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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
KAZAKHSTAN**

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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. This year an updated version² of the “Methods and procedures” document proposed by the Task Force on Emission Inventories and Projections (TFEIP) was tested.

2. This annual review, has concentrated on SO_x, NO_x, NMVOC, NH₃, plus PM₁₀ & PM_{2.5} for the time series years 1990 – 2015 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 and EU NEC Directive inventories of Kazakhstan coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 19th June 2017 to 23th June 2017 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 – Ms. Elo Mandel (Estonia), Energy - Mr. GJ Venhuis (Netherlands), Transport - Ms. Antonella Bernetti (Italy), Industry - Ms. Maria Purzner (Austria), Solvents - Ms. Mirela Poljanac (Croatia), Agriculture - Mr. Juan José Rincón Cristóbal (Spain), Waste - Mr. Dirk Wever (Netherlands).

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

¹ Methods 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/review_guidelines.pdf

² Proposal for updating the 'Methods and procedures' document laying down the process for the EMEP emission inventory review Available at: http://www.unece.org/fileadmin/DAM/env/documents/2016/AIR/EMEP/Informal_Document/3_Methods_Procedures_update_proposal_May2016_ISSUE1_TFEIP.pdf

PART A: KEY REVIEW FINDINGS

5. The ERT found Kazakhstan's inventory to be partly in line with the EMEP/EEA air pollutant emission inventory guidebook – 2016 (hereafter 2016 EMEP/EEA Guidebook or Guidebook) and the UNECE Reporting Guidelines (hereafter Reporting Guidelines). Transport emissions are reported based on fuel sold.
6. Emission data in the NFR tables were submitted on time with respect to the timeframe set in the UNECE Reporting Guidelines. Kazakhstan did not submit an Informative Inventory Report (hereafter IIR).
7. The 2017 submission shows some improvement. Nevertheless, the ERT identified need for further improvements in the transparency, completeness, consistency and accuracy of the inventory.
8. During the review the ERT did not identify possible technical corrections.
9. The ERT thanks Kazakhstan for participating actively in the Stage 3 review process by providing further information and data when requested. Based on that information, the ERT was able to review the inventory in detail and to provide a number of detailed recommendations.

INVENTORY SUBMISSION

10. Kazakhstan submitted NFR tables under the CLRTAP on 14th February 2017 by the set deadline of 15th February. In the 2017 submission Kazakhstan reported emissions in the NFR 2014 format for the years 1990, 1995, 2000, 2010, 2011, 2012, 2013, 2014 and 2015. ERT notes that Kazakhstan provided NFR tables for the years 1990, 1995, 2000, 2010, 2011 and 2012 for the first time and commends Kazakhstan for that.
11. The 2017 submission of Kazakhstan did not include an IIR. Therefore, the previous IIR from the 2016 submission was used. During the review week, Kazakhstan indicated that they plan to provide an IIR for the next submission. The ERT strongly encourages Kazakhstan to prepare and submit an IIR on the next submission.
12. 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.
13. The submission did not include LPS emission data. The ERT recommends Kazakhstan to include LPS data in their future submissions.

KEY CATEGORIES

14. Kazakhstan has not carried out a key category analysis (hereafter KCA). The ERT recommends Kazakhstan to provide a KCA in next submission to help prioritize the available resources for improvement of data and methods on key categories.

15. The ERT used the KCA prepared by the CEIP during the review. Tier 2 or higher methodologies have been applied only to some key categories. The ERT encourages 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

16. As Kazakhstan did not submit an IIR it was difficult for the ERT to evaluate the transparency of the inventory. However, in the introduction of the IIR submitted in 2016 the Party specifies a list of guidelines used to prepare the inventory data. The list includes the 2013 EMEP/EEA Guidebook. The ERT recommends applying the methodologies from the 2016 EMEP/EEA Guidebook as the latest version of the Guidebook should be used according to the Reporting Guidelines. The ERT recommends the Party to submit an IIR according to the structure and contents of Annex II of the Reporting Guidelines.

17. The ERT commends Kazakhstan for limiting the use of zero values in the NFR tables. However, the ERT noted that Kazakhstan still uses zero values for POP emissions from the transport sector and for activity data in the energy sector. The ERT recommends Kazakhstan to use the appropriate notation keys e.g. “NO” where emissions are “Not Occurring” and “NE” where emissions are “Not Estimated” when estimates are not available or necessary.

Completeness

18. The ERT acknowledges the effort Kazakhstan has taken to provide the current estimates of emissions. Kazakhstan provided NFR tables for the years 1990, 1995, 2000, 2010, 2011, 2012, 2013, 2014 and 2015. During the review week, Kazakhstan indicated that they have calculated emissions for the entire period of 1990-2015 and they plan to provide complete tables for all reporting years for the next submission. The ERT recommends Kazakhstan to report emissions for the whole time series covering all pollutants in the next submission.

19. Kazakhstan uses the notation keys “NE” (Not estimated) and “IE” (Included Elsewhere)” in a number of areas. An explanation for the use of the notation key “IE” (Included Elsewhere) is provided in the NFR tables. The ERT encourages Kazakhstan to include an explanation in the IIR whether the activity existed in a certain year or not, and under which NFR it was included. The ERT also notes that in some cases Kazakhstan does not report all emissions from the energy sector but uses the notation key “NE” instead. However, as the Party reports activity data in the NFR tables for most categories, the ERT notes that using at least Tier 1 methods

from the 2016 EMEP/EEA Guidebook, emissions could have been calculated. The ERT recommends Kazakhstan to calculate and report all relevant emissions according to the Guidebook.

Consistency, including recalculations and time series

20. Kazakhstan has not carried out any recalculations. The ERT encourages Kazakhstan to report information on possible recalculations in the next submission and also to indicate in the IIR if no recalculations were performed.

21. Due to the lack of information provided in the 2016 IIR, and due to the missing activity data the ERT cannot properly assess the consistency of the time series.

Comparability

22. The ERT notes that due to the lack of the IIR the ERT was not able to fully assess the comparability of the inventory, but notes that according to information in the 2016 IIR, Guidebook methods are used. Also, the allocation of source categories follows that of the UNECE Reporting Guidelines. The ERT concludes that Kazakhstan's inventory is in general comparable with those of other reporting Parties, however, for full comparability the latest version of the Guidebook shall be used.

CLRTAP/NECD comparability

23. Kazakhstan is not an EU country and therefore does not report emissions under the EU National Emission Ceilings (NEC) Directive.

Accuracy and uncertainties

24. The ERT notes that Tier 2 or higher methodologies have been applied only to some of the key categories. The ERT encourages Kazakhstan to use Tier 1 or higher Tier methods for all key categories in line with the Reporting Guidelines in order to increase the accuracy of the inventory.

