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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:

KAZAKHSTAN

CONTENT

INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention*'[1] – hereafter referred to as the 'Review guidelines 2018'.

2. This annual review, has checked all pollutants covered by LRTAP Convention and its protocols (SO_2, NOx, NMVOC, NH_3, plus PM_{10} $PM_{2.5}$, BC, 3 HMs and POP_S) for the time series years 1990 – 2019 reflecting current priorities from 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 of Kazakhstan coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place during May and June and was performed as desk review with virtual meetings. The following team of nominated experts from the roster of experts performed the review: Generalist – Zuzana Herrera (Czechia), Energy – Garmt Jans Venhuis (Netherlands), Transport – Antonella Bernetti (Italy), IPPU – Michaela Titz (Austria), Agriculture – Rikke Albrektsen (Denmark), Waste – Zuzana Jonacek (Slovakia).

4. Anne Misra was the lead reviewer. The review was coordinated by Katarina Marečková, (EMEP Centre on Emission Inventories and Projections - CEIP).

[1] Decision 2018/1 adopted by EB: *Updated methods and procedures for the technical review of air pollutant emission Inventories reported under the Convention*. ECE/EB.AIR/142/Add.1 http://www.unece.org/fileadmin/DAM/env/documents/2002/eb/air/EB%20Decisions/Decision_2018_1.pdf

PART A: KEY REVIEW FINDINGS

5. The inventory is partly in line with the *EMEP EEA inventory guidebook* and UNECE Reporting Guidelines. Emissions for the calendar year 2019 are calculated using the 2019 EMEP/EEA Guidebook. However, ERT noted that emissions from 1990 to 2018 and based on the 2016 EMEP/EEA Guidebook and have not been updated in the most recent 2021 submission.

6. Kazakhstan did not report an IIR as part of the 2021 submission and as such the inventory could only partially be reviewed using the IIR and NIR published in 2020.

7. The ERT also noted that Kazakhstan applies Tier 1 methods and default parameters for most key categories across all sectors.

8. ERT also noted that recalculations have not been applied consistently throughout entire time series. Only emissions for the calendar year 2019 have been updated in the 2021 submission. Emissions for 1990 and 2018 have not be updated since the last submission in 2020.

9. The 2021 submission shows improvements made since the previous review. However, the ERT identified a need for further improvements in the transparency, completeness, time series consistency.

10. During the review the ERT was not able to identify possible technical corrections due to the lack of data and information available.

11. The ERT thanks Kazakhstan for participating actively in the Stage 3 review process by providing further information when requested. Based on that information, the ERT was able to review the inventory to some extend and to provide several detailed recommendations.

INVENTORY SUBMISSION

12. In 2021 submission Kazakhstan reported emissions for its Protocol base years (1990) and a full time series to 2019 (the latest year) for its protocol pollutants in the NFR format. However, it appears that emissions estimated for the years 1990-2018 were not updated since the 2020 submission and are based on emission factors from EMEP/EEA Guidebook 2016. The EMEP/EEA Guidebook 2019 was used only for emissions estimated for 2019. The ERT strongly recommends Kazakhstan to update the emissions for the entire time series, i.e. from 1990 onwards to ensure consistency and comparability.

13. The submission did not include data on projections or gridded emissions data. The ERT recommends Kazakhstan to include data on projections and gridded emissions in the next submission.

14. The 2021 submission of Kazakhstan did not include an IIR. Therefore, the previous IIR from the 2020 submission was used. The level of information provided in the IR was not sufficient to carry out a detailed review of the emission data. The ERT

strongly recommends Kazakhstan to prepare and submit an IIR based on the recommended ANNEX II structure for the next submission.

KEY CATEGORIES

15. Kazakhstan did not compile uncertainty estimates for their submission. During the review Kazakhstan indicated that they are planning to conduct an uncertainty analysis in the next submission. The ERT encourages Kazakhstan to compile at least tier 1 estimates for future submissions.

16. It is not possible to establish which Tier methodology has been applied to estimate the 2019 emissions. The ERT recommends Kazakhstan to use higher Tier methods for all key categories in line with the Guidebook in order to increase the accuracy of the inventory.

QUALITY

Transparency

17. The ERT recognises the level of effort undertaken by Kazakhstan in providing an inventory with much higher level of detail than in the previous submissions. However, information on planned improvements or the methodology used for the estimate provided was missing in multiple sectors (see the individual sectoral chapters below). The ERT also notes that a lot of sources and assumptions were not indicated in the current IIR, which was also the case in the previous submissions. The ERT strongly recommends Kazakhstan to include in the future IIR more complete/sufficient information on the EFs, activity data, methodology, timeframe, assumptions and sources used. The ERT strongly recommends Kazakhstan to update IIR annually.

Completeness

18. The ERT commends Kazakhstan for providing more complete activity data set tables for most categories, estimates for most pollutants and limited use of notation keys in the Energy sector. The ERT considers the Energy sector to be almost complete. However, there are some categories and pollutants not covered by the current estimations. The ERT recommends Kazakhstan to complete the inventory by estimating and reporting the missing sources, as well as to review estimates and activity data for the whole time series and secure consistency in the data presented for the years 1990 – 2018.

19. Where missing activity data labelled as NE in datasets were identified by sectoral experts (see individual sectoral chapters below), the ERT recommends including this issue in Kazakhstan’s planned improvements.

20. The ERT recommends that Kazakhstan performs additional reviews to identify gaps in the inventory. The correct use of notation keys is highly recommended to support the finding of such gaps.

Consistency, including recalculations and time-series

21. Kazakhstan has undertaken a number of recalculations in their current submission. The ERT welcomes the upgrade to EMEP/EEA Guidebook 2019 but it appears that emissions estimated for the years 1990-2018 have not been updated since the 2020 submission and are based on emission factors from EMEP/EEA Guidebook 2016. EMEP/EEA Guidebook 2019 was used only for emissions estimated for 2019. The ERT recommended Kazakhstan to review estimates, EFs and activity data for the whole time series and secure consistency in the presented data. During the review process Kazakhstan mentioned that in the next IIR plans to provide all data in full compliance with the methodology described in the EMEP/EEA Guidebook 2019.

22. The ERT encourages Kazakhstan to provide additional detail on the impacts of the changes introduced by the recalculations on the national estimates and timeseries in its future IIR submissions.

Comparability

23. The ERT noted that the inventory appears to be in line with the Reporting Guidelines. However, as Kazakhstan does not provide details on methodologies, activity data and EFs it is not possible to check the accuracy of calculations and to compare EFs or IEFs with the ones of other countries. The ERT strongly recommends Kazakhstan to provide detailed information about the methodologies, activity data and EF used, as well as any possible drivers behind the emission trends in the next submission of the IIR.

24. The ERT recommends Kazakhstan to include an inventory improvement plan with scheduled actions for all sectors where they have not done so yet (e.g. Energy) and to report on progress in the future IIR, in order to improve on completeness, comparability and transparency.

Accuracy and uncertainties

25. Kazakhstan did not compile uncertainty estimates for their submission. During the review Kazakhstan indicated that they are planning to conduct an uncertainty analysis in the next submission. The ERT encourages Kazakhstan to compile at least tier 1 estimates for future submissions.

Verification and quality assurance/quality control approaches

26. Kazakhstan’s quality assurance/quality control (QA/QC) description includes no detailed information. The ERT recommends implementing individual sector specific QA/QC procedures (with checks of time series for both emissions and activity data) and include information on the checks in place, the associated results and plans for future improvements in the IIR.

Reporting of Condensable

27. Kazakhstan does not provide information on the condensable compound of PMs for relevant categories in the IIR. The ERT recommends the Party include information on whether particle emissions include or exclude the condensable component in the next submissions in line with Reporting Guidelines Annex II. Information on condensable fraction could also be provided as a table which lists if condensable are included in the IEF or excluded or if there is no information are available.

FOLLOW-UP TO PREVIOUS REVIEWS

28. In the current submission Kazakhstan's data are reasonably complete in comparison to the previous submissions. However, the ERT noted that there are several issues that have not been addressed from the previous submissions, such as sufficiently detailed information on EFs, activity data, methodology, timeframe, assumptions and sources used, as well as the planned improvements.

AREAS FOR IMPROVEMENTS IDENTIFIED BY KAZAKHSTAN

29. There is no improvement plan mentioned in Kazakhstan's IIR. However, in the response to the review stages this year, Kazakhstan indicates that it is planning to:

(a) Include all emission sources available in Kazakhstan in future inventory submissions;

(b) Conduct an uncertainty analysis in the next submission;

(c) Use the EMEP/EEA Guidebook 2019 when preparing the data for the next submission;

(d) Use Tier 2 or Tier 3 methodologies in the relevant categories.

TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY ERT

30. The ERT did not proposed technical corrections for Kazakhstan, despite significant inconsistencies in IPPU and Solvents, as there was insufficient amount of data provided for any potential technical correction to be carried out.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

31. The ERT identified the following cross-cutting issues for improvement and recommends that the Party:

(a) include in the future IIR as much information as possible on the EFs, activity data, methodology, timeframe, assumptions and sources used, as well as any possible drivers behind the emission trends.

