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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:**

KYRGYZSTAN

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INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols*'⁽¹⁾ – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review, has concentrated on SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ & PM_{2.5} for the time series years 1990 – 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 Kyrgyzstan 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 – Eva Krtkova (CZ), Energy - Glen Thistlethwaite (UK), Transport – Giannis Papadimitriou (EU), Industry & Solvent - Neil Passant (UK) , Agriculture - Hakam Al Hanbali (SE), Waste - Intars Cakars (LV).
4. Jean-Pierre Chang (FR) was the lead reviewer. The review was coordinated by 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.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf>

PART A: KEY REVIEW FINDINGS

5. The ERT commends effort and improvements achieved by Kyrgyzstan to report inventory data to the Convention. However the CLRTAP inventory submission of Kyrgyzstan is not yet in line with UNECE Reporting Guidelines. Indeed, the 2017 submission does not include the IIR inventory report and includes only emissions for the last reporting year 2015 .
6. Although, in particular the ERT could not assess the transparency of the inventory and the used methodologies, the ERT was in position to assess other TCCCA criteria of the inventory, to point out some priorities and to help Kyrgyzstan to set its improvement plan.
7. Especially, concerning completeness and accuracy, in the frame of the 2017 trial exercise of technical correction procedure, some potential technical corrections were identified, relating to significant over or under estimations of emissions (i.e. corrections higher than 2% of the national total).
8. Beyond the well identified and reported technical corrections where ERT was able to estimate emissions, there is a more general need to further develop activity data sources and the use of the EMEP/EEA 2016 Guidebook to further complete the national inventory.
9. In summary, ERT encourages Kyrgyzstan for its future inventories to further develop its inventory system and further complete its CLRTAP submissions (IIR, complete time series including its recalculations...), year after year as much as possible, through an annual improvement plan.

INVENTORY SUBMISSION

10. In 2017 submissions Kyrgyzstan has reported emissions for 2015. Kyrgyzstan did not provide full time series for its protocol pollutants in the NFR format. Kyrgyzstan did not report IIR. ERT recommends Kyrgyzstan to report IIR in the future submissions.

KEY CATEGORIES

11. Kyrgyzstan has not compiled Key Source Category Analysis neither at level or trend. The ERT encourages Kyrgyzstan to report IIR in the future submissions including Key Category Analysis.

QUALITY

Transparency

12. The ERT recognises the level of effort undertaken by Kyrgyzstan in providing the air pollution inventory. The Kyrgyzstan's IIR is not available. The ERT recommend s Kyrgyzstan to provide IIR in the future submissions including the detailed descriptions of methodologies, data sources and emission factors used, to enable the assessment of the transparency of the inventory.

Completeness

13. The ERT acknowledges the effort to which Kyrgyzstan has done to provide estimates of emissions for all sub-sectors and all pollutants reviewed.

14. Kyrgyzstan's inventory for the pollutants reviewed is generally complete for the reported year. However, notation keys are used in several cases. Since no IIR is available, it is difficult to assess appropriate use of the notation keys. The ERT encourages Kyrgyzstan to review using of the notation keys in the future inventories including explanation of reasons for using the notation keys.

15. The ERT noted, that activity data are reported as 'NE', 'NA' or 'NO'. The ERT recommends Kyrgyzstan to report the activity data.

16. The ERT noted that some pollutants and categories are reported as 'IE'. The ERT encourages Kyrgyzstan to include explanation of 'IE' notation key in future submissions.

Consistency, including recalculations and time-series

17. Since no IIR is available, and only last year is reported (2015), ERT assumes that no recalculations were carried out on the data from previous submissions. The ERT recommends Kyrgyzstan to include IIR in its future submissions including information on recalculations and improvements. .

Comparability

18. The ERT notes that the inventory of Kyrgyzstan is comparable with those of other reporting parties for the year 2015. The allocation of source categories follows that of the EMEP/UNECE reporting Guidelines. The ERT encourages Kyrgyzstan to continue with this approach and further include also time series estimates.

CLRTAP/NECD comparability

19. Kyrgyzstan as a non-EU country does not report emissions under the NEC Directive.

Accuracy and uncertainties

20. Kyrgyzstan has not compiled uncertainty estimates for its UNECE submission. During the review Kyrgyzstan didn't reply to the question raised considering possibility of uncertainty analysis. The ERT encourages Kyrgyzstan to consider uncertainty assessment for key categories in its future submissions.

Verification and quality assurance/quality control approaches

21. *The ERT cannot assess the* Kyrgyzstan's QA/QC procedures undertaken in the emission inventory. The ERT encourages Kyrgyzstan provide information about QA/QC procedures and QA/QC plan in IIR in its future submissions.