25. Kazakhstan did not perform an uncertainty analysis as part of the 2017 submission. During the review week, Kazakhstan indicated that they plan to provide an uncertainty analysis for the next submission. The ERT recommends Kazakhstan to undertake an uncertainty analysis to help guide the inventory improvement process and to provide an indication of the reliability of the inventory data.

Verification and quality assurance/quality control approaches

26. The IIR does not provide information on verification of the inventory.

27. In the 2016 IIR the Party included a paragraph on quality control procedures, where Kazakhstan described some basic and general QA/QC activities. The ERT recommends the Party to implement sector specific OA/QC procedures in future submissions and to provide information on the results in the IIR.

FOLLOW-UP TO PREVIOUS REVIEWS

28. Results from Stage 1 and Stage 2 reviews using the 2015 emission data were employed in this Stage 3 review. The ERT invites Kazakhstan also to refer to these previous reviews when examining this review report and when establishing its improvement plans.

29. No previous Stage 3 review report is available.

AREAS FOR IMPROVEMENTS IDENTIFIED BY KAZAKHSTAN

30. In the 2016 IIR Kazakhstan included a paragraph on planned improvements. During the review week, Kazakhstan indicated that the Party was not able to implement the planned improvements in 2017 because of the lack of capacity. The ERT encourages Kazakhstan to follow up on their intentions and to include the planned improvements in the next submission.

31. The ERT welcomes information provided by the Party during the review on the planned inventory improvements:

- (a) to perform a KCA level assessment;
- (b) to provide information about planned improvements in the IIR;
- (c) to establish an uncertainty analysis;
- (d) to apply the methodologies from the most recent EMEP/EEA Guidebook 2016;
- (e) to provide explanations for missing sources;
- (f) to provide a complete time series from 1990 onwards.

TECHNICAL CORRECTIONS CONSIDERED AND/OR CALCULATED BY THE ERT

33. The ERT did not identify significant inconsistencies in the inventory and therefore did not propose potential technical corrections to the party.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

34. The ERT identified the following cross-cutting issues for improvement in Kazakhstan's inventory:
- (a) The ERT recommends Kazakhstan to provide a complete time series from 1990 onwards.
 - (b) The ERT strongly encourages Kazakhstan to provide an IIR consistent with UNECE template.
 - (c) The ERT recommends Kazakhstan to undertake a key category analysis.
 - (d) The ERT recommends Kazakhstan to elaborate an improvement strategy.
 - (e) The ERT recommends Kazakhstan to apply the methodologies from the 2016 EMEP/EEA Guidebook.
 - (f) The ERT recommends Kazakhstan further development of a QA/QC system.
 - (g) The ERT encourages Kazakhstan to consider uncertainty assessment for key categories.
35. 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, PAHs		
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	NE		X
1A3eii	Other	NA		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	NE		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	NE		X
1B2aiv	Fugitive emissions oil: Refining / storage	NE		X
1B2av	Distribution of oil products	NE		X
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	NE		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

36. The 2017 submission of Kazakhstan did not include an IIR. Therefore the ERT cannot comment on the transparency of the energy sector inventory. The ERT recommends the Party to submit a complete IIR in addition to the NFR tables in its next submission.

37. The ERT commends Kazakhstan for limiting the use of zero-values in the NFR table. However, for activity data the Party still uses zero-values for most of the biomass. The ERT encourages Kazakhstan to use the appropriate notation key "NO" (Not Occurring) to indicate that the specific fuels are not used.

Completeness

38. The ERT notes that Kazakhstan does not report particle matter, heavy metal and POP emissions in the NFR tables, but uses the notation key "NE" (Not Estimated) instead. However, as in the NFR tables activity data is reported for most categories, the ERT notes that by applying the methods (at least Tier 1 methods) presented in the 2016 EMEP/EEA Guidebook, emissions could have been calculated. The ERT asked Kazakhstan for additional information on this subject. During the review week the Party responded that they will report emissions of heavy metals, POPs and particles in the NFR tables in the next submission. The ERT recommends Kazakhstan to follow up on their intentions and include the emissions in the next submission.

39. The ERT notes that Kazakhstan does not report activity data and emissions under NFRs 1B1 and 1B2 (Fugitive emissions), but uses the notation key "NE" (Not Estimated) instead. The ERT asked Kazakhstan to provide additional information on this subject. During the review week Kazakhstan responded that the activity data is available and that they will provide activity data used to calculate fugitive emissions in the next submission. The ERT encourages Kazakhstan to follow up on their intentions and include the data in the next submission.

Consistency including recalculation and time series

40. The ERT notes that Kazakhstan does not report emissions for the years 2001-2004 and 2006-2009. In the IIR 2016 the Party states in the paragraph on 'Completeness of inventory' that it is planned to submit the full series from 2000 to 2015 in next year's IIR (2017). The ERT asked Kazakhstan to provide additional information on this subject. During the review week Kazakhstan responded that the Party will provide calculations for the full time series from 1990 to 2016 in the 2018 submission. The ERT recommends Kazakhstan to follow up on their intentions and include the emissions in the next submission.

Comparability

41. The submission of Kazakhstan in 2017 did not include an IIR. However, in the Introduction of the IIR 2016 the Party specifies a list of guidelines used to provide data on emissions, where the 2013 EMEP/EEA Guidebook is included. The ERT

recommends Kazakhstan to use the 2016 EMEP/EEA Guidebook instead of the older version for future submissions, to enable comparability of the inventory to other reporting Parties.

Accuracy and uncertainties

42. The 2017 submission of Kazakhstan did not include an IIR. However, in the IIR 2016 the Party included a paragraph on quality control procedures, where Kazakhstan described some basic and general QA/QC activities. The ERT recommends the Party to implement sector specific QA/QC procedures also in future submissions and to include information on the results of the QA/QC process in the IIR.

Improvement

43. The ERT notes that in the 2017 submission of Kazakhstan did not include an IIR. However, in the IIR 2016 the Party included a paragraph on planned improvements. The ERT asked Kazakhstan for additional information on planned improvements for the energy sector for future years, and to give information on why the planned improvements for 2017 were not implemented. During the review week Kazakhstan responded that the Party was not able to implement the planned improvements because of the lack of capacity. The Party hopes that, in 2018, this reporting will be included into the annual workplan of the Ministry of energy and they will be able to expand the staff in the energy sector. The ERT recommends Kazakhstan to follow up on their intentions and to implement this improvement.