(b) review estimates and activity data for the whole time series, secure consistency in the data presented for the years 1990 – 2018.

(c) provide all data in full compliance with the EMEP/EEA Guidebook 2019 methodology (incl. using Tier 2 or higher for Key categories).

(d) include an inventory improvement plan with scheduled actions for all sectors where they have not done so yet (e.g. Energy) and to report on progress in the future IIR, to improve on completeness, comparability and transparency.

(e) compile at least a Tier 1 uncertainty estimates for future submissions.

(f) implement individual sector specific QA/QC procedures (with checks of time series for both emissions and activity data) and include information on the checks in place, their results and plans for future submissions.

(g) include information on whether particle emissions include or exclude the condensable component in the next submissions in line with Reporting Guidelines Annex II.

(h) provide additional detail on the impacts of the changes introduced by the recalculations on the national estimates and timeseries.

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 – 2019		
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	NE		X
1A3eii	Other	NE		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	NE		X
1B1c	Other fugitive emissions from solid fuels	NE		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)	NE		X
1B2d	Other fugitive emissions from energy production	NE		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

32. During the review week Kazakhstan provided the ERT with a recently updated version of the IIR. The ERT considered the information provided basic as no clear descriptions of methodology, trends or emission factors are provided. In general, the inventory is considered as not transparent. The ERT recommends Kazakhstan to include more information on activity data, emission factors and description of the methodologies used for the estimation of emissions, in general and for each energy subsector, and to provide a more detailed IIR in future submissions.

33. During the review week Kazakhstan also provided the ERT with an updated version of the NFR which included updated estimates and activity data for 2019. The ERT comments the Party for providing a complete table with activity data for most sectors, estimates for most pollutants and limited use of notation keys. However, the tables for the years 1990 – 2018 do not appear to have been updated. The ERT recommends Kazakhstan to review estimates and activity data for the whole time series and to ensure consistency in the data presented.

Completeness

34. The ERT considers the Energy sector to be almost complete. However, there are some categories and pollutants not covered by the current estimations as explained under sub-sector specific recommendations below, especially the key source 1.B.1.a, 1.B.2.ai, 1.B.2.aiv and 1.B.2.av where no activity data and estimates are given in the NFR. The ERT recommends Kazakhstan to calculate all missing emission sources, in particular key categories.

Consistency including recalculation and time series

35. There is no information on recalculations and time series for the Energy sector included in the IIR. During the review it became clear, that emissions estimated for the years 1990-2018, were based on emission factors from EMEP/EEA Guidebook 2016, but for emissions estimated for 2019 EMEP/EEA Guidebook 2019 were used. The ERT commends Kazakhstan for using the EMEP/EEA Guidebook 2019 to estimate emissions in 2019 but recommends Kazakhstan to ensure consistency in use of activity data and emission factors for the entire time series.

36. During the review Kazakhstan provided an updated Annex I which included updated estimates and activity data for 2019 only. The ERT thanks the Party for the update. However, the ERT noted that inconsistency in use of activity data may occur with respect to the period 1990-2018 since these emission data were not updated in the recent resubmission. The ERT recommends Kazakhstan to review activity data used for the whole time series and ensure consistency in the activity data used, and recalculate emissions using emission factors from the 2019 EMEP/EEA Guidebook.

Comparability

37. The ERT noted that Kazakhstan does not provide methodologies, activity data and EFs in the Annex I NFR table or the IIR. It is not possible for the ERT to check the accuracy of calculations and to compare EFs or IEFs with the ones of other countries. The ERT recommends Kazakhstan to provide detailed information about the methodologies, activity data and EF used in the next submission of the IIR.

Accuracy and uncertainties

38. The ERT notes that Kazakhstan includes only some general information on QA/QC in their IIR, but no information specific for the Energy sector is given. The ERT recommends Kazakhstan to provide source-specific information on QA/QC procedures carried out in the Energy sector and on the results of the checks in the IIR.

39. The ERT encourages Kazakhstan 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.

Condensable

40. The ERT notes that Kazakhstan does not provide any information on the condensable component in PM for the relevant categories. The ERT recommend the Party to include information on whether particle emissions include or exclude the condensable component in the next submissions in line with Reporting Guidelines Annex II.

Improvement

41. There are no improvements mentioned for the Energy sector in Kazakhstan's IIR. The ERT recommends Kazakhstan to include an inventory improvement plan with scheduled actions for the Energy sector and to report on progress in the IIR to improve the completeness, comparability and transparency of the inventory.

Potential Technical Corrections

42. The ERT concludes that for the Energy sector no significant inconsistencies were found, and that therefore no further recommendations are necessary.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1.a, 1.A.1.b, 1.A.2.a, 1.A.2.b, 1.A.4.bi, 1.B.1.a, 1.B.2.ai, 1.B.2.av, 1.B.2.aiv Transparency – SO_2, NOx, NMVOC, CO, PM, HM, POPs

43. The ERT noted that Kazakhstan reported NFR sectors 1.A.1.a, 1.A.1.b, 1.A.2.a, 1.A.2.b, 1.A.4.bi, 1.B.1.a, 1.B.2.ai, 1.B.2.av and 1.B.2.aiv as key categories for the pollutants SO_2, NOx, NMVOC, CO, PM, HM and POPs. From the IIR it is not clear, however, which Tier method was used to calculate the emissions. During the review week Kazakhstan responded that a Tier 1 method was used for the calculations

and that they plan to consider the possibility of using Tier 2 or Tier 3. The ERT thanks the Party for their response. However, the ERT already included a recommendation on this matter in the previous review report. Therefore, the ERT strongly recommends Kazakhstan to follow up on their intent. The ERT also recommends including this issue in their planned improvements in their IIR. Furthermore, the ERT strongly recommends for Key categories to use Tier 2 or 3 methodology in line with the Reporting Guidelines paragraph 21. Parties should make every effort to use a Tier 2 or higher (detailed) methodology for all key categories.

Category issue 2: 1.A.2.c & 1.A.2.gviii - Chemicals & Stationary combustion: Other - TSP, PM_{10}

44. The ERT noted in the NFR table 2019 for sectors 1.A.2.c and 1.A.2.gviii that the estimates for PM_{10} are higher than the estimates for TSP. During the review week Kazakhstan provided an updated NRF table for 2019. The ERT thanks the Party for their quick response and recommends that Kazakhstan uses the correct estimates in their next submission.

Category issue 3: 1.A.2.d, 1.B.1.a, 1.B.2.aiv Transparency - NH_3, Cr, Cu, Ni

45. The ERT noted in the NFR table 2019 emissions of NH_3, Cr, Cu and Ni were labelled as confidential in the sectors 1.A.2.d, 1.B.1.a and 1.B.2.aiv but no explanation was provided as to why. During the review week Kazakhstan responded that for these sectors a Tier 2 methodology was used, based on data from facilities and calculated according to national methods or obtained because of industrial environmental control. Many companies mark their emissions for these sources as confidential. In the next IIR, the Party plans to provide all data to fully comply with the 2019 EMEP/EEA Guidance methodology. In addition, Kazakhstan provided an updated NRF table for 2019 and in this file the estimates are no longer reported as confidential. The ERT recommends that the Party reports emissions for all years and subsectors in the next submission.

Category issue 4: 1.A.2.d, 1.A.2.e Completeness - $PM_{2.5}$, PM_{10}, HM, POPs

46. The ERT noted in the NFR table 2019 that $PM_{2.5}$, PM_{10}, HM and POPs are labelled as NE, NO or NA in the sectors 1.A.2.d, and 1.A.2.a. During the review week Kazakhstan responded that a Tier 2 was used, based on data from facilities calculated according to national methods or obtained as a result of industrial environmental control. The reports of enterprises do not indicate the amount of emissions for these sources due to difficulties in paying for monitoring or calculation. In the next IIR, the Party plans to provide all data to fully comply with the 2019 EMEP/EEA Guidance methodology. In addition, Kazakhstan provided an updated NRF table for 2019 and in this file the estimates are no longer reported as NE, NO or NA. The ERT recommends that the Party reports emissions for all years and subsectors in the next submission.

Category issue 5: 1.A.3.ei Pipeline transport - all pollutants and all AD

47. The ERT noted in the NFR table 2019 that no activity data is given (NA for all AD) and for all pollutants the notation key NE was used. No additional information was provided on whether pipelines are present in Kazakhstan or not (in which case NO

should have been used) or that AD and emissions are included elsewhere (in which case IE should have been used). During the review week Kazakhstan responded that in the statistical bulletin "Fuel and Energy Balance", data on the activities "Land transport and pipeline transportation" are combined, so there was confusion in the provision of the IIR. The Party also indicated that they would divide the activity data in the next submission, if possible. The ERT thanks the Party for their response and recommends following up on their intent. The ERT also recommends including this issue in their planned improvements.

