
3B4giii	Turkeys	NE		X
3B4giv	Other poultry	NE		X
3B4h	Other animals	NE		X
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	IE		X
3Da2b	Sewage sludge applied to soils	NE		X
3Da2c	Other organic fertilisers applied to soils (including compost)	NA		X
3Da3	Urine and dung deposited by grazing animals	IE		X
3Da4	Crop residues applied to soils			
3Db	Indirect emissions from managed soils			
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	NA		X
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA		
3De	Cultivated crops	NE		
3Df	Use of pesticides	NA		
3F	Field burning of agricultural residues	NA		
3I	Agriculture other	NE		
11A	Volcanoes			
11B	Forest fires			
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

144. There is lack of transparency in the inventory due to not presenting livestock numbers for each sub-category in a table rather than in graphs, e.g. Figure 5.1 of the

IIR. The ERT recommends Belarus to provide actual livestock numbers in table format. Such information should be presented in the IIR.

145. The ERT found that the use of notation keys was not always correct. The ERT recommends Belarus to use the appropriate notation keys (e.g. for 3B4giv (other poultry), i.e. “NO” if emissions are “Not Occurring” due to there being no such types of poultry (e.g. ducks and geese) in Belarus, or “IE” where emissions are “Included Elsewhere”).

146. Insufficient detail was provided in the IIR for the ERT to check the calculation of emissions. The ERT recommends Belarus to provide more details on calculations: activity data, such as the proportions of cattle and pigs housed on slurry- and litter-based manure systems, the length of the housing period of cattle and other relevant information related to the calculation of the emissions in the next submission. Such information should be presented in the IIR.

147. Section 5.2 of the 2016 IIR states that “For NH₃ estimations average weighted emission factors for each category were calculated taking in account the relevant emission factors of the abatement technologies for each manure system”. To make the IIR more transparent, information on the abatement technologies, the proportion of NH₃ abated and the percentage of the sub-category to which the abatement technique is applied should be included in the IIR.

Completeness

148. The ERT notes that there is a need to improve the completeness of the the agriculture sector inventory and welcomes the statement in the 2016 IIR paragraph 5.4 that Belarus plans to calculate NO_x emissions from agriculture and recommends the Party to do so for the next inventory submission. The ERT recommends that Belarus includes NO_x emissions from each of the sub-sectors of 3B and from 3Da1, 3Da2a and 3D3. The ERT also recommends that NH₃ emissions are calculated from 3B4d and that Belarus reports NH₃ emissions from the application of livestock manure to land and from excreta deposited during grazing under sub-categories 3Da2a and 3D3 respectively. The ERT also recommends Belarus to calculate and report NMVOC emissions from the agriculture sub-sectors 3B2, 3B4d and 3B4e.

Consistency including recalculation and time series

149. The ERT notes that Belarus has plans (paragraph 5.4 of the IIR) to recalculate NMVOC emissions from agriculture for all years. However, the ERT did not find any plan to recalculate other emissions from agriculture. The ERT recommends Belarus to provide detailed recalculations, including the rationale, the impact on the agriculture sector and implication for the overall emission trends for NH₃ and PM emissions to the next submission. Such information should be provided in the IIR.

150. With respect to trends in the time series the ERT noted that total NH₃ emissions have declined since 2012 by *about* 13%. The IIR (Figure 5.1) suggests cattle numbers have changed little since 2012 but numbers of pigs (-25%) and horses (-20%) have decreased, although numbers of poultry have increased by about 20%. Given that emissions from 3B arise mainly from cattle (aprox. 72 kt) and emissions from pigs and poultry are similar (19.5 and 15.5 kt respectively), the ERT

found it difficult to understand how a 13% reduction in NH₃ emissions from 3B could be possible. To the question on the issue the ERT did not receive a response from Belarus and therefore recommends Belarus to explain the main reasons for the decrease in NH₃ emissions from 2012 onwards in the next submission. Such information should be included in the IIR.

Comparability

151. Based on the information in the 2016 IIR the ERT is not able to assess if the inventory is comparable with other reporting. The 2016 IIR states that Belarus has used methods recommended in the 2013 Guidebook for NH₃, NMVOC, PM₁₀, and PM_{2.5}. However, later in the same paragraph (5.2) the IIR states that 'Emissions of TSP, PM₁₀ and PM_{2.5} were calculated using GAINS model approach'. The ERT did not receive any response to the question to confirm the methods used.

152. The ERT recommends that Belarus uses the methods and EFs provided in the EMEP/EEA Guidebook to calculate emissions of NH₃, NMVOC, PMs and NO_x from agriculture and to provide information on the Guidebook version used. If other methods are used than those proposed in the Guidebook, the ERT recommends Belarus to document the methods and to justify the use of those methods if they better reflect the national circumstances.