Potential Technical Corrections

44. The ERT concludes that for the energy sector no significant under- or over-estimations were found, and that therefore no technical corrections were prepared by the ERT.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1.a, 1.A.1.c, 1.A.2.a, 1.A.4.ai, 1.A.4.bi, 1.A.4.ci, 1.A.5.a – SO₂, NO_x, NMVOC, CO

45. The ERT noted that Kazakhstan provides NFRs 1A1a, 1A1c, 1A2a, 1A4ai, 1A4bi, 1A4ci and 1A5a as key categories for the pollutants SO₂, NO_x, NMVOC and CO in the 2016 IIR. From the IIR it is not clear, however, what Tier method was used to calculate the emissions. The ERT asked Kazakhstan for additional information on this subject. During the review week Kazakhstan responded that a Tier 1 method was used for the calculation of NO_x, NMVOC and CO emissions and a Tier 3 method was used for SO₂ emissions, and that they will improve the calculations for key categories in the next submission. The ERT recommends the Party to use Tier 2 or higher methods for all key categories for the next submission.

Category issue 2: 1.A.3.e.i – Completeness

46. The ERT notes that Kazakhstan uses the notation key “NE” (Not Estimated) for most of the activity data and for all of the emissions. The ERT asked Kazakhstan

for additional information on this subject, as well as for the reason why the 2016 EMEP/EEA Guidebook was not used to calculate emissions. During the review week Kazakhstan responded that emission calculations were limited by the reporting under the Kyoto Protocol, and that next year the emission calculations will be restricted to the use of the 2016 EMEP/EEA Guidebook. The ERT recommends Kazakhstan to follow up on their intentions to carry out the improvement for the next submission.

Category issue 3: 1.A.3.e.ii – Completeness

47. The ERT notes that Kazakhstan uses the notation key “NA” (Not Applicable) for all of the emissions and for liquid fuels (activity data). For other activity data the cells are left blank (no data and no notation keys). The ERT asked Kazakhstan to provide the ERT with additional information on this subject. During the review week Kazakhstan responded that the off road transport emissions will be calculated for the next inventory submission (2018) and that activity data for the calculation is available. The ERT recommends Kazakhstan to follow up on their intentions and to include the emissions to the next submission.

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2015		
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		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		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

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

49. The ERT 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 them as well as information about their impacts on the emission levels.

Completeness

50. The ERT noted that the inventory is not fully complete for the period 1990-2015: KZ reports emissions only for the following years: 1990, 2000, 2005 and 2010-2015.

51. The ERT noted that heavy metal emissions from aviation (NFRs 1A3ai(i) and 1A3aii(i)) are not reported. Regarding road transport NMVOC emissions from gasoline evaporation are not estimated, except for Pb emissions (NFRs 1A3bi - 1A3biv), other heavy metal emissions from road transport are not reported. In addition particle emissions PM10, TSP and BC from aviation and road transport (NFR 1A3b) are not reported. Also, the not exhaust particulate matter emissions from road transport are not estimated.

52. The ERT also noted that emissions from pipeline transport are not reported.

53. The ERT recommends Kazakhstan to complete the time series and to estimate and report the missing emissions according to the 2016 EMEP/EEA Guidebook.

Consistency including recalculation and time series

54. The ERT noted noticeable fluctuation for the Pb, Cd and Hg emissions' time series from NFR 1A3dii "National navigation (shipping)". To the question on the issue the Party replied that there had been changes in the initial data and that a recalculation is planned for the next submission.

55. For Memo items, "NE" (Not Estimated) is reported for emissions from international aviation cruise (civil), domestic aviation cruise (civil) and international maritime navigation. To the question on the issue Kazakhstan responded to have not differentiated fuel from domestic and international activities. The ERT recommends the Party to differentiate domestic and international transport fuel use and to recalculate and to report the emissions separately in the next submission.

56. The ERT recommends Kazakhstan to review and recalculate the time series showing critical issues by implementing the planned improvements, using consistent methodologies over the years, and applying the highest possible Tier methods from the 2016 EMEP/EEA Guidebook, as well as to adequately document the recalculations (e.g. activity data, emission factors and methods and their references, assumptions made) in the IIR of the next submission.

Comparability

57. The ERT recommends Kazakhstan to improve the comparability of the time series by implementing the planned improvements to recalculate the time series and eliminate the current gaps using method provided in the 2016 EMEP/EEA Guidebook.

Accuracy and uncertainties

58. The ERT recommends the Party to undertake an uncertainty analysis for the transport sector in order to help enhance the improvement process and to provide an indication of the reliability of the inventory data.

59. The ERT recommends the Party to implement QA/QC procedures for the Transport sector inventory and to provide a description of the QA/QC procedures and their results in the next IIR.

Improvement

60. The Party has identified some general improvement needs in the IIR 2016, including the completion of the calculation of the emissions for heavy metals and particulate matter since 2000. The ERT recommends the Party to implement the improvement for the whole time series. The ERT recommends the Party to prepare an inventory improvement plan and also encourages the Party to include information on the implementation of improvements in the IIR of the next submission.

Potential Technical Corrections

61. The ERT did not prepare technical corrections for Kazakhstan for the Transport sector.

Sub-Sector Specific Recommendations

Category issue 1:

62. The ERT strongly recommends Kazakhstan to review and update the transport sector time series, completing the inventory, for all the years and relevant pollutants as well as for emission sources of the territory, according to the 2016 EMEP/EEA Guidebook. The ERT encourages the Party to provide documentation on the recalculations in the IIR of the next submission.

Category issue 1: 1.A.3.a; 1.A.3.b – Particulate Matter, HMs

63. Heavy metal emissions from NFRs 1A3ai(i) and 1A3aii(i) are not estimated. For road transport Pb emissions are reported for NFRs 1A3bi - 1A3biv. Other heavy metal emissions from road transport are not reported.

64. Emissions of PM₁₀, TSP, BC from NFRs 1A3ai(i), 1A3aii(i) and 1A3b are not reported. In addition, exhaust particulate matter emissions from road transport are not estimated.

65. The ERT strongly recommends Kazakhstan to complete the time series of particulate matter and heavy metal emissions for aviation and road transport, according to the 2016 EMEP/EEA Guidebook. The ERT encourages Kazakhstan to provide transparent documentation on the recalculations in the IIR of the next submission.

Category issue 2: 1.A.3.b – NMVOC from gasoline evaporation

66. The ERT strongly recommends the Party to estimate NMVOC emissions from gasoline evaporation according to the 2016 EMEP/EEA Guidebook, and encourages the Party to provide transparent documentation about the calculation of emissions in the IIR of the next submission.