FOLLOW-UP TO PREVIOUS REVIEWS

22. No Stage 3 review was carried out for Kyrgyzstan before.

AREAS FOR IMPROVEMENTS IDENTIFIED BY KYRGYZSTAN

23. The IIR is not available and thus, Kyrgyzstan does not indicate any areas for improvements. The ERT encourages Kyrgyzstan to report IIR in its future submissions including information on planned improvements.

TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY ERT

24. The IIR identified some significant over or under estimations in the inventory (i.e. above the 2% threshold compared to the national total) and proposed during the review week technical corrections for the sectors of residential, domestic solvent use and agriculture. A synthesis of the different proposed technical corrections are given in the following table. For more detailed information go to sectoral chapters and annex I.

Table 1 Summary of potential technical corrections identified by ERT for the Kyrgyzstan

NFR category (s)	Pollutant	Years	Calculated by country / Calculated by ERT	Potential correction to national total calculated by Party
1.A.4.bi Residential: Stationary	NOx	2015	ERT	17 %
1.A.4.bi Residential: Stationary	SOx	2015	ERT	63 %
1.A.4.bi Residential: Stationary	NMVOC	2015	ERT	29 %
1.A.4.bi Residential: Stationary	PM2.5	2015	ERT	63 %
2D3a Domestic solvent use including fungicides	NMVOC	2015	ERT	27 %
3B Manure management	NH3	2015	ERT	99 %
3B Manure management	PM10	2015	ERT	-2 %
3B Manure management	NMVOC	2015	ERT	31 %
Total	NMVOC	2015	ERT	86 %
Total	NOx	2015	ERT	17 %
Total	SOx	2015	ERT	63 %
Total	PM2.5	2015	ERT	63%
Total	NH3	2015	ERT	99 %
Total	PM10	2015	ERT	-2 %

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

25. The ERT identifies the following cross-cutting issues for improvement:
- (a) The ERT encourages Kyrgyzstan to review the use of notation keys in the inventory and provide appropriate explanation of reasons for the use of notation keys in its future submission.
 - (b) The ERT encourages Kyrgyzstan to report IIR in its future submission, which would include information on methodologies used, activity data, emissions factors and other relevant assessments for the air pollutants emission estimation.
 - (c) The ERT encourages Kyrgyzstan to conduct Key Category Analysis and elaborate on it in its future IIRs.
 - (d) The ERT encourages Kyrgyzstan to conduct uncertainty assessment of the inventory and elaborate on it in its future IIRs.
 - (e) The ERT encourages Kyrgyzstan to report activity data in its future air emission inventories.
 - (f) The ERT encourages Kyrgyzstan to apply QA/QC procedures as described within the EMEP/EEA guidebook, on its air emission inventory and report on it in its future submission.
 - (g) The ERT encourages Kyrgyzstan to include in its future IIR information about archiving procedures related to the air emission inventory.
 - (h) The ERT encourages Kyrgyzstan to include in its future IIR explanation on trends over the time-series.
26. 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, CO, NH ₃ , PM ₁₀ & PM _{2.5} , Cd, Hg, Pb, Dioxin, PAH		
Years		2010, 2011, 2012, 2014, 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	
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	x		x
1A3ei	Pipeline transport		x	
1A3eii	Other		x	
1A4ai	Commercial/institutional: Stationary	x		x
1A4bi	Residential: Stationary	x		x
1A4ci	Agriculture/Forestry/Fishing: Stationary	x		
1A5a	Other stationary (including military)		x	
1B1a	Fugitive emission from solid fuels: Coal mining and handling	x		x
1B1b	Fugitive emission from solid fuels: Solid fuel transformation		x	
1B1c	Other fugitive emissions from solid fuels		x	
1B2ai	Fugitive emissions oil: Exploration, production, transport	x		x
1B2aiv	Fugitive emissions oil: Refining / storage	x		x
1B2av	Distribution of oil products		x	
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)		x	
1B2c	Venting and flaring (oil, gas, combined oil and gas)	x		x
1B2d	Other fugitive emissions from energy production		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

27. As explained in Part A of this report, Kyrgyzstan sent no IIR. Consequently, the methodology employed cannot be checked by the ERT. No explanations of the emission trends over time are given. The ERT strongly encourages Kyrgyzstan to provide an IIR with all future submissions.