Category issue 6: 1.A.3.eii, 1.B.1.b, 1.B.1.c, 1.B.2.b, 1.B.2.c, 1.B.2.d Completeness - all pollutants and all AD

48. The ERT noted in the NFR table 2019 that for 1.A.3.eii, 1.B.1.b, 1.B.1.c, 1.B.2.b, 1.B.2.c and 1.B.2.d no pollutants and no activity data were reported, and for all pollutants and AD the notation key NE was used. The ERT asked Kazakhstan to comment on why no activity data was presented for these sectors, on why no emissions were calculated (even though the EMEP/EEA Guidebook provides a Tier 1 methodology), and to provide the ERT with additional information. During the review week Kazakhstan responded that in the statistical bulletin "Fuel and Energy Balance", data on solid fuel processing are not filled in, and there is also no data on the amount of fuel burned on flares. Geothermal energy is not produced in Kazakhstan. The ERT thanks the Party for their response and recommends including this issue in their planned improvements.

Category issue 7: 1.B.1.a, 1.B.2.aiv Completeness – all Activity Data

49. The ERT noted in the NFR table 2019 for sectors 1.B.1.a and 1.B.2.aiv emissions are presented, but all activity data is labelled as NE. The ERT asked the Party to provide the ERT with additional information on activity data for these sectors. During the review week Kazakhstan responded that for sector 1.B.1.a, Tier 2 specific data on actual emissions were taken. For sector 1.B.2.aiv there was no data for Kazakhstan on the amount of oil production, exploration and transportation, only data for large corporations were available. If possible, in the next submission, Kazakhstan will present more accurate calculated data without taking into account Tier 2. The ERT thanks the Party for their response and recommends following up on their intent. The ERT also recommends including this issue in their planned improvements in the IIR. Furthermore, the ERT strongly recommends for Key categories to use Tier 2 or 3 methodology in line with the Reporting Guidelines paragraph 21.

Category issue 8: 1.B.2.ai, 1.B.2.av Completeness – all Pollutants and all Activity Data

50. The ERT noted in the NFR table 2019 that for sectors 1.B.1.ai and 1.B.2.av no pollutants and no activity data were reported, and for all pollutants and AD the notation key NE were used. Key source analysis showed that NMVOC is a key pollutant for sectors 1.B.2.ai and 1.B.2.av. The ERT asked the Party to comment on why no activity data were presented for these Key categories and why emissions were not calculated (Tier 2 or 3 methodology), and to provide the ERT with additional information. During the review week Kazakhstan responded that, for sectors 1.B.2.ai and 1.B.2.av, Tier 2

specific data on actual emissions were used. In the next submission, Kazakhstan plans to provide all data in a single Tier 1 calculation to fully comply with the methodology of the 2019 EMEP/EEA Guidelines to avoid the occurrence of inconsistencies. The ERT thanks the Party for their response and recommends Kazakhstan following up on their intent. The ERT also recommends including this issue in their planned improvements in the IIR. Furthermore, the ERT strongly recommends Kazakhstan to use Tier 2 or 3 methodology for Key categories in line with the Reporting Guidelines paragraph 21.

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2019		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A2gvii	Mobile Combustion in manufacturing industries and construction	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		X
1A3dii	National navigation (shipping)	X		X
1A4aii	Commercial/institutional: Mobile	X		
1A4bii	Residential: Household and gardening (mobile)	X		
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	X		
1A4ciii	Agriculture/Forestry/Fishing: National fishing	X		
1A5b	Other, Mobile (including military, land based and recreational boats)	X		
1A3di(i)	International maritime navigation	X		X
1A3	Transport (fuel used)	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

51. The ERT encourages the Party to improve the transparency of the inventory by including additional and more detailed information on the methods applied to calculate emissions in the IIR, documenting emission factors, activity data and assumptions underlying the estimates as well as the choice of notation keys.

52. The ERT strongly recommends Kazakhstan to include information on recalculations based on planned improvements, as stated in the replies by the Party to questions raised by the ERT, in the IIR of the next submission, and to provide justifications for these as well as information about their impacts on the emission levels.

Completeness

53. The ERT noted that the Transport sector is not fully complete for the period 1990 - 2019, regarding both the estimation of pollutants emissions across the time series and the activity data, not reported for all years. The ERT strongly recommends Kazakhstan to complete the time series and to estimate and report the missing emissions according to the 2019 EMEP/EEA Guidebook.

Consistency including recalculation and time series

54. The ERT noted inconsistencies regarding the pollutants estimated over the years for transport activities, the activity data, not reported for all years, and the choice of the notation keys used. The ERT strongly recommends Kazakhstan to harmonise the transport sector in all its aspects and for all transport modalities, according to the 2019 EMEP/EEA air pollutant emission inventory guidebook, ensure consistency across the time series. The ERT recommends Kazakhstan to review and recalculate the time series showing critical issues by implementing the planned improvements, using consistent methodologies throughout the time series. Furthermore the ERT strongly recommends to make every effort to use a Tier 2 or higher (detailed) methodology, including country-specific information for sources that are determined to be key categories in accordance with the 2019 EMEP/EEA Guidebook methodologies and Reporting Guidelines paragraph 21.

55. The ERT recommends the Party to update the relevant sections of the IIR, also providing documentation on the recalculations (e.g. activity data, emission factors and methods and their references, assumptions made) in the IIR of the next submission.

Comparability

56. The ERT recommends Kazakhstan to improve the comparability of the time series by implementing the planned improvements to revise the time series and eliminate the current discrepancies according to the methodology provided in the 2019 EMEP/EEA Guidebook.

Accuracy and uncertainties

57. The ERT encourages Kazakhstan to implement specific QA/QC procedures for the transport sector and to provide a detailed description of the QA/QC procedures and their results in the next IIR.

58. The ERT encourages Kazakhstan to provide quantitative uncertainty analysis for the transport sector to help inform the improvement process and to provide an indication of the reliability of the inventory data.

Condensable

59. The Party did not provide explanatory information on condensable component of PM for road transport categories estimates elaborated for the different years. The ERT recommends Kazakhstan to include such information in the IIR of the next submission.

Improvement

60. Party identified the need to improve the transport sector estimations, also by means of a better organization of the collection of national statistical data. The Party intends to address that by proposing to include the data required for estimating emissions according to the 2019 EMEP/EEA air pollutant emission inventory guidebook in the national statistical reports. The ERT strongly recommends Kazakhstan to follow up on their intent, harmonising the transport sector in all its aspects and for all transport modalities, for the whole time series, according to the Guidebook. The ERT also recommends including this issue in the planned improvements in the IIR of the next submission.

Potential Technical Corrections

61. The ERT did not note significant inconsistencies in NFR category and as such does not proposed any Technical Corrections for the transport sector.

Sub-Sector Specific Recommendations

Category issue 1: Transport – Accuracy, Completeness, Consistency - All Pollutants

62. The ERT noted inconsistencies regarding the pollutants estimated across the timeseries for transport activities, the activity data (not reported for all years) and the choice of the notation keys used. The Party answered that there is a need to improve and better organize the collection of national statistical data, regarding road transport activity data. The Party intends to address that by proposing to include the data required for estimating emissions according to the Guidebook in the national statistical reports explaining that at least 2 years are needed to achieve that. The ERT strongly recommends Kazakhstan to follow up on their intent, harmonising the transport sector in all its aspects and for all transport modalities, according to the 2019 EMEP/EEA air pollutant emission inventory guidebook, to ensure completeness and consistency across the time series. The ERT also recommends including this issue in Kazakhstan's planned improvements in their IIR. Furthermore the ERT strongly recommends for sources that are determined to be key categories, in accordance with the EMEP/EEA Guidebook methodologies, to make every effort to use a Tier 2 or higher (detailed) methodology, including country-specific information, according to Reporting Guidelines paragraph 21. The ERT encourages the Party to update the relevant sections of the IIR, also providing documentation on the recalculations.

Category issue 2: 1A3a - Completeness, Consistency - All Pollutants

63. For aviation, the ERT noted inconsistencies across the time series regarding emissions data for all pollutants and liquid fuels activity data. The set of pollutants considered is not consistent across the time series and consumption data are not always reported, consequently leading to inconsistencies in implied emission factor values. Same consumption values have been reported from 1990 to 2015, for 2016 there is a noticeable difference with respect to 2015, mainly regarding International LTO consumption. In 2017 and 2018 fuels data are not reported. For 2019, only pollutants for which Tier 1 default emission factors are available in the Guidebook 2019 have been estimated (NOx, CO, NMVOC, SOx estimated on the basis of fuel consumption data in tonnes, ref. Table 3.3 of GB 2019). Same values have been assigned to LTO and Cruise, for each pollutant, in the detail domestic/International; fuel consumption being specified only for LTO. For previous years, the set of estimated pollutants included NOx, CO, NMVOC, SOx, $PM_{2.5}$, TSP, benzo(a) pyrene, benzo(b) fluoranthene, Indeno (1,2,3-cd) pyrene. BC and HM emissions have not been estimated. Taking into account that, according to the Guidebook 2019, for the estimation of heavy metals, the Tier 1 methodology is sufficient, as emissions of these pollutants depend only on fuel and not on technology, while the emissions of PM depend on the aircraft and the payload (for instance in the 2019 Guidebook, if national PM emission factors are available, BC fraction of PM (f-BC) are suggested). The Party answered that estimates reflect available national information and that it is necessary to analyse the availability of basic statistics to revise aviation emissions for the previous years. Party responded that if possible, the estimates will be revised for the 2020 update. The ERT strongly recommends Kazakhstan to harmonise the aviation emissions estimations, also in terms of completeness, consistency between emissions estimations and reported fuels data, over the years of the historical timeseries, on the basis of the 2019 EMEP/EEA air pollutant emission inventory guidebook, and to update the relevant sections of the IIR accordingly.