Category issue 3: 1.A.3.d.ii – Priority Heavy Metals

67. The ERT noted that priority heavy metal emissions from national navigation (shipping) show noticeable fluctuation over the years. The ERT strongly recommends Kazakhstan to verify and update the time series according to the 2016 EMEP/EEA Guidebook, and also encourages Kazakhstan to provide transparent documentation on the recalculations in the IIR of the next submission.

Category issue 4: 1.A.3.e.i – All pollutants

68. The ERT noted that emissions from pipelines are not estimated. During the review the Party indicated to implement the planned recalculation and to recalculate the time series according to the 2016 EMEP/EEA Guidebook. The ERT recommends Kazakhstan to carry out this improvement. The ERT also encourages the Party to provide transparent documentation of the recalculations in the IIR of the next submission.

Category issue 5: 1.A.3.a.i(ii), 1.A.3.a.ii(ii), 1.A.3.d.i(i) – All pollutants

69. The ERT noted that emissions from international aviation cruise (civil), domestic aviation cruise (civil) and international maritime navigation are not estimated. The ERT recommends the Party to estimate emissions from these sources to overcome the difficulty to differentiate the fuel between domestic and international activities as described during the review. The ERT recommends the Party to update the time series according to the 2016 EMEP/EEA Guidebook, and encourages the Party to provide transparent documentation in the IIR of the next submission.

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 *reported as NE	Recommendation Provided *general recommendation given
2A1	Cement production	X		X*
2A2	Lime production	X		X*
2A3	Glass production		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		X*	X*
2A6	Other mineral products		X*	X*
2B1	Ammonia production	X		X*
2B2	Nitric acid production		X	
2B3	Adipic acid production		X	
2B5	Carbide production	X		X*
2B6	Titanium dioxide production		X	
2B7	Soda ash production		X	
2B10a	Chemical industry: Other		X*	X*
2B10b	Storage, handling and transport of chemical products		X*	X*
2C1	Iron and steel production	X		X
2C2	Ferroalloys production	X		X*
2C3	Aluminium production	X		X
2C4	Magnesium production		X	
2C5	Lead production	X		X*
2C6	Zinc production	X		X*
2C7a	Copper production	X		X*
2C7b	Nickel production		X	
2C7c	Other metal production		X	
2C7d	Storage, handling and transport of metal products		X	
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		X*	X*
2I	Wood processing	X		X*
2J	Production of POPs		X*	X*
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)		X*	X*
2L	Other production, consumption, storage, transportation or handling of bulk products		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

70. 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, 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 listed in the improvement plan in the IIR. The ERT strongly encourages Kazakhstan to follow this idea as soon as possible, by including information on activity data, methods and EFs used, data sources and a description of trends into the IIR in order to increase the transparency of the inventory.

Completeness

71. 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 Party to improve the completeness of the inventory.

72. The ERT notes that Kazakhstan only reports emissions from those NFR sectors that match the ones that are reported under the UNFCCC, while most of the remaining sectors are reported as "NE". The ERT encourages the Party to clearly state in the IIR which activities occur in Kazakhstan and which not and to document in the IIR the reasons for not estimating. However, the ERT strongly recommends Kazakhstan to estimate and to report all emissions for which default methods exist from activities that exist in the country.

73. The ERT also noted that for those pollutants reported Kazakhstan uses the default EFs from the Guidebook and that the use of country specific emission factors is not yet a priority in Kazakhstan's improvement list. The ERT recommends Kazakhstan to improve the accuracy of reporting by developing country specific EFs, and encourages also to include those pollutants for which no default EFs are given. The ERT further recommends the Party to collect activity data for those sectors that are now reported as "NE".

Consistency including recalculation and time series

74. Kazakhstan does not provide any information on the time series and trends, but includes this in the priority improvement list. The ERT strongly encourages Kazakhstan to explain the dips and jumps in the time series in the IIR. One sector specific recommendation is given below.

Comparability

75. In the IIR, Kazakhstan only provides some general information on how the emissions were calculated, the general source of activity data and the default EFs from the Guidebook. Although Kazakhstan uses methods from the Guidebook, the comparability to other Parties' inventories is restricted because only Tier 1 methods are used and emissions are not calculated from all existing sources. 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

76. Kazakhstan does neither provide a quantitative nor a qualitative uncertainty analysis in the IIR, while the uncertainty analysis is listed as a priority in their improvement list. The ERT commends Kazakhstan on this endeavour, and recommends the Party to provide an uncertainty analysis in their next submission.

77. Kazakhstan does not provide a key category analysis (KCA), but this is listed as a priority in their improvement list. The ERT commends Kazakhstan on this target and recommends to perform the KCA and to calculate emissions from all key sources using at least a Tier 2 method.

78. In their IIR, Kazakhstan describes their general QA/QC system. The ERT commends Kazakhstan on this, and recommends the Party to further develop the sector specific QA/QC procedures and to include information of the results of the QA/QC system in the IIR.

Improvement

The ERT noted that Kazakhstan provides a list of improvements in the IIR but that the development of country specific EFs is not on the list. The ERT strongly recommends the Party to include the completion of the industrial processes sector inventory on the improvement list.

Potential Technical Corrections

79. There are no potential technical corrections for the industrial processes sector for Kazakhstan.

Sub-Sector Specific Recommendations

Category issue 1: 2.C.1 Iron and Steel production

80. The ERT noted a dip in emissions in 2013 for iron and steel production. To the question on the issue Kazakhstan did not provide a response. The ERT recommends the Party to describe the reasons behind this dip in the IIR of the next submission.

Category issue 2: 2.C.3 Aluminium Production

81. Kazakhstan reports emissions from aluminium production since 2000. A question was sent to find out if this is the only plant in Kazakhstan that produces aluminium, which seems to have opened in 2000. The ERT recommends Kazakhstan to include more information on this plant (and all other plants) in their next IIR.

SOLVENTS

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
2D3a	Domestic solvent use including fungicides	X		X
2D3d	Coating applications	X		X
2D3e	Degreasing		NE	X
2D3f	Dry cleaning	X		X
2D3g	Chemical products		NE	X
2D3h	Printing		NE	X
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

82. The ERT noted that the chapter of the IIR relating to the solvent sector contains only basic information about the methodologies, data sources and assumptions used to calculate emissions. Moreover, activity data is not provided in the NFR tables. In response to the question of the ERT Kazakhstan responded that next year they plan to significantly improve the inventory concerning the solvent sector. The ERT commends Kazakhstan for the plan and recommends the Party to include all recommendations provided by the ERT during the review into the improvement plan for solvent sector. The ERT recommends that Kazakhstan includes information on the methods and activity data as indicated in the relevant sections below.