Completeness

28. Kyrgyzstan provided limited information on stationary combustion in its 2017 inventory submission to LRTAP. The ERT noted that Kyrgyzstan has reported energy statistics to the International Energy Agency (IEA) and that data are available for the period 1990 to 2014: <http://www.iea.org/countries/non-membercountries/kyrgyzstan/>. Unfortunately, activity data presented in the IEA tables doesn't seem consistent across years. The only year which seems correct is 2014. The data in 2014 are coming from a project within the INOGATE Programme to assist Kyrgyzstan to produce an energy balance and strengthen their ability to fill-in the joint IEA/Eurostat/UNECE energy questionnaires for 2014 (http://www.inogate.org/documents/ACR_KG_CWP.07_19042016_E_R.pdf). The ERT believes that this activity data could be used as a good basis for estimating air pollutant emissions according to the Guidelines for Reporting Emission Data under the LRTAP. Default emission factors from the 2016 EMEP/EEA Guidebook (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2016>) could be used in combination with the activity data from the energy balance to produce Tier 1 emission estimates.

29. Kyrgyzstan does not estimate all the pollutant emissions in the sectors concerned. The ERT encourages Kyrgyzstan to estimate all the pollutant emissions, using at least the Tier 1 method of the EMEP EEA Emission Inventory Guidebook 2016 to ensure a suitable level of completeness.

Consistency including recalculation and time series

30. Consistency could not be checked because Kyrgyzstan didn't provide an IIR and didn't reported recalculations. The ERT noted that there are large fluctuations between the year 2010 and 2015. The ERT assumes there aren't recalculations of the previous years during the different submissions. The ERT encourages Kyrgyzstan to update emissions from previous submissions.

Comparability

31. The ERT could not check comparability because there was a lack of information on the sources and methods used by Kyrgyzstan. The ERT encourages Kyrgyzstan to compile and submit an IIR to address this.

Accuracy and uncertainties

32. The ERT could not check for accuracy and uncertainties because there is no IIR. The ERT encourages Kyrgyzstan to provide an IIR, to undertake an uncertainty analysis and to develop a quality system for the inventory in order to inform the improvement process.

Improvement

33. Kyrgyzstan has not provided an IIR so the ERT cannot determine whether improvements have been made to the inventory.

Potential Technical Corrections

34. 1.A.4.bi Residential: the ERT noted that Kyrgyzstan do not estimate emissions from the combustion in the residential sector. The ERT found that Kyrgyzstan has reported energy statistics to the International Energy Agency (IEA) and that data are available for the period 1990 to 2014 : <http://www.iea.org/countries/non-membercountries/kyrgyzstan/>. Activity Data for the residential sector are available in these statistics but aren't consistent across years. The only year which seems correct is 2014. The data in 2014 are coming from a project within the INOGATE Programme to assist Kyrgyzstan to produce an energy balance and strengthen their ability to fill-in the joint IEA/Eurostat/UNECE energy questionnaires for 2014. Consequently, a technical correction has only been performed for the year 2014 and is indicative for the country. 2015 is considered to be equal to 2014. The ERT recommends that Kyrgyzstan estimates emissions from this sector. Methodologies to estimate emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2016). Cf. part 1, table 1 and annex I - Technical Corrections.

35. 1.A.4.ai Commercial/institutional: the ERT noted that Kyrgyzstan do not estimate emissions from the combustion in commercial or institutional activities. According to the NFR tables, all the emissions of this sector are not applicable. The ERT is unable to determine whether there is an underestimate that may be above the threshold of significance. The ERT recommends that Kyrgyzstan investigate if activity data exist, and estimate emissions or revise the notation keys accordingly. Methodologies to estimate emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2016).

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1. and 1.A.2. Combustion - All Pollutants

36. The ERT noted that Kyrgyzstan does not report the methodology and the activity data to estimate emissions of the combustion activities. During the review, Kyrgyzstan explained that the emissions from energy sources are calculated according to the study : "Collection of methods for calculating air emissions of pollutants from various industries" UDC 504.064.38 of 1986 L. Gidrometeoizdat. The emission factors are calculated by using the maximum permissible emissions in the environmental permit of plants. The activity data are the fuel consumptions by plant. The ERT congratulates

Kyrgyzstan to provide this information and encourages Kyrgyzstan to include it in the future IIR and to complete the emission inventory for each sector by using the energy balance (energy balance of the sector minus plant energy consumptions) and the default emission factors from the EMEP/CORINAIR guidebook.

Category issue 2: 1.A.1. and 1.A.2. Combustion – HMs, POPs

37. The ERT noted that in the NFR table the notation key “NA” or “NE” are used for HMs and POPs for some energy sub-sectors but EMEP EEA Emission Inventory Guidebook 2016 suggests emission factors for these pollutants following the fuels used by sector. ERT recommends to estimate these emissions by performing analyses or by using the energy used by sector and the default emission factors from the guidebook.