153. The ERT notes, as indicated above that there is insufficient activity data to enable the ERT to fully verify the calculations.

Accuracy and uncertainties

154. The ERT noted that NFR 3Da1 has been incorrectly reported as a source of PM. This would have been due to a mistake in the 2013 Guidebook that has now been corrected in the 2016 version of the Guidebook. PM emissions from 3D arise from 3Dc, farm-level agricultural operations including storage, handling and transport of agricultural products. The ERT recommends the Party to correct this in the next inventory submission.

155. The ERT acknowledges that Belarus has carried out an uncertainty analysis (Appendix 2) indicating an uncertainty of 0 - 9% for livestock numbers and uncertainties in NH₃ emissions of up to 27% of total emissions. The ERT commends Belarus for carrying out these analyses.

156. The 2016 IIR reports that a quality management system is currently being developed to support the emission inventory, and that some procedures for QA/QC are already used in Belarus' inventory. The ERT notes that improvement of the QA/QC system is one of the planned improvements planned for Belarus' Inventory (paragraph 9.2 of the 2016 IIR). The ERT recommends Belarus to implement sector specific OA/QC procedures for the agriculture sector.

Improvement

157. The ERT commends the Party for its plan to improve the agriculture Inventory by including emissions of NO_x and encourages Belarus to implement this planned improvement.

Potential Technical Correction (PTC)

None.

Sub-Sector Specific Recommendations

Category issue 1: 3.B Manure management - NO_x

158. The ERT noted that NO_x emissions are not reported from 3B1a, 3B1b, 3B3, 3B4e, 3B4gi, although there are methods available in the 2016 Guidebook. The ERT initially assumed that emissions from 3B2 (sheep production) had not been calculated as they would be raised outdoors. However, since PM emissions have been calculated for this sub-category NO_x emissions should be calculated as well. The ERT did not receive a response to the question on the issue. The ERT recommends Belarus to calculate these emissions for the next submission.

159. The ERT noted that emissions of NH₃ from goats (3B4d) have not been calculated while PM emissions are calculated. The ERT did not receive a response to the question on the issue. The ERT recommends Belarus to calculate these emissions for the next submission.

160. The ERT noted that emissions from 3B4giii (turkeys) are reported as not estimated "NE". The emissions shall be estimated if this activity exists, or the notation key "NO" ("not occurring") shall be used if turkeys are not raised or "IE" – "included elsewhere" if the emission values are reported under another category and information on the allocation should be provided in the IIR. The ERT did not receive a response to the question on the issue. The ERT recommends Belarus to estimate the emissions or adopt the appropriate notation key to the next submission.

161. The ERT noted that the notation key for NH₃ and PM emissions for other poultry (3B4giv) and other livestock (3B4h) should either be "NO" if there are no other poultry in Belarus or "IE" if the emissions are included under another category, since other poultry production will be a source of NH₃ and PMs. The ERT did not receive a response to the question on the issue. The ERT recommends Belarus to estimate the emissions or to adopt the appropriate notation key to the next submission.

162. The ERT noted that the information provided in the IIR does not contain enough details to support an emission inventory review and therefore recommends the Party to include in its next IIR submission the details of the data used for the calculations.

Category issue 2: 3.D Agricultural Soils

163. The ERT noted that Belarus does not report emissions of NO_x arising from N fertilizers applied to land (3D1a). The ERT did not receive a response to the question on the issue. The ERT recommends the Party to include these emissions in the next submission.

164. During the review the ERT informed Belarus that NH₃ emissions from 3Da2a (livestock manure application) and 3Da3 (excreta deposited during grazing) should be reported under 3D and not included elsewhere as in the current inventory

submission. Chapter 3B of the 2016 version of the Guidebook provides instructions on how this can be done in Table 3-1, 'NFR codes under which emissions from manure management are calculated and reported'. The ERT recommends the Party to comply with this in the next submission.

165. The ERT noted that emission were “not estimated” (“NE”) from 3D2b. The notation key “NO” (“not occurring”) should be used if no sewage sludge is applied to land or “IE” if “included elsewhere”. The 2016 IIR indicates that the emissions are not estimated because there are no activity data for sewage sludge application to land. To the question on the status of the issue the ERT did not receive a response. The ERT recommends Belarus to find out if sewage sludge is applied to land and if so to calculate emissions arising from the practice, for the next submission.

166. The 2015 ERT Review encouraged Belarus to make efforts to find some reliable statistics on the annual population numbers of goats and other sub-categories as well (e.g. (3B4giii) turkeys and (3B4giv) other poultry) to estimate emissions of NH₃, PM_{2.5} and PM₁₀. The ERT also recommended that Belarus uses the correct notation keys for the reporting of AD and emissions in the next submission. To the question on the progress made in adopting these recommendations the ERT did not receive any response. The ERT encourages the Party to include information on the issue in the IIR of the next submission.