Completeness

83. Kazakhstan reported emissions for the years 1990, 2000, 2005, 2010 – 2015 for the solvent sector. Due to the missing years the ERT considers the solvent sector to be incomplete. The ERT recommends Kazakhstan to include clear information on why they do not estimate the whole time series in the IIR. The ERT also recommends Kazakhstan to include estimation of the whole time series since 1990 in their improvement plan.

84. The ERT considers that the emissions from the solvent sector are underestimated due to the use of the notation key “NE” for many of solvent categories. The ERT recommends Kazakhstan to include collecting activity data and estimating all relevant missing emissions by using the methodology proposed in the 2016 EMEP/EEA Guidebook, in their inventory improvement plan.

85. The ERT noted that Kazakhstan does not report activity data. However, on the request of the ERT during the review, Kazakhstan provided the time series of activity data for a few categories. The ERT strongly recommends Kazakhstan to improve the reporting by providing activity data or to use the appropriate notation key instead and to provide a justification for its use in the IIR.

Consistency including recalculation and time series

86. Kazakhstan reports a partial time series for all calculated emissions in the NFR tables. However, due to the lack of information provided in the IIR 2017, and due to the missing activity data, the ERT could not fully assess the consistency of the time series.

87. Kazakhstan provides no information in the IIR on recalculations performed. The ERT encourages Kazakhstan to report information on recalculations in the next submission and also to document if no recalculation performed.

Comparability

88. The ERT noted that the methodologies used to estimate emissions from the solvent sector are included in the IIR on general level with some basic information provided for some source categories. The ERT also noted that there is no separate chapter in the IIR regarding the solvent sector. The ERT strongly encourages Kazakhstan to prepare a dedicated chapter for the solvent sector and to include detailed descriptions of activity data and methodologies for all source categories of the solvent sector for the next submission.

Accuracy and uncertainties

89. The ERT notes that neither a quantitative nor a qualitative uncertainty analysis has been provided in the IIR. The ERT strongly encourages Kazakhstan to include an uncertainty analysis for the solvent sector in the next submission in order to help enhance the improvement process and to provide an indication of the reliability of the inventory data.

90. The ERT notes QA/QC checks for the solvent sector haven't been included in the IIR. The ERT strongly encourages Kazakhstan to include some basic QA/QC checks for the solvent sector in the inventory.

Improvement

91. The ERT has noted that there is no improvement plan for the solvent sector available in the IIR. The ERT recommends Kazakhstan to develop an improvement plan for the solvent sector, based on the findings included in this report and encourages Kazakhstan to include information on this plan in the IIR of the next submission.

Potential Technical Corrections

92. The ERT did not provide any technical corrections for the inventory of Kazakhstan.

Sub-Sector Specific Recommendations

Category issue 1: 2.G Other product use

93. During the review the ERT noted that no air pollutant emissions have been calculated for the activities under NFR 2G other product use, and that Kazakhstan uses the notation key “NE” instead. The ERT considers that in Kazakhstan there are also some activities like: SNAP 060601 use of fireworks, SNAP 060602 use of tobacco, SNAP 060603 use of shoes that exist in almost all countries and that activity data for these activities should be available from the national statistics. The ERT recommends Kazakhstan to collect data and to use the methodology provided in the 2016 EMEP/EEA Guidebook to calculate emissions for these activities.

Category issue 2: 2.D.3.i Other solvent use

94. During the review the ERT asked the Party for a clarification about the activities that are sources for NMVOC emissions from NFR 2D3i other solvent use. Kazakhstan responded that this category covers activities like coatings for glass wool and mineral wool, printing industry, extraction of oils and fats, use of adhesives, protection of wood, household use of solvents (excluding paints) and anticorrosive coatings of cars and dewaxing (in cars). The ERT commends the Party for that answer and recommends that Kazakhstan includes these details in the IIR of the next submission.

95. In response to the question on the issue Kazakhstan answered that one of the activities that is included in the NMVOC calculation for the NFR 2D3i is household use of solvents (excluding paints). The ERT notes that these emissions should be reported under NFR 2D3a domestic solvent use including fungicides, instead. The ERT recommends Kazakhstan to revise the NMVOC estimates reported under both NFRs 2D3a and 2D3i for the next submission.

96. The ERT noted that the NMVOC emissions reported from NFR 2D3i are low, and that no other air pollutant emissions are reported in the NFR tables. The ERT considers that there may be a possible underestimation of NMVOC emissions as well as of all other relevant emissions. For example, the activity fat, edible and non-edible oil extraction is a source of NMVOC, TSP, PM₁₀ and PM_{2.5} emissions. Preservation of wood with creosote is a source of NMVOC and PAHs as well. For all these emissions Tier 2 EFs are provided in the Guidebook. The ERT recommends the Party to collect data and to use the methodologies provided in the Guidebook to estimate and report these emissions.

97. The ERT notes that activity data is not provided in the IIR or in the NFR tables, and recommends Kazakhstan to report activity data both in the NFR tables and in the IIR.

98. The ERT recommends Kazakhstan include NFR category 2D3i in their inventory improvement plan and to include the plan in the next IIR submission.

Categories issue 3: 2.D.3.e Degreasing, 2.D.3.g Chemical products, 2.D.3.h Printing and 2.G Other product use – all relevant

99. During the review the ERT noted that in the NFR14 tables Kazakhstan reported the notation key "NE" for NMVOC and all other emissions for source categories: 2D3e degreasing, 2D3g chemical products, 2D3h printing and 2G other product use. During the review, Kazakhstan provided a preliminary estimation of NMVOC emissions from NFR 2D3e and NFR 2D3h. The ERT commends the Party for that and encourages Kazakhstan to collect activity data for the full time series and for all categories for which they currently report "NE" and to use at least Tier 1 methodologies from the 2016 EMEP/EEA Guidebook to calculate all relevant emissions. The ERT encourages Kazakhstan to include details of the calculation in the IIR of the next submission.

Categories issue 4: 2.D.3.a Domestic solvent use including fungicides, 2.D.3.d Coating applications, 2.D.3.f Dry cleaning, 2.D.3.i Other solvent use – all

100. During the review the ERT noted that for calculation of NMVOC emissions from NFRs 2D3a Domestic solvent use including fungicides, 2D3d Coating applications, 2D3f Dry cleaning and 2D3i Other solvent use, Kazakhstan uses the amount of dyes and solvents used in industry, construction and households and that the simplified method described in the 2005 EMEP/EEA Guidebook were used. During the review Kazakhstan provided details on the methodology used for the emission calculation. The ERT commends Kazakhstan for that and recommends that Kazakhstan includes these details in the next submission.