Category issue 3: 1A3ai - Accuracy, Transparency - CO

64. The ERT noted that CO emissions from International aviation show large variability over the years, both for LTO and cruise, in particular 2019 values are much higher than the values of the previous years. The Party responded that data for domestic and international aviation flights for 2019 are taken from national statistical reports and estimates calculated according to the Guidebook Tier 1, while data and calculations for the previous years were not updated, but that will be done for next submission. The ERT thanks the Party for their response and strongly recommends Kazakhstan to follow up on their intent, revising and harmonising the estimates on the basis of the EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR accordingly.

Category issue 4: 1A3b - Completeness, Transparency - PM

65. The ERT noted that Kazakhstan estimated only $PM_{2.5}$ emissions. According to the Guidebook 2019, it is assumed that all PM mass emission factors are assumed to correspond to $PM_{2.5}$, as the coarse fraction (PM_{10}-$PM_{2.5}$) is considered negligible, namely $PM_{2.5}$=PM_{10}=TSP. The ERT strongly recommends Kazakhstan to report in next

submissions also PM_{10} and TSP, in addition to $PM_{2.5}$. Moreover, in the 2019 EMEP/EEA Guidebook, Tier 1 BC fractions of PM for vehicle category are proposed. The ERT encourages Kazakhstan to also estimate BC. The ERT recommends Kazakhstan to update the relevant sections of the IIR accordingly for next submission, also including information if the estimates of exhaust Particulate Matter emissions from road transport elaborated for the different years take into account both filterable and condensable material.

Category issue 5: 1A3b - Completeness - Heavy Metals

66. The ERT noted that exhaust emissions of Heavy Metals from road transport are estimated only for Pb in the inventory. Exhaust Heavy Metals emissions from road transport, being fuel consumption dependant, emission factors for all heavy metals and vehicle categories in the Guidebook 2019, are proposed taking also into account the engine wear impact. The reference is to the heavy metal emission factors for all vehicle categories in ppm/wt fuel (Table 3-78, 2019 EMEP/EEA air pollutant emission inventory guidebook 2019 – Update Oct. 2020). The ERT strongly recommends Kazakhstan to complete for the next submission exhaust Heavy Metals emissions estimations from road transport, on the basis of the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR accordingly.

Category issue 6: 1A3b - Completeness - PAHs

67. PAHs emissions have been estimated but totals PAHs have not always been reported for exhaust emissions from road transport. The ERT strongly recommends Kazakhstan to report for next submission also total PAHs emissions estimations from road transport, on the basis of the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR accordingly.

Category issue 7: 1A3bi - Accuracy, Transparency - CO

68. The ERT noted that CO emissions from passenger cars show a dip in 1999. Kazakhstan responded that analysis of emissions of previous years will be performed for the next submission. The ERT strongly recommends Kazakhstan to follow up on their intent, revising and harmonising the estimates on the basis of the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR accordingly.

Category issue 8: 1A3biii - Accuracy, Transparency - SOx

69. The ERT noted that SOx emissions from heavy duty vehicles and buses show large variability in the emission data values over the years. The emission value for 2019 (estimated on the basis of fuel sold) has a different order of magnitude compared to the values of the previous years. Kazakhstan responded that the fuel amount is taken from the 2019 statistical bulletin "Fuel Balance of the Republic of Kazakhstan", which details fuel consumption for all types of GCEA activities and that this detail is not available for previous years. Kazakhstan explained that the analysis of the data of previous years was not carried out and that they aim to update the data. It is necessary to analyse the availability of basic statistics for calculating emissions for previous

years. The ERT strongly recommends Kazakhstan to perform for next submission this analysis, and if necessary, revising the estimates, according to the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR, providing documentation on the recalculations.

Category issue 9: 1A3bv - Completeness- NMVOC

70. The ERT noted that NMVOC emissions from Gasoline evaporation have been estimated only for 2019, on the basis of fuel sold. Kazakhstan explained that for previous years it is necessary to perform an analysis of available data first. The ERT strongly recommends Kazakhstan to perform this analysis for next submission, elaborating and reporting the estimates for all years, according to the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR.

Category issue 10: 1A3bvi, 1A3bvii - Completeness - PM, PAHs

71. The ERT noted that non exhaust emissions from road transport have been estimated only for 2019 and only for $PM_{2.5}$, PM_{10}, TSP. In the 2019Guidebook, BC fractions, and brake and tyre debris-bound PAHs are also listed. The ERT strongly recommends Kazakhstan to complete the estimations for all years for next submission, according to the EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR.

Category issue 11: 1A3c - Accuracy, Transparency - CO, PM

72. The ERT noted that CO emissions from railways show large variability over the years, showing in particular a dip in 2016. $PM_{2.5}$ and PM_{10} emissions from railways also show large variability, in particular low values have been estimated from 2010 to 2018 and 2019 value is much higher than 2018 value. BC emissions from railways also show large variability, in particular a dip has been found in emissions in 2017. Kazakhstan explained that the fleet of diesel locomotives has been increasing annually since 2008 and the freight turnover of rolling stock has increased in 2019. To improved calculation of emissions from railway transport it is necessary to introduce statistical reporting not only about mileage, but also about fuel consumed. The ERT strongly recommends Kazakhstan to follow up on this intent, updating the estimations according to the 2019 EMEP/EEA air pollutant emission inventory guidebook. The ERT also recommends including this issue in their planned improvements in their IIR and to update all the relevant sections in the IIR.

Category issue 12: 1A3d - Accuracy, Transparency - Heavy Metals, POPs

73. The ERT noted that Pb, Cd and Hg emissions from navigation show large variability over the years. The 2019 values are significantly lower than the values of the previous years. Dioxins and PCBs emissions from international navigation show a jump in 1991. Kazakhstan responded that for shipping, the emission estimation has been elaborated on the basis of the 2019 bulletin "Fuel Balance of the Republic of Kazakhstan" describing fuel consumption. The analysis and QAQC of emissions for previous years was not carried out, including the possibility of a technical error in the calculation of 1991 estimate, which will be checked in time for next submission. The

ERT strongly recommends Kazakhstan to follow up on their intent, revising and if necessary, updating the emission estimations according to the 2019 EMEP/EEA air pollutant emission inventory guidebook and to include this issue in all the relevant sections of the IIR.

Category issue 13: 1A3d - Completeness - PM

74. The ERT noted that BC and TSP emissions from navigation are not reported. In the 2019 Guidebook Tier 1 default emission factors are proposed for navigation, for each fuel as well as for TSP (kg/tonne fuel) and BC fraction of PM (f-BC). Kazakhstan responded that this issue will be addressed in the next submission. The ERT encourages Kazakhstan to follow up on their intent, elaborating and reporting the estimates on the basis of the 2019 EMEP/EEA air pollutant emission inventory guidebook and to update the relevant sections of the IIR accordingly.

Category issue 14: 1A3ei - - Completeness

75. Regarding pipeline transport, although it is mainly important for greenhouse gases (methane leakage), the ERT asked about any territorial assessments made to assess the extent of the phenomenon also in terms of air pollutant emissions. Kazakhstan responded that emission estimation has been elaborated regarding greenhouse gas emissions from pipelines in the framework of the UNFCCC and that an assessment of the extent of the phenomenon also in terms of air pollutant emissions is planned for the next submission. The ERT encourages Kazakhstan to follow up on their intent and to update the relevant sections of the IIR accordingly.

Category issue 15: 1A3b – Completeness, Consistency, Transparency

76. Kazakhstan reported the estimation of the emissions from road transport also based on the fuel used. Clarification has been required about the criteria followed and in general about the plan to improve and harmonise the estimates for the entire road transport time series, also about the possibilities of rationalising and improving national statistical data collection. Kazakhstan explained that the Industry Association only considers the indicators for commercial transport without considering individual transport, so the data on emissions from road transport cannot be adequately estimated. Kazakhstan stated to have done a proposal to include the data necessary for estimating emissions in the national statistical reports according to the EMEP/EEA air pollutant emission inventory guidebook, explaining that at least 2 years are needed to achieve that. The ERT strongly recommends Kazakhstan to follow up on their intent, harmonising the road transport sector in all its aspects, according to the 2019 EMEP/EEA air pollutant emission inventory guidebook, to improve completeness and consistency across the time series. The ERT also recommends including this action in the planned improvements in their IIR. Furthermore the ERT strongly recommends for sources, determined to be key categories in accordance with the EMEP/EEA Guidebook methodologies, to make every effort to use a Tier 2 or higher (detailed) methodology, including country-specific information, according to Reporting Guidelines paragraph 21. The ERT encourages the Party to update the relevant sections of the IIR, also providing documentation on the recalculations.