WASTE

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM, Heavy Metals, POPs		
Years		1990 – 2016 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
5A	Solid waste disposal on land	X		X
5B1	Biological treatment of waste – Composting	X		X
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	X		X
5C1a	Municipal waste incineration	X		X
5C1bi	Industrial waste incineration	X		X
5C1bii	Hazardous waste incineration	X		X
5C1biii	Clinical waste incineration	X		X
5C1biv	Sewage sludge incineration	X		X
5C1bv	Cremation	X		X
5C1bvi	Other waste incineration	X		X
5C2	Open burning of waste		X	
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		X
5D3	Other wastewater handling		X	
5E	Other waste	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

167. Belarus last provided an IIR in 2016, which contained a chapter on the waste sector. The IIR provides a short summary of methods as well as some of the emission factors used in calculations. Emission data submitted in 2018 is provided in NFR-14 format for the year 2016 only, however no activity data were provided.

168. Belarus did not provide any answers to questions on the waste sector during the 2018 centralized review. This is why Belarus' submission could not be reviewed properly. The ERT strongly recommends that Belarus prepares a complete time series in NFR14 format and encourages Belarus to include a complete IIR with all the necessary information in its next submission.

Transparency

169. The 2016 IIR of Belarus provides some information regarding methodologies and emission factors used in the waste sector calculations. Importantly, for key categories (for example 5C1bi industrial waste incineration for dioxins and HCB), the ERT requested Belarus to provide further information on methods and data used for the calculations during the review, however, Belarus did not respond to the request. The ERT strongly recommends that Belarus provides complete information on its methodologies, including references to documentation of country specific methods and / or emissions factors.

Completeness

170. The fact that the waste sector documentation of the IIR was not updated for the submission in 2018 made the review effort extremely difficult in terms of assessing inventory completeness.

171. The ERT notes that the waste sector inventory is incomplete and not fully consistent with the Reporting Guidelines and the 2016 EMEP/EEA Emission Inventory Guidebook. The ERT reiterates its recommendations from the 2011 and 2015 reviews to Belarus to improve the completeness of the inventory and encourages Belarus to complete the IIR with more detailed explanation about the methodology applied.

172. As identified in the 2015 review, Belarus continues to use the notation key “Not Estimated” (“NE”) for a range of pollutant and source combinations in the waste sector. The 2016 IIR outlines simple reasons for the use of “NE” by category, however there is no further detailed explanation or improvement plan given and in most cases this information is now outdated compared to the 2018 NFR submission. The ERT reiterates its recommendation from the 2011 and 2015 reviews, namely that Belarus shall estimate emissions for those sources that are currently reported as “NE” in the NFR tables. In addition, the ERT recommends Belarus to complete the necessary AD for these sources in the NFR tables.

Consistency, including recalculation and time series

173. As noted in previous reviews, Belarus has submitted its NFR for a single year (2016) only. This makes it difficult for the ERT to assess consistency of Belarus’ reporting and time series. The ERT reiterates its recommendation from the 2011 and 2015 reviews, namely that Belarus should recalculate the complete time series and report it in the NFR format for future submissions.

Comparability

174. Belarus has not submitted an updated IIR since the submission 2016, in which the methodologies and emissions factors refer to the 2013 Guidebook. As such, it has not been possible for the ERT to consider whether all applied methodologies in the waste sector are comparable to other Parties, and whether appropriate, updated 2016 Guidebook methodologies and emission factors have been followed. The ERT recommends Belarus to explain the methodologies used in the inventory in its next submission. Such information should be provided in the IIR.

Accuracy and uncertainties

175. Belarus describes some QA/QC activities in its 2016 IIR, but has not provided an update on these, or a detailed description of the QA/QC activities performed in the waste sector. The ERT reiterates its recommendation from the 2011 and 2015 reviews to Belarus to implement sector-specific QA/QC procedures for the waste sector and reiterates the encouragement to describe these within its next IIR submission.

176. Belarus has not provided an uncertainty analysis for the waste sector. The ERT reiterates its recommendation from the 2011 and 2015 reviews to Belarus to undertake an uncertainty analysis for the waste sector in order to support the

improvement process and to provide an indication of the reliability of the inventory data.

Improvement

177. Without an update of the IIR submission since 2016, Belarus has neither provided any other overview of the progress made as a result of the previous 2015 ERT recommendations. Given the lack of response, the ERT recommends that Belarus reports the improvements made in the next submission. Such information should be provided in the IIR.

Potential Technical Corrections

None.