101. During the review the ERT asked Kazakhstan to provide an activity data time series for NFR categories 2D3d, 2D3f and 2D3i. Kazakhstan in its response provided:

102. 1) the full time series of activity data for NFR 2D3d along with details on the percentage of the annual application of paint for the decorative coating application for the industry, of the application of paint for other coatings,

103. 2) the full time series of activity data for NFR 2D3f (Population of the Republic of Kazakhstan),

104. 3) EFs used for the emission calculation for each activity under NFRs 2D3d and 2D3f. The ERT commends Kazakhstan on all data provided and recommends Kazakhstan to include all provided data (AD and EFs) in the IIR of the next submission.

105. The ERT recommends Kazakhstan to include an improvement plan covering NFR categories 2D3f dry cleaning and 2D3i other solvent use in the next IIR and to collect the activity data needed to implement the methodology using the 2016 EMEP/EEA Guidebook. The ERT notes that implementation of these improvements will improve the completeness of the inventory.

AGRICULTURE

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
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		
3Da1	Inorganic N-fertilizers (includes also urea application)	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		
3Dd	Off-farm storage, handling and transport of bulk agricultural products	X		
3De	Cultivated crops	X		
3Df	Use of pesticides	X		
3F	Field burning of agricultural residues	X		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

106. The inventory is generally not transparent as the information provided in the IIR is not transparent for the source of activity data, methodology descriptions and

trends. The ERT encourages the Party to include activity data, emission factors and description of the methodologies used in the calculation of emissions in its IIR.

Completeness

107. 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 the missing sources.

Consistency including recalculation and time series

108. Kazakhstan has not provided any information about its recalculations in the IIR. The ERT encourages Kazakhstan to provide detailed explanation on recalculations, including the rationale, the impact on the sector and the implication on emission trends in the IIR.

Comparability

109. The inventory is in line with the Reporting Guidelines and the methodologies used in the inventory are in accordance with the latest EMEP/EEA Guidebook.

Accuracy and uncertainties

110. 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 recommends the Party to apply Tier 2 or higher methodologies for all key categories.

111. Kazakhstan has not provided an uncertainty analysis for the agriculture sector. The ERT recommends Kazakhstan to undertake an uncertainty analysis for the agriculture Sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

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

Improvement

113. Kazakhstan does not present information on agriculture sector specific planned improvements in the IIR. During the review, Kazakhstan informed the ERT of its intention to improve estimates and transparency for some categories in future submissions. The ERT welcomes this plan. The ERT encourages Party to include information regarding the planned improvements.

Potential Technical Corrections

114. The ERT did not prepare any technical corrections for the inventory of Kazakhstan.

Sub-Sector Specific Recommendations

Category issue 1: 3.B Manure management – Activity data

115. The ERT noted that the animal numbers included in the NFR tables do not match the numbers provided by the national statistics, cited as the source of activity data in the IIR. Additionally, the national statistics provide, for some animals, their number in aggregated categories (e.g. sheep and goats together). In the IIR, there is no explanation about how these numbers of heads are disaggregated into the NFR categories. During the review, Kazakhstan explained that they used average annual numbers of animals based on a monthly livestock in farms statistics. The ERT recommends Kazakhstan to provide clear references for the activity data sources and the methodology in order to obtain the data required by the methodology to calculate emissions in its next submission.

Category issue 2: 3.B.4.g.ii, 3.B.4.g.iii and 3.B.4.g.iv - Manure management – Broilers, Turkeys and Other poultry – NO_x, NMVOC, NH₃, PM_{2.5} and PM₁₀

116. The ERT noted that Kazakhstan reports NO_x, NMVOC, NH₃, PM_{2.5} and PM₁₀ emissions from NFRs 3B4gii, 3B4giii and 3B4giv - manure management – broilers, turkeys and other poultry as “IE” for all years and that no information is provided in the IIR about the allocation of emissions. During the review, Kazakhstan explained that the national statistics only provide aggregated poultry numbers. Additionally, the Party explained that they report and estimate emissions based on “laying hens” emission factors as this category constitutes the main part of the poultry. The ERT recommends Kazakhstan to provide information about the allocation of emissions reported as “IE” and also recommends Kazakhstan to estimate and report these emissions disaggregated in its next submission.

Category issue 3: 3.D.a.2.a Animal manure applied to soils and 3.D.a.3 Urine and dung deposited by grazing animals – NMVOC and NH₃

117. The ERT noted that Kazakhstan reports NMVOC and NH₃ 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 that no information is provided in the IIR about the allocation of the emissions. Additionally, activity data cells in the NFR tables are reported as “NA”. During the review, Kazakhstan replied that the emissions are reported in the category 3B manure management. The ERT recommends Kazakhstan to provide the activity data and information about the allocation of emissions and, also, recommends Kazakhstan to report these emissions disaggregated in its next submission.

Category issue 4: 3.B Manure management, All animals - NMVOC

118. The ERT noted that the NMVOC emission factors used by Kazakhstan for NFR 3B manure management originate in the 2016 EMEP/EEA Guidebook table 3.4 column “without silage feeding”. In the IIR there is no information regarding the selection of this column. During the review, Kazakhstan explained that the Statistical

Committee does not provide reliable data on animals fed with silage, so the coefficients were taken without taking these data into account. The ERT considers that in this case the emissions could be underestimated and recommends the Party to recalculate the emissions using the mix of with/without silage in its next submission taking into account the possible changes of silage feeding in the time series.

Category issue 5: 3.B.1.a and 3.B.1.b Manure management, Dairy and None Dairy Cattle - NH₃ and NO_x

119. The ERT noted that NH₃ and NO_x emission factors used by the Party to calculate emissions from NRFs 3B1a and 3B1b – dairy and non-dairy cattle originate in the 2016 EMEP/EEA Guidebook tables 3.2 and 3.3. For non-dairy cattle, Kazakhstan uses the row “slurry” from table 3.2 and the row “solid” in table 3.3, while the Party uses “solid” from both tables for dairy Cattle. There is no further information in the IIR regarding the manure management systems or the selection of the EF from this row. During the review, Kazakhstan acknowledged that there was an error in NH₃ emissions from non-dairy cattle and that the error will be corrected in the next inventory submission. The ERT considers that there is an inconsistency in the selection of NH₃ and NO_x emission factors because the manure management systems could have changed since 1990. The ERT recommends Kazakhstan to correct the inconsistency regarding manure management of non-dairy cattle in its next submission. Additionally, the ERT recommends the Party to obtain statistical information of the mix of slurry/solid systems in the country and to recalculate the emissions in the next submission taking into account the possible changes of the manure management systems in the time series.