Category issue 16: 1A3 – Completeness, Transparency

77. With regards to transport activities for which emission estimates have not been reported for one or more pollutant, Kazakhstan has been requested to provide the ERT with the activity data per year where these are missing in the NFR (e.g. 2019 activity data for road transport are completely lacking). Kazakhstan responded they will provide data on transport activities for the next submission. The ERT recommends Kazakhstan to follow up on their intent, documenting everything and updating the relevant sections in the IIR for next submission.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		All mandatory pollutants		
Years		1990 – 2019		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2A1	Cement production	x		
2A2	Lime production	x		
2A3	Glass production	x		x
2A5a	Quarrying and mining of minerals other than coal	x		x
2A5b	Construction and demolition	x		x
2A5c	Storage, handling and transport of mineral products	NE		
2A6	Other mineral products	x		x
2B1	Ammonia production	x		
2B2	Nitric acid production	NA		x
2B3	Adipic acid production	NO		
2B5	Carbide production	NO		
2B6	Titanium dioxide production	NO		
2B7	Soda ash production	NO		
2B10a	Chemical industry: Other	NE		x
2B10b	Storage, handling and transport of chemical products	x		
2C1	Iron and steel production	x		x
2C2	Ferroalloys production	x		
2C3	Aluminium production	x		x
2C4	Magnesium production	NO		
2C5	Lead production	x		x
2C6	Zinc production	x		x
2C7a	Copper production	x		x
2C7b	Nickel production	NO		
2C7c	Other metal production	x		x
2C7d	Storage, handling and transport of metal products	NA		
2D3b	Road paving with asphalt	x		x
2D3c	Asphalt roofing	x		x
2H1	Pulp and paper industry	x		x
2H2	Food and beverages industry	x		x
2H3	Other industrial processes	NE		
2I	Wood processing	x		
2J	Production of POPs	NE		
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	NE		
2L	Other production, consumption, storage, transportation or handling of bulk products	NE		
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

78. The inventory of the industrial processes sector was not transparent enough to enable the ERT to undertake a full review. Kazakhstan does not provide any information in the IIR on the methods used to calculate emissions and provides only a general reference to data sources and default EFs from the Guidebook. Measures to increase the transparency of the inventory by providing descriptions of methodologies and information on data sources and trends are not mentioned. The ERT strongly recommends Kazakhstan to include information on activity data, methods and EFs used, data sources and a description of trends into the IIR, as well as the activity data in the NFR, in order increase the transparency of the inventory.

79. Kazakhstan uses zero-values in a number of areas in the reporting tables. The ERT encourages Kazakhstan to use the appropriate notation keys (e.g. NO where emissions are “Not Occurring”, NE where emissions are “Not Estimates” and IE where emissions are “Included Elsewhere”) for reporting where estimates are not available or necessary.

80. The estimates for 2019 differ from the years 1990 until 2018, there is no information on this dips and jumps provided. During the Review Kazakhstan provided detailed information on the estimates for 2019 and mentioned that the time series will be completed in one of the future submissions.

Completeness

81. The inventory of the industrial processes sector is not complete enough to allow the ERT to undertake a full review of the sector. The ERT recommends the Kazakhstan to improve the completeness of the inventory.

82. The ERT strongly recommends Kazakhstan to estimate and to report all emissions for which default methods exist from activities that exist in the country for the whole time series. The ERT further recommends the Party to collect activity data for those sectors that are now reported as “NE” and encourages Kazakhstan to improve the accuracy of reporting by developing country specific EFs.

83. The ERT consider the IP sector only to be complete and comprehensive only for 2019. Emissions for 1990 – 2018 were not recalculated and it seems that there are several pollutants and sectors not estimated or wrongly allocated.

Consistency including recalculation and time series

84. The estimates for 2019 in the IP sector differ to the estimates from the years 1990 until 2018, there is no information on this obvious inconstancy is provided. During the Review Kazakhstan provided detailed information on the estimates for 2019 and mentioned that the time series will be completed in one of the future submissions. The ERT strongly recommend recalculating the whole time series.

85. There have been no significant recalculations carried out on the time series. As time series consistency is one of the major requirements of an inventory any methodological change has to be reflected throughout the time series and has to be described in a transparent way in the IIR. The ERT strongly recommend calculating the whole time series based on the same methodology approach or use the methodologies to ensure the time series consistency provided in the 2019 EMEP Guidebook Part A chapter 4.

86. Kazakhstan does not provide any information on the time series and trends. The ERT strongly encourages Kazakhstan to explain the dips and jumps in the time series in the IIR.

Comparability

87. The ERT noted that Kazakhstan does not provide methodologies, activity data and EFs. Thus it is not possible to check the accuracy of calculations and to compare EFs or IEFs with the ones of other countries. In the IIR, Kazakhstan only provides some general information on how the emissions were calculated, the general source of activity data and the use of default EFs from the Guidebook. Although Kazakhstan uses methods from the Guidebook, the comparability to other Parties' inventories is restricted due to the lack of detail and transparency on the methods used for the estimates in each sector and subsector. The ERT strongly recommends Kazakhstan to improve the comparability by estimating and reporting all emissions and by providing information in the IIR on the methodologies and drivers behind the emission trends.

Accuracy and uncertainties

88. The ERT encourages Kazakhstan to undertake a quantitative or a qualitative uncertainty analysis for the Industry Sector to help inform the improvement process and to provide an indication of the reliability of the inventory data.

89. Kazakhstan does not provide a key category analysis (KCA). The ERT recommends performing a KCA and to calculate emissions from all key sources using at least a Tier 2 method.

90. The ERT encourages Kazakhstan to implement sector specific OA/QC procedures for all emission estimates in the IP Sector.

Condensable

91. Kazakhstan did not provide explanatory information on condensable component of PM for all categories. In the IIR, there is no clear information of whether PM includes/excludes the condensable component. The ERT recommends including such information in the next submission. Information on condensable fraction could also be provided as table which lists if condensable are included in the IEF or excluded or if there is no information are available.

Improvement

92. The ERT encourages Kazakhstan to include information on planned improvements in detail on subsector level to enable the ERT to track the improvement of the inventory.

Potential Technical Corrections

93. The ERT notes significant inconsistencies in the year 2019 compared to time series 1990-2018. As there were no activity data provided no potential technical corrections could be calculated by the ERT.

Sub-Sector Specific Recommendations

Category issue 1: 2A5a Construction and demolition - PM, 2A5b Quarrying and mining of minerals other than coal- PM, 2A6 Other mineral products - PM, 2 B10a Chemical industry: Other - NOx, SOx,NH_3, PM, CO, Pb, Cd, Hg, As, Cr, Cu, Se & BaP, 2H1 Pulp and paper industry-NOx, NMVOC, SOx & PM

94. The ERT noted that Kazakhstan provided emission estimates for the categories 2A5a-Construction and demolition, 2A5b-Quarrying and mining of minerals other than coal, 2A6-Other mineral products, 2 B10a-Chemical industry: Other, 2H1-Pulp and paper industry) only for 2019. During the review Kazakhstan provided information on the methodology of the estimates for 2019. The ERT commends Kazakhstan for the efforts of implementing Tier 2 methods for potential key sources. As only 2019 is estimated the ERT recommends estimating the whole time series from 1990 on and provide sufficient information on methodologies and data sources in their IIR.

Category issue 2: 2H2 Food and beverages industry- NMVOC

95. The ERT noted a significant drop in NMVOC emissions in 2019 compared to the previous years. In response to a question raised during the review Kazakhstan stated that an error occurred. The ERT recommends Kazakhstan to correct this error in the next submission and provide sufficient information on methodologies and data sources in their IIR.

Category issue 3: 2A3 Glass production -PM, NOx, SOx, NH_3, PM, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se

96. The ERT noted that from 1990 until 1998 zero values are submitted. The ERT notes the discussion already held throughout the review with Kazakhstan on the difficulties finding suitable activity data for the estimates. As a first step the ERT recommends Kazakhstan to use the appropriate notation keys (e.g. NO where emissions are “Not Occurring”, NE where emissions are “Not Estimates” and IE where emissions are “Included Elsewhere”) and provide sufficient information on methodologies and data source in their IIR.

Category issue 4: 2B2 Nitric acid production -all pollutants

97. The ERT noted that from 1990 until 2005 zero values are submitted. The ERT notes the discussion already held throughout the review with Kazakhstan on the difficulties finding suitable activity data for the estimates. As a first step the ERT recommends Kazakhstan to use the appropriate notation keys (e.g. NO where emissions are “Not Occurring”, NE where emissions are “Not Estimates” and IE where emissions are “Included Elsewhere”) and provide sufficient information on methodologies and data source in their IIR.