Sub-Sector Specific Recommendations

Category issue 1: 5A Solid waste disposal on land – All pollutants

178. The ERT notes that Belarus reports emissions of NH₃ only from this source category. During the centralized review, Belarus was asked to justify the use of the notation key “NE” for NMVOC, PMs and heavy metals for which Guidebook methodologies are available. Belarus did not provide a response. The ERT reiterates the 2015 review recommendation that Belarus should obtain statistical data and calculate emissions for these pollutants from sub-category 5A where methodologies are available, and that it should outline the methods and activity data available in its next IIR.

Category issue 2: 5B1 and 5B2 Biological treatment of waste - NMVOC, NH₃

179. The ERT notes that the notation key “NA” is reported for the sub-categories 5B1 and 5B2 by Belarus in the NFR tables for NH₃ and NMVOC despite Guidebook methodologies being available. The ERT recommends reporting emissions from these sources in the NFR tables and encourages to complete the IIR by providing a description of methodology, AD and EFs used in the next submission. Alternatively, if the activity does not occur in Belarus, or the resulting emissions are deemed negligible, the appropriate notation key (“NO” or “NE”) should be applied in the next NFR submission.

Category issue 3: 5C1 All waste incineration – all pollutants

180. A number of emission estimates are made for pollutants under waste incineration categories 5C1a municipal waste incineration, 5C1bi industrial waste incineration, 5C1biii clinical waste incineration and 5C1bv cremation; however there is incompleteness in terms of the pollutant coverage across these sources, specifically for pollutants for which methodologies are available in the Guidebook. As in the previous 2011 and 2015 reviews, Belarus is strongly recommended to estimate emissions for all pollutants from all sources where Guidebook methodologies are available. In addition, Belarus should report in its IIR details on the methodologies applied.

Category issue 4: 5.C.1.b.ii Hazardous waste incineration and 5.C.1.b.iv Sewage sludge incineration - all pollutants

181. The ERT notes that the notation key "Included elsewhere" ("IE") is reported for a number of pollutants under sub-categories 5C1bii and 5C1biv from incineration of hazardous waste and sewage sludge, respectively. The 2016 IIR did not provide justification or explanation for how these waste streams are included in other waste sub-categories and no response has been provided by Belarus in relation to this issue during the centralized review. Belarus is strongly recommended to provide a complete time series for all pollutants where methodologies are available in the Guidebook, and to outline its methodologies, and justification for any notation keys used, in its next IIR submission.

Category issue 4: 5D All waste water handlings – NMVOC, NH₃

182. The ERT notes that the notation keys "NE" (NMVOC) and "NA" (NH₃) are used for pollutants under sub-category 5D1 domestic wastewater handling and 5D2 industrial wastewater handling despite Guidebook methodologies being available. The ERT recommends that Belarus collects activity data in order to be able to estimate emissions of NMVOC and NH₃ from wastewater handling in line with the Guidebook methodologies, and encourages the Party to provide documentation and justification for the chosen methods, activity data and any issues in implementing the methods in its next submission. Such information should be provided in the IIR.

Category issue 5: 5E Other waste – NMVOC, NH₃

183. Belarus has included emission estimates for NMVOC and NH₃ in its NFR submission under the sub-category 5E. Without any updates of the 2016 IIR related to the 2018 submission, it has not been possible for the ERT to understand what these emissions represent. Belarus is encouraged to include a description of this source and the calculation methods used in its next IIR submission.

MATERIALS USED BY THE REVIEW TEAM

1. Belarus' IIR 2016 (pdf)
2. Annex 1 NFR tables 2014 – 2016 (3 Excel files)
3. Belarus Stage 1 report 2018
4. Belarus Stage 2 S&A report 2018
5. Belarus Stage 3 review report 2015
6. Data and tools developed by CEIP (<http://unece-stage3.wikidot.com/data-analysis>)

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Response to preliminary questions raised prior to the review (wiki)
2. Response to questions raised during the review (wiki)

REFERENCES

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ANNEX I POTENTIAL TECHNICAL CORRECTIONS

In File "TC – Belarus 2K_REVIEW2018.xlsx"

BELARUS - Summary table to be included in RR

TC REVISED ESTIMATES	Description	Reference	Pollutant estimates		
			2016	2010	2005
	PCBs				
	National total as reported 2018 (row 141)	CEIP database	11.664	11.763	10.222
	Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
	Difference between original estimate and technical correction deemed necessary by the ERT				
	2K Consumption of POPs and heavy metals, PCBs in kilograms (kg)		950.153	NE	966.392
	National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	961.817	NE	976.614
Hg					
National total as reported 2018(row 141)	CEIP database	0.198	0.854	0.649	
Difference (t) between original estimate and revised estimates provided by Party and accepted by the ERT					
Difference between original estimate and technical correction deemed necessary by the ERT					
2K Consumption of POPs and heavy metals, Hg in tonnes (t)		0.095	NE	0.097	
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	0.293	NE	0.746	