Category issue 6: 3.B.3 Manure management, Swine - NO_x, NMVOC, NH₃, PM_{2.5} and PM₁₀

120. The ERT noted that the emission factors used for estimating emissions from NMVOC and particle emissions from NFR 3B3 manure management - swine are exclusively taken from the row “fattening pigs” in 2016 EMEP/EEA Guidebook, instead of taking the different sub-categories of swine included in the methodology into account. Additionally, the number of heads of these sub-categories is not presented in the IIR, impairing the transparency of the emission factors used. During the review, Kazakhstan replied that they used the emission factor for “fattening pigs” as, by average mass, regional pigs can be attributed to fattening pigs. The ERT considers that this approach is not in line with the Guidebook and recommends 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.

Category issue 7: 3.B.4.g.i Manure management, Laying hens – NO_x, NMVOC, NH₃, PM_{2.5} and PM₁₀

121. The ERT noted that the emissions from all poultry categories (NFRs 3B4gi to 3B4giv) seem to be reported under NFR 3B4gi manure management - laying hens. The ERT also noted that the emission factors used for estimating emissions are

exclusively taken from the row “laying hens” in the 2016 EMEP/EEA Guidebook, instead of taking the different sub-categories of poultry (broilers, turkeys and other poultry) included in the methodology into account. During the review, Kazakhstan explained that the national statistics only provide aggregated poultry numbers. Additionally, the Party explained that they report and estimate emissions based on “laying hens” emission factors as this category constitutes the main part of the poultry. The ERT considers that this approach could lead to an over- or under-estimation of emissions depending on the poultry distribution between different poultry categories. The ERT recommends Kazakhstan to disaggregate the national statistics into the poultry categories required by the methodology, to recalculate emissions using the correct EFs for each animal and to report the emissions disaggregated by NFR category.

Category issue 8: 3.B.4.h Manure management, Other animals - NO_x, PM_{2.5} and PM₁₀

122. The ERT noted that Kazakhstan uses NH₃ and NMVOC emission factors from the row “Other livestock (camels)” in tables 3.2 and 3.4 of the 2016 EMEP/EEA Guidebook. However, for NO_x and particles, Kazakhstan uses emission factors from the rows “Other animals” and “Other animals (Fur animals)” from tables 3.3 and 3.5. Additionally, information about the animal species included under NFR 3B4h is not presented in the IIR. During the review, Kazakhstan replied that camels are allocated under the category “Other animals” and that they will correct the EFs in its next submission. The ERT commends Kazakhstan intention to correct these emission estimates. The ERT encourages Kazakhstan to provide detailed information on the animal species considered under NFR 3B4h in the IIR.

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

123. Kazakhstan reports the emissions from NFR 3Da2b sewage sludge applied to soils as “NO” for all pollutants and years. During the review, 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 considers that there is an underestimation of these emissions and recommends Kazakhstan to estimate and report these emissions in its next submission.

Category issue 10: 4.F Field burning of agricultural residues – All pollutants

124. Kazakhstan reports emissions from NFR 4F field burning of agricultural residues as “NO” for all pollutants and years. In the IIR, there is no explanation to support this notation key. The ERT also noted that Kazakhstan reports emissions under NFR 11C other natural emissions using “Area of field burned [kha]” as activity data and emissions from field burning are reported in FAOSTAT. During the review,

Kazakhstan explained that field burning was prohibited by law in 2007. The Party did not provide an explanation for the emissions from NFR 11C or the FAOSTAT data, or on the practices before the law (1990-2006). The ERT recommends Kazakhstan to check this category and either to estimate these emissions and report them in its next submission or to provide support of the use of this notationkey for the whole-time series and to provide an explanation of the consistency with other categories and international datasets.

WASTE

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PMs, heavy metals and POPs		
Years		1990 – 2015 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
5A	Solid waste disposal on land	X		X
5B1	Biological treatment of waste - Composting		X	
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities		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		X
5C1bvi	Other waste incineration	X		X
5C2	Open burning of waste	X		X
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		X
5D3	Other wastewater handling	X		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

125. The ERT commends the Party for the general transparency of the inventory and for promptly responding to the questions raised by the ERT to clarify issues and to bring later discovered missing emissions to the attention of the ERT. However, as also stated by the Party in the list of improvements, there is a need for a more detailed description of the methodologies, presentation of activity data and data sources. The ERT encourages the Party to improve this in the IIR of the next submission.

Completeness

126. The ERT notes that the Party does not report a complete time series, but only the years 1990, 2000, 2005 and 2010-2015. The ERT recommends the Party to complete the whole time series for the next submissions.

127. The ERT notes that there are some differences between the reported activity data in the NFR tables, the IIR, the responses by the Party during the review, and the data from the Party's Committee on Statistics. Kazakhstan stated that for landfilled waste this will be examined and reported in the next submission. However, there are

also other significant waste streams with potential emissions for which the destination is not clear. For instance for hazardous waste the Committee on Statistics reports a produced amount of 251 255.6 Gg for 2015 while Kazakhstan states that incineration of toxic and hazardous waste is prohibited. Furthermore, the Party states that most of this waste is stored without environmental impact and a part is exported to Europe. The ERT notes that this yearly production of hazardous waste is enormous. Therefore, the ERT recommends the Party to extend the study on the difference of amounts of municipal waste compared with the amounts reported by the Committee on Statistics, for all the relevant waste streams and to determine if there are emissions that should be reported.

Consistency, including recalculation and time series

128. The ERT notes that the Party uses the notation key “NO” for pollutants when no emissions are reported for several NFR categories. However, the Guidebook provides the notation key “NA” for several of these sources and pollutants. The ERT recommends Kazakhstan to follow the Guidebook and to correct the notation keys for all reported years in the next submission.

Comparability

129. The ERT notes that Kazakhstan uses the methods from the Guidebook and that the inventory is in general comparable to other reporting Parties. However, the ERT noted that no activity data is reported in the NFR tables or in the IIR for all sources where emissions are reported and that it is not always clear from the IIR which activities are covered by the NFR sectors. The ERT encourages the Party to report activity either in the NFR tables and/or in the IIR.

Accuracy and uncertainties

130. The ERT notes that no key category analysis is provided and that no analysis of uncertainties is made. The Party states in the IIR that both the key category analysis and the uncertainty analysis are considered priorities on the list of planned improvements.

Improvement

131. The ERT noted that the Party presents a list of planned improvements.

Sub-Sector Specific Recommendations

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

132. The Party reports the amounts of landfilled waste in the NFR tables. In response to the question the Party stated that the landfilled waste originates from municipal solid waste produced in urban areas. The ERT notes that there is a discrepancy between this statement and the statistics on the website of the Kazakhstan’s Committee of Statistics that provides a produced amount of municipal solid waste that is about 1/3 lower. The ERT recommends the Party to clarify this issue for the next submission.