Category issue 5: 2C1 Iron and steel production, 2C3 Aluminium production, 2C5 Lead production, 2C6 Zinc production, 2C7a Copper production, 2C7c Other metal production, 2D3b Road paving with asphalt, 2D3c Asphalt roofing - all pollutants

98. For categories 2C1 -Iron and steel production, 2C3 -Aluminium production, 2C5 - Lead production, 2C6 - Zinc production, 2C7a - Copper production, 2C7c - Other metal production, 2D3b-Road paving with asphalt, 2D3c - Asphalt roofing the ERT noted that there are several pollutants not estimated for the year 2019. In contrast to this underestimation, some pollutants are just estimated for 2019. The emission trends 2018-2019 of several pollutants (e.g.: $PM_{2.5}$, NFR 2C6) shows noticeable deviations, i.e. jumps of more than 400%. In response to a question raised during the review Kazakhstan explained, that this category will be estimated based on Tier 1 in the next submission from 1990-2018 and some of the estimates for 2019 are already based on Tier 2. The ERT commends Kazakhstan for the efforts to implement Tier 2 methods. The ERT encourages Kazakhstan to follow the plan to estimate 2C1 based on Tier 2. For all non-Key categories, the ERT recommends Kazakhstan to estimate the time-series from 1990 on consistently using Tier 1 and provide sufficient information on methodologies and data source in their IIR.

SOLVENTS

Review Scope

Pollutants Reviewed		SO_2, NOx, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2019		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2D3a	Domestic solvent use including fungicides	NE		x
2D3d	Coating applications	NE		
2D3e	Degreasing	NE		
2D3f	Dry cleaning	NE		
2D3g	Chemical products	x		x
2D3h	Printing	NE		
2D3i	Other solvent use	x		x
2G	Other product use	NE		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

99. The inventory of the Solvent sector was not transparent enough to enable the ERT to undertake a full review. Kazakhstan does not provide any information in the IIR on the methods used to calculate emissions but provides only a general reference to data sources and default EFs from the Guidebook. Measures to increase the transparency of the inventory by providing descriptions of methodologies and information on data sources and trends are not mentioned. The ERT strongly recommends Kazakhstan to include information on activity data, methods and EFs used, data sources and a description of trends in the IIR, as well as the activity data in the NFR Annex I reporting template, to increase the transparency of the inventory.

100. The estimates for 2019 differ in from the estimates for 1990 until 2018. There is no information provided in the IIR on these time series inconsistencies. During the Review Kazakhstan provided detailed information on the estimates for 2019 and mentioned that the time series will be updated for all years in one of the future submissions.

Completeness

101. The inventory of the Solvent sector is not complete enough to allow the ERT to undertake a full review of the sector. The ERT recommends Kazakhstan to improve the completeness of the inventory.

102. For 2019 there are only emissions reported for 2D3g -Chemical products and 2D3i- Other solvent use estimated. Emission estimates for 2D3a-Domestic solvent use including fungicides, 2D3d-Coating applications and 2D3f- Dry cleaning are only estimated from 1990 until 2018 and reported as “NE” for 2019. Emissions from 2D3e-Degreasing, 2D3h-Printing and 2G-Other product use are not estimated over the whole

time series. The ERT strongly recommends Kazakhstan to estimate and report all emissions for activities that exist in the country for the whole time series for which default methods exist in the EMEP/EEA Guidebook.

Consistency including recalculation and time series

103. The estimates for 2019 differ in from the estimates for 1990 until 2018. There is no information on these obvious inconsistencies provided in the IIR. During the Review Kazakhstan provided detailed information for the estimates for 2019 and mentioned that the time series will be completed in full in one of the future submissions. Kazakhstan does not provide any information on the time series and trends. The ERT strongly encourages Kazakhstan to explain the dips and jumps in the time series in the IIR.

104. There have been no significant recalculations carried out on the time series. As time series consistency is one of the major requirements of an inventory any methodological change has to be reflected throughout the time series and has to be described in a transparent way in the IIR. The ERT strongly recommend Kazakhstan to recalculate the whole time series based on the same methodology approach or use the methodologies in the EMEP Guidebook 2019 Part A chapter 4 to provide a consistent time series.

Comparability

105. The ERT noted that because Kazakhstan does not provide methodologies, activity data and EFs it is not possible to check the accuracy of calculations and to compare EFs or IEFs with the ones of other countries. In the IIR, Kazakhstan only provides some general information on how the emissions were calculated, the general source of activity data and the use of default EFs from the Guidebook. The ERT strongly recommends Kazakhstan to improve the comparability of its inventory by estimating and reporting all emissions and by providing information in the IIR on the methodologies and drivers behind the emission trends.

Accuracy and uncertainties

106. The ERT encourages Kazakhstan to undertake uncertainty analysis for the Solvent Sector to help inform the improvement process and to provide an indication of the reliability of the inventory data.

107. Kazakhstan does not provide a key category analysis (KCA). The ERT recommends Kazakhstan to perform a KCA and to calculate emissions from all key sources using at least a Tier 2 method.

108. The ERT encourages Kazakhstan to implement sector specific OA/QC procedures for all emission estimates in the Solvent Sector.

Condensable

109. Kazakhstan did not provide explanatory information on condensable component of PM for all categories. In the IIR, there is no clear information of whether

PM includes/excludes the condensable component. The ERT recommends to include such information in the next submission. Information on condensable fraction could also be provided as tables which lists if condensable are included in the IEF or excluded or whether there is no information are available.

Improvement

110. The ERT encourages Kazakhstan to include detailed information on planned improvements on subsector level to enable the ERT to track the improvement of the inventory.

Potential Technical Corrections

111. No potential technical corrections have been carried out, due to the lack of data and information available at sector level to estimate sources.

Sub-Sector Specific Recommendations

Category issue 1: 2D3a Domestic solvent use including fungicides -NMVOC

112. The ERT noted that the emissions for 2019 are not estimated. For 1990 until 2018 estimates are provided but the methodology is not described. In response to a question raised during the review Kazakhstan explained that data are missing for 2019. The ERT recommends Kazakhstan to estimate the emissions for all years. In terms of missing data, the approach of submitting the estimates from the last reliable year (gap filling), should be preferred instead of not estimating sources. As there is no information on the methodology for the estimates provided, the ERT encourages Kazakhstan to start estimating emissions using a Tier 1 methodology and to add to the improvement plan to move to Tier 2 for this possible key category.

Category issue 2: 2G Other product use – all pollutants

113. Kazakhstan did not estimate emission from this source. In response to a question raised during the review Kazakhstan explained, that it has difficulties obtaining reliable data on products sold. The ERT encourages Kazakhstan to search for alternative data source, like WHO statistics on population smoking and average tobacco consumption per day of smoking population and estimate the emissions from subsectors for the whole time series based on international statistics or expert judgments.

Category issue 3: 2D3g Chemical products – NMVOC

114. The ERT noted that Kazakhstan provided emission estimates for the categories for 2019 only. As only 2019 is estimated the ERT recommends estimating the whole time series from 1990 onwards and provide sufficient information on methodologies and data source in their IIR.

Category issue 4: 2D3i Other solvent use– NMVOC

115. The ERT noted that emissions from this category increased by 313.319% from 2018 until 2019. The ERT recommends Kazakhstan to estimate the emissions for the time series from 1990 onwards based on the same methodology and provide sufficient information on the methodologies and data source used in their IIR.

AGRICULTURE

Review Scope

Pollutants Reviewed		SO_2, NOx, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2015 + (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	X		X
3B4d	Goats	X		X
3B4e	Horses	X		X
3B4f	Mules and asses	X		X
3B4gi	Laying hens	X		X
3B4gii	Broilers	X		X
3B4giii	Turkeys	X		X
3B4giv	Other poultry	X		X
3B4h	Other animals	X		X
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		X
3Da2b	Sewage sludge applied to soils	X		X
3Da2c	Other organic fertilisers applied to soils (including compost)	X		
3Da3	Urine and dung deposited by grazing animals	X		X
3Da4	Crop residues applied to soils	X		
3Db	Indirect emissions from managed soils	X		
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		X
3Dd	Off-farm storage, handling and transport of bulk agricultural products	X		
3De	Cultivated crops	X		X
3Df	Use of pesticides	X		
3F	Field burning of agricultural residues	X		
3I	Agriculture other	X		
11A	Volcanoes	X		
11B	Forest fires	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

116. The inventory is generally not transparent since an IIR has not been provided for this year submission. In the IIR submitted in 2020 no information is provided on the activity (apart from number of cattle), EFs, methodologies and assumptions used. The ERT recommends Kazakhstan to include more activity data, emission factors and

description of the methodologies used for the calculation of emissions in its IIR and strongly recommends providing an updated IIR with each submission.

117. The ERT noted that information on activity data is not provided for all agricultural NFR categories for all years and recommends Kazakhstan to include this information in the NFR Annex I reporting table.

Completeness

118. The ERT considers the agriculture sector to be almost complete. However, there are some categories and pollutants not covered by the current estimations as explained under sub-sector specific recommendations below. The ERT recommends Kazakhstan to complete the inventory by estimating and reporting these missing sources.

Consistency including recalculation and time series

119. No recalculations have been calculated. The time series is not considered consistent since emission pre 2019 have not be updated since the 2020 submission. Thus, a multitude of outliers and missing emissions have been identified. During the review it became clear, that emissions estimated for the years 1990-2018, were based on emission factors from EMEP/EEA Guidebook 2016, but for emissions estimated for 2019 EMEP/EEA Guidebook 2019 were used. The ERT welcomes the upgrade to EMEP/EEA Guidebook 2019 but recommends Kazakhstan to ensure consistency in the use of activity data and emission factors for the complete time series.

120. During the review Kazakhstan provided an updated Annex I which included updated activity data for 2019 and the ERT noted inconsistencies in use of activity data. The ERT recommends Kazakhstan to review activity data used for the whole time series and ensure consistency in the activity data used.

Comparability

121. The inventory is in line with the Reporting Guidelines, but the methodologies and emission factors used in the inventory are based on EMEP/EEA Guidebook 2016 for the reported years 1990-2018 and not the latest EMEP/EEA Guidebook (2019). Emissions for 2019 are based on the latest EMEP/EEA Guidebook (2019). The ERT recommends Kazakhstan to use the latest EMEP/EEA Guidebook (2019) for all reported years.

Accuracy and uncertainties

122. The emission estimates are based on Tier 1 methodologies. As the sub sectors in the agriculture sector are key categories for instance for ammonia, the ERT strongly recommends Kazakhstan to apply Tier 2 or higher methodologies for all key categories.

123. Kazakhstan has not provided an uncertainty analysis for the agriculture sector for this year's submission since no IIR has been provided. In the IIR submitted in 2020 uncertainty estimates were provided. The ERT acknowledge this and strongly

recommends Kazakhstan to provide an updated IIR with an updated uncertainty analysis.

124. Kazakhstan has not provided detailed information on the QA/QC checks in place. The ERT recommends Kazakhstan to implement sector specific OA/QC procedures and to include information on the checks and their results in the IIR.

Improvement

125. Kazakhstan does not present information on agriculture sector specific planned improvements in the IIR. The ERT encourages Kazakhstan to include information regarding the planned improvements.

Potential Technical Corrections

126. The ERT was not able to prepare any technical corrections for the agriculture inventory of Kazakhstan due to the lack of data and information provided by the Party.

Sub-Sector Specific Recommendations

Category issue 1: 3.B Manure management – NH_3, NMVOC, NOx and PM

127. The ERT noted several emission outlier for 2019 for all animal categories for emissions of NH_3, NMVOC, NOx and PM. During the review Kazakhstan explained that emission for 2019 are based on EMEP/EEA Guidebook 2019. The ERT noted that emissions of NH_3, NMVOC, NOx and PM for the years 1990-2018 are based on EMEP/EEA Guidebook 2016. This is not considered a consistent time series and the ERT welcomes the use of EMEP/EEA Guidebook 2019 but strongly recommends the Party to recalculate the whole time series using the EMEP/EEA Guidebook 2019.

Category issue 2: 3.B Manure management – NFR 3B1b, 3B4d, 3B4f

128. The ERT noted that emissions from NFR 3B1b, 3B4d, 3B4f (non-dairy cattle, goats, mules and asses) were reported as “NA”, “IE” and “IE”, respectively, in 2019, but emissions were reported for these categories in 1990-2018. During the review, Kazakhstan explained that emissions for 3B1b were not filled in by mistake but will be provided for next submission. For 3B4d the Party explained that number of sheep and goats are combined in the statistics and therefore reported in 3B2 (sheep). The ERT recommends Kazakhstan to use consistent methodology and activity data and to use correct EFs for each animal category and to report the emissions disaggregated by NFR category.

Category issue 3: 3.B.4.g Manure management – Poultry

129. During the review in 2017 it was recommended that Kazakhstan should disaggregate emissions from poultry in the NFR categories 3B4gi to 3B4giv. The ERT noted that the emissions from all poultry categories are still reported under NFR 3B4gi manure management - laying hens and are based on “laying hens” emission factors. The ERT considers that this approach could lead to an over- or underestimation of emissions depending on the poultry distribution between different poultry categories.

The ERT strongly recommends Kazakhstan to disaggregate the national statistics into the poultry subcategories required by the Guidebook methodology, to recalculate emissions using the correct EFs for each animal category and to report the emissions disaggregated by NFR category.

130. The ERT noted that inconsistency occurred in the time series for activity for Laying hens (3B4gi), where IE were reported for 1994 for activity data, but emissions of several pollutants were reported for this category. The ERT recommends Kazakhstan to implement QA/QC procedures with checks of time series for both emissions and activity data.

Category issue 4: 3.B.3 Manure management – Swine

131. During the review in 2017, the ERT noted that the emission factors used for estimating emissions from swine were not in line with the Guidebook and recommended the Party to provide detailed information on the breakdown of the numbers of the different sub-categories included in the category swine and to recalculate emissions using the correct EFs for each sub-category. In the ongoing review the ERT noted that this is still an issue and strongly recommends Kazakhstan to use consistent methodology and recalculate emissions using the correct EFs for each sub-category.

Category issue 5: 3.B.4.h Manure management – Other animals

132. The ERT noted that emissions were reported in NFR 3.B.4.h Manure management – Other animals, but since no IIR is available the type of animals are not specified. Kazakhstan responded that the type of animal are camels, and they will add an explanation in the next submission and included the information in the updated Annex I provided during the review. The ERT welcomes the information in the updated Annex I and encourages the country to include this information in future IIR.

Category issue 6: 3.D.a.2.a Animal manure applied to soils and 3.D.a.3 Urine and dung deposited by grazing animals – NH_3

133. During the review in 2017 the ERT noted that Kazakhstan reported NH_3 emissions from NFR 3Da2a animal manure applied to soils and NFR 3Da3 urine and dung deposited by grazing animals as “IE” for all years and it was recommended to report these emissions disaggregated. During the ongoing review the ERT noted that emissions of NH_3 from NFR 3Da2a animal manure applied to soils and NFR 3Da3 urine and dung deposited by grazing animals are still reported as “IE” for the years 1990-2018 but emissions are reported for 2019. The ERT welcomes the disaggregated emissions reported for 2019 but recommends the Party to use consistent methodology and activity data and recalculate emissions for 1990-2018 and report disaggregated emissions for the whole time series.

Category issue 7: 3.D.a.1 Inorganic N-fertilizers, 3.D.c Farm-level agricultural operations and 3.D.e Cultivated crops

134. The ERT noted that there were outliers for the implied emission factors for several pollutants for 3.D.a.1 Inorganic N-fertilizers, 3.D.c Farm-level agricultural operations and 3.D.e Cultivated crops and found that this was probably due to errors in activity data. During the review Kazakhstan explained that QA/QC procedures for previous years had not been conducted. The ERT recommends Kazakhstan to implement QA/QC procedures with checks of time series consistency for both emissions and activity data and include units for activity data in the NFR Annex I template or IIR.

135. During the review Kazakhstan provided an updated Annex I with updated activity data and emissions for 2019. This showed reasonable implied emission factors for 3.D.a.1 Inorganic N-fertilizers and 3.D.c Farm-level agricultural operations. For 3.D.e Cultivated crops an error has occurred for activity data. The ERT welcomes the updated Annex I and recommends Kazakhstan to do thorough QA/QC work before submission.

Category issue 8: *3.B.1.a and 3.B.1.b Manure management, Dairy and Non-Dairy Cattle - NH_3 and NOx.*

136. During the review in 2017 the ERT considered that there were inconsistencies in the selection of NH_3 and NOx emission factors because the manure management systems could have changed since 1990. The ERT recommended the Party to obtain statistical information of the mix of slurry/solid systems in the country and to recalculate the emissions taking into account the possible changes of the manure management systems in the time series. This has not been done and the ERT therefore repeats this recommendation.

Category issue 9: 3.D.a.2.b Sewage sludge applied to soils – All pollutants.

During the review in 2017 the ERT noted that Kazakhstan provided contradictory explanations to the ERT's questions stating that: i) there is no practice of incineration of sewage sludge in Kazakhstan, so, after drying, the sludge is used as a fertilizer on agricultural fields for the cultivation of industrial crops; and ii) there is no practice of the using of the sewage sludge for fertilization of agricultural soils based on information from agricultural experts. The ERT considered that there was an underestimation of these emissions and recommended Kazakhstan to estimate and report these. This has not been done and the ERT therefore repeats this recommendation.

WASTE

Review Scope

Pollutants Reviewed		SO_2, NOx, NMVOC, NH_3, TSP, PM_{10} & $PM_{2.5}$, BC, CO, Heavy metals, POPs		
Years		1990 – 2019 + (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		
5C1bv	Cremation	X		
5C1bvi	Other waste incineration	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

Transparency

137. Kazakhstan has not reported its IIR in 2021, therefore, the transparency of the emissions reported is considered low with no information about the methodology, activity data and trends available. The ERT recommends the party to report the IIR containing all the missing information in the next submission.