133. In response to a question raised during the review the Party stated that in the inventory only emissions of the landfilled municipal waste from urban areas are reported. The Party stated furthermore that in 2015 approximately 10 million inhabitants lived in the urban areas. The ERT notes that the remaining approximately 7 million inhabitants are living mostly scattered in the rural areas. Furthermore, these inhabitants will in some cases deposit their waste in small local unmanaged landfills, but most of them will only produce small amounts of mostly non-decaying waste that is deposited on land. Due to the composition of this waste the emissions can be expected to be very low. The ERT encourages the Party to provide an explanation in the IIR for not calculating emissions from the waste produced by the 7 million inhabitants living in the rural areas, in next submission.

134. In response to a question raised by the ERT during the review Kazakhstan stated that the amounts of municipal solid waste that are landfilled are calculated from production per capita. The ERT notes that the total amounts of landfilled municipal waste differ from those reported by the Party's Committee on Statistics. The Party states that this is probably caused by the amount of solid municipal waste that is recycled and that this issue will be examined and reported on in the next submission.

Category issue 2: 5.C.1. Waste incineration – all pollutants

135. The Party states that there is no crematorium in Kazakhstan and that emissions coming from the incineration of animal carcasses and animal by-products cannot be calculated due to lack of activity data. The ERT notes that the Party uses the notation key "NO" in the NFR tables. The ERT recommends the Party to include actions in their inventory improvement programme that will address the missing activity data. Furthermore the ERT recommends the Party to use the notation key "NE" for the not estimated pollutants from this source.

Category issue 3: 5.C.1.b.iii Clinical waste incineration – all pollutants

136. In response to a question on the issue the Party explained the activity data and provided the emission factors used for clinical waste incineration. The ERT encourages the Party to describe the source, activity data and methodology and to report the activity data in next submissions.

Category issue 4: 5.C.2. Open burning of waste – all pollutants

137. The ERT notes that the Party uses the notation key "NO" for open burning of waste. With 7 million inhabitants living in the rural areas, even though open burning of waste is forbidden, the ERT considers it unlikely that no open burning of waste will occur, and recommends Kazakhstan to use the notation key "NE" or "NA" instead of "NO". The ERT recommends the Party to correct this in the next submission and to make an effort to improve the inventory by calculating the emissions from this source for next submissions, or to provide further clarification on the issue in the IIR.

Category issue 5: 5.D. Wastewater handling – NMVOC and NH₃

138. The Party reports NMVOC and NH₃ emissions from waste water handling. In response to a question during the review the Party explained that industrial waste waters are partly mixed with domestic waste water in the sewer system and that the remainder is discharged to open water bodies. Furthermore, the Party explained that there are no statistics available on the amount of industrial waste water that is discharged in the sewer system. The Party provided the ERT with a complete time series of the amount of sewage handled at sewage plants. The ERT encourages the Party to describe this source in the IIR of the next submission.

139. Regarding waste water handling the Party reports that no sewage sludge incineration takes place. In response to a question on the subject of sewage sludge handling, the Party answered that sewage sludge is produced and dried for use as fertilizer in agriculture. However, the Party also stated as response to the follow up question that no sewage sludge is used in agriculture. The ERT recommends the Party to describe in the IIR the destination of the produced sewage sludge in the IIR (fertilizer, incineration, landfills, etc.) and when relevant, to calculate the related emissions and to report these under the appropriate NFR sector.

140. The ERT noted that the Party uses the notation key “NE” for several pollutants from the source other waste water handling (NFR 5D3). The ERT recommends that in case no other waste water handling is present the notation key “NO” should be used.

141. The ERT noted that for Industrial waste water handling the notation keys “NE” and “NA” are used. However, the Party states that emissions from this source are included under the source domestic waste water handling. For the ERT it is not clear from the reply of Kazakhstan on the issue or from the IIR, if this is the case for all pollutants. If so, the correct notation key should be “IE”. The ERT encourages the Party to describe the source in the IIR and recommends Kazakhstan to also correct the notation key in the NFR tables.

142. During the review the Party discovered that NH₃ emissions from latrines and/or cesspits in rural areas are not incorporated in the inventory. The Party provided the ERT with a complete time series for the lacking emissions from this source. These additional NH₃-emissions from this source add up to approximately 5.8% of the national total of NH₃-emissions reported and thus the ERT concludes that this is a significant underestimation. The ERT strongly recommends Kazakhstan to include these revised estimates in the inventory of the next submission.

Category issue 6: 5.E Other waste – NH₃, PMs, priority -and additional HMs and PCDD/PCDF.

143. On a question asked during the review the Party stated that sewage sludge is dried before the use as fertilizer in agriculture. In this case the sludge is dried by spreading, there are NH₃ emissions to be expected from the drying process. As there are also drying processes that do not emit pollutants, the ERT recommends the Party to provide an inventory of the drying process(es) used in the country. Furthermore, if

relevant the Party is recommended to calculate NH₃ emissions from sludge spreading and to report the emissions in the next submission.

144. The ERT notes that the Party does not report emissions from accidental house, industrial buildings and car fires. The ERT recommends Kazakhstan to try to collect information on activity data from these sources, and to calculate emissions using the default EFs from the Guidebook.

MATERIALS USED BY REVIEW TEAM

1. Annex I emissions 1990-2015 (Excel file)
2. Kazakhstan _CLRTAP_EMEP emission inventory status report 2017 (Word document)
3. Kazakhstan's Stage 2 S&A report
4. Kazakhstan's Stage 1 report 2017
5. Data and tools developed by CEIP (<http://unece-stage3.wikidot.com/data-analysis>)

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

6. Response to preliminary questions raised prior to the review (wiki_)
7. Response to questions raised during the review: (wiki)
8. Solvents: cf. question above:
9. The full time series of activity data for NFR 2D3d along with details on the percentage of the annual application of paint for the decorative coating application for the industry, of the application of paint for other coatings,
10. The full time series of activity data for NFR 2D3f (Population of the Republic of Kazakhstan),
11. EFs used for the emission calculation for each activity under NFRs 2D3d and 2D3f. The ERT commends Kazakhstan on all data provided and recommends Kazakhstan to include all provided data (AD and EFs) in the IIR of the next submission.
12. Waste sector: During the review the Party sent a document "Overview of inhabitants using latrines and cesspits: *NH3_Emissions_KZ.PNG*"

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ANNEX I POTENTIAL TECHNICAL CORRECTIONS

The ERT did not specify technical corrections for Kazakhstan.