Completeness

138. The ERT notes that the waste sector is not complete, and the methodology descriptions are missing. Kazakhstan reports “NO” for the sub-sector 5E other waste. In the EMEP/EEA Guidebook 2019 methodologies for sludge spreading, car fires and apartment/industrial building fires are described. The ERT recommends the Party to improve the completeness of its inventory and in sub-sectors where possible.

Consistency, including recalculation and time series

139. The ERT commends the Party for work done on completing the time series. There are still several categories with incomplete time series as Solid waste disposal on land (2018-2019 data for NMVOC, PMs), Industrial waste incineration (2019 data for all reported pollutants) and domestic wastewater treatment (2019 data for NH_3). During the 2021 review Kazakhstan sent an updated version of the NFR tables, but

changes in waste were for the year 2019 only. The ERT recommends the Party to complete the time series for all source categories occurring in Kazakhstan.

Comparability

140. As Kazakhstan does not provide methodologies, activity data and EFs it is not possible for the ERT to check the accuracy of calculations and to compare EFs or IEFs with the ones of other countries. The ERT recommends Kazakhstan to provide detailed information about the methodologies, activity data and EF used in the next submission.

Accuracy and uncertainties

141. Kazakhstan does not describe key category analysis, QA/QC procedures and uncertainty analyses for the waste sector. The ERT encourages the party to undertake a key categories analysis, an uncertainty analysis for the waste sector and to implement the QA/QC process and describe the outcome in the IIR.

Condensable

142. Kazakhstan provides no information about the condensable compound of the PMs in the IIR. The ERT recommends the Party to report this information in the next submission of the IIR.

Improvement

143. There are no improvements mentioned for the waste sector in Kazakhstan's IIR. The ERT encourages Kazakhstan to plan improvements for the waste sector regarding time series consistency, completeness and transparency of the inventory.

Potential Technical Corrections

144. The ERT was not able to estimate any potential technical corrections for the waste sector inventory of Kazakhstan due to the lack of data and information provided.

Sub-Sector Specific Recommendations

Category issue 1: 5.A *Solid waste disposal on land* –NMVOC, PMs

145. The ERT notes that the Party does not report activity data for this source category. By checking the data with the GHG inventory report it is not clear why the data for 2018 and 2019 are reported as NO when the activity is stated as occurring in the GHG inventory. Kazakhstan responded that they plan to include this data in the next submission of the NFR tables. Kazakhstan sent an updated version of the NFR tables with an update for the year 2019 only. The ERT recommends revising the emissions in the 5A category for 2018 and 2019.

146. The ERT notes that there is a significant increase in emissions of $PM_{2.5}$ in the year 2017. Emissions in this year are 68037% higher than in the previous year 2016. Emissions of $PM_{2.5}$ are even higher than emissions of PM_{10} and TSP, which is not expected. Kazakhstan sent an updated version of the NFR tables with an update of

the year 2019 only, but no correction of the year 2017. Kazakhstan responded that they plan to revise the emissions for the next submission. The ERT recommends the party check the calculation of the particular year and provide consistent and complete timelines in the next submission.

147. The ERT notes that the Party does not provide any information about the activity data, EFs and methodology in the IIR 2021. Kazakhstan reported that it is planned to provide the information in the next submission of the IIR. The ERT recommends the Party implement a detailed explanation of the methodology, EFs and activity data source in the next submission of the IIR.

Category issue 2: 5.B Biological treatment of waste–NH_3

148. The ERT notes that Kazakhstan reports NH_3 emissions from this source category as NE (not estimated) even when there is a Tier 1 method for this category in EMEP/EEA Guidebook 2019. There is no information in the Kazakhstan 2021 IIR as to why the category is reported as NE. The Party responded that technologies for aerobic and anaerobic digestion in Kazakhstan have only just begun to be implemented and there are no statistical data to be used to estimate emissions.

Category issue 3: 5.C Waste incineration – all pollutants

149. The ERT notes that Kazakhstan reports the emission of air pollutants only for the year 2019 in the category 5.C.1.b.i in this submission. No information about the activity data and methodology were identified in the IIR to confirm as to whether an incineration plant started operating in 2019. The Party responded that incineration of solid waste in open landfills is prohibited. Information on the amount of waste directed to incineration with energy extraction is taken from the statistical indicators of 2019. The ERT considered that further clarification is needed and asked if there was no incineration data of industrial waste before 2019. The Party responded that they plan to check the availability of the activity data pre 2019 and if available include the calculation in the 2022 submission. The ERT recommends the Party to check the availability of the activity data and report emissions from this category as well as a detailed explanation in the next submission.

150. The ERT notes that Kazakhstan reports emission data from category 5.C.1.b.iii from the year 2006 onwards, but no explanation is provided in the 2020 IIR. Kazakhstan responded that they are preparing to implement the information on activity data in the next submission. For the question of methodology explanation, the Party sent updated values for 2019 only and responded that they used methodology from EMEP/EEA Guidebook 2019 for calculating emissions for 2019. Kazakhstan plans to implement the explanation in the next submission. The ERT recommends the Party to use EMEP/EEA Guidebook 2019 methodology for all reported years and provide a detailed explanation of activity data and methodologies used in the next submission of NFR tables and IIR.

151. Regarding category 5.C.1,b.iii, the ERT also notes that emissions of all reported pollutants are 34 times higher in 2019 than in 2018. The Party responded that no analysis of emissions from previous years (i.e. pre 2019) was done, but will check

on the activity data and calculation method to improve the consistency of the data in the next submission. For the year 2019, the country sent updated estimates using methodology from EMEP/EEA Guidebook 2019. The ERT recommends the Party to use EMEP/EEA GB 2019 methodology for all reported years and to provide a detailed explanation of activity data and methodology in the next submission of NFR tables and IIR.

Category issue 4: 5.D Wastewater treatment – NH_3, NMVOC

152. The ERT notes that the Party reports emissions of NMVOC in the category 5.D.1 which are 160-times higher in 2019 than in 2018. The Party responded that no analysis of emissions for 1990 to 2018 were processed but will check on the activity data and calculation method to improve the consistency of the data in the next submission. For the year 2019, the Party send updated estimates using methodology from EMEP/EEA Guidebook 2019. The ERT recommends the Party to use EMEP/EEA Guidebook 2019 methodology for all reported years and provide a detailed explanation of activity data and methodology in the next submission of NFR tables and IIR.

153. The ERT also notes that there is no information about activity data, methodology and emission factors used in the calculation of emissions in the 5.D.1 category in the 2020 IIR. Kazakhstan responded that this information will be provided in the next submission of the IIR. The ERT recommends the Party to provide all the information about activity data, emission factors and methodology for the whole time series in the next submission of the IIR.

154. Additionally, in the 5.D.1 category the ERT notes that the Party reports its emissions of NH_3 for this category with exception of the year 2019 when the notation key NE was used. The Party responded that they reposted the emission following Table 3-1 of the EMEP/EEA Guidebook 2019. The ERT pointed Kazakhstan to Table 3-2 of the EMEP/EEA Guidebook 2019 where emission factor from use of dry toilets (latrines) is provided and asked the Party if they could check on the use of latrines in households in the country. Kazakhstan responded that the data will have to be checked for availability and if possible to obtain them, the calculation will be reported in the next submission. The ERT recommends Kazakhstan to investigate this matter with the aim to obtain information on latrines used in Kazakhstan and schedule the implementation of this matter in the next submission.

155. The ERT notes that Kazakhstan reports the emission of NMVOC in category 5.D.2 using notation key IE, but no explanation in which category these data are included is available. Also, no information on methodology and activity data is included in the 2020 IIR. Kazakhstan confirmed that the emissions are reported in category 5.D.1 as the national statistics does not provide information if the wastewater treated was industrial or domestic. The ERT recommends Kazakhstan to include this information in the next submission of the IIR.

Category issue 5: 5.E Other waste – all pollutants

156. The ERT notes that Kazakhstan reports emissions for this category as Not Occurring (NO) even when there is Tier 2 methodology available in the EMEP/EEA

Guidebook 2019. This category includes activities such as sludge spreading, cars/houses/industrial/apartment building fires. It is expected that some of these activities occur in Kazakhstan. Information on fires is mostly accessible through national fire and emergency offices. The Party responded that the availability of the data has to be checked first. The ERT recommends Kazakhstan investigating the availability of the data and provide a schedule of the implementation of this matter in the next submission.

LIST OF MATERIALS PROVIDED TO ERT

1. Kazakhstan Stage 2 S&A report
2. Kazakhstan Stage 1 report 2021
3. Kazakhstan 2020 IIR
4. Kazakhstan 2020 NIR
5. Annex I 30-14-2
6. Annex _VI_LPS_emisisons_2019
7. Repdab-Report
8. Extended checks

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

9. Responses to question raised by ERT during the review ("Clever space" platform at Umweltbundesamt website)
10. Material received from the Party during the Review
    - Annex_I_Emissions_1990-2019_Kazakhstan_2.xlsx
    - IIR_KZ_2018 for 2019_eng.docx