Category issue 3: 1.A.1. and 1.A.2. Combustion – PM, BC

38. The ERT noted that in the NFR table the notation key “IE” is used for TSP and BC for some energy sub-sectors but PM_{2.5} and PM₁₀ emissions exist for these sectors. No explanation is given as to where the emissions are included. ERT assume these emissions are not estimated, therefore the notation key must be NE. The ERT encourages Kyrgyzstan to estimate these emissions or to use other notation keys for these pollutants.

Category issue 4: 1.A.4.ci Agriculture/Forestry/Fishing : Stationary – All Pollutants

39. The ERT noted that in the NFR table the notation key “IE” is used for 1A4ci, but no explanation is given as to where the emissions are included. The ERT encourages Kyrgyzstan to give explanations for this in their future IIR.

Category issue 5: 1.B.1.a Coal mining and handling – NMVOC, PM_{2.5} and PM₁₀

40. The ERT noted that in the NFR tables, the notation keys for this sector are “NO” or “NA”. But according some websites : <https://www.timesca.com/index.php/news/14803-kyrgyzstan-ramping-up-coal-production>; <https://pubs.usgs.gov/of/1997/0137a/report.pdf>, it seems that coal mining activities exist in the country. ERT recommends that Kyrgyzstan investigate if the source exists and if yes, try to estimate the emissions to increase the completeness.

Category issue 6: 1.B.2.ai Fugitive emissions oil - NMVOC

41. The ERT noted that in the NFR tables, the notation key for this sector is NA for NMVOC emissions while there are EFs available in the EMEP EEA Emission Inventory Guidebook 2016 for this pollutant and this sector. If there is no emission because there is no activity, ERT recommends Kyrgyzstan to write “NO” instead of “NA”.

Category issue 7: 1.B.2.aiv and 1.B.2.c Refining – NO_x, CO, NMVOC, SO_x

42. The ERT noted that Kyrgyzstan do not estimate emissions from the fugitive emissions from the refining activities. The ERT found that Kyrgyzstan has reported

energy statistics to the International Energy Agency (IEA) and that data are available for the period 1990 to 2014 : <http://www.iea.org/countries/non-membercountries/kyrgyzstan/>. Activity Data for the crude oil production are available in these statistics. The ERT believes that this activity data could be used as a good basis for estimating air pollutant emissions and recommends Kyrgyzstan to estimate emissions. Methodologies to estimate emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2016).

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		2015		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A2gvii	Mobile Combustion in manufacturing industries and construction	x		
1A3ai(i)	International aviation LTO (civil)	x		
1A3ai(ii)	International aviation cruise (civil)	x		
1A3aii(i)	Domestic aviation LTO (civil)	x		
1A3aii(ii)	Domestic aviation cruise (civil)	x		
1A3bi	Road transport: Passenger cars	x		
1A3bii	Road transport: Light duty vehicles	x		
1A3biii	Road transport: Heavy duty vehicles and buses	x		
1A3biv	Road transport: Mopeds & motorcycles	x		
1A3bv	Road transport: Gasoline evaporation	x		
1A3bvi	Road transport: Automobile tyre and brake wear	x		
1A3bvii	Road transport: Automobile road abrasion	x		
1A3c	Railways	x		
1A3di(ii)	International inland waterways	x		
1A3dii	National navigation (shipping)	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		
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

43. The ERT noted that all pollutants for the whole transport sector have notation keys, either NE, or IE, NO, NA, and asked for clarifications, i.e., why these emissions are not provided or if they are included in another sector; no answer has been received and no IIR was available for further review of the transport sector of the inventory.

44. ERT recommends Kyrgyzstan to complete its national inventory for the transport sector within its future submissions. Below, the ERT would kindly like to propose some information sources for creating an inventory in the transport sector.

<https://www.eea.europa.eu/publications/emep-eea-guidebook-2016>

(latest version of the EMEP/EEA air pollutant emission inventory guidebook - 2016)

<http://emisias.com/products/copert>

(example of free software tool to calculate air pollutant and greenhouse gas emissions from road transport)

<http://unfccc.int/resource/docs/natc/kyrnc2e.pdf>

(the Kyrgyz Republic's second communication to the United Nations Framework Convention on Climate Change - with some information on transport activity in Kyrgyzstan)

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INDUSTRIAL PROCESSES

Review Scope

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

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

45. Kyrgyzstan provided emissions data for 2015 only, and did not provide an IIR and so there is a lack of any transparency for the inventory.
46. The NFR table for 2015 either contains emissions data or uses notation keys where estimates are not available or necessary for all source categories within the industrial processes sector. The notation key IE is used for several potentially significant sources and no information is available on where these emissions are included.
47. Kyrgyzstan does not provide any activity data in the NFR table for 2015 so it is not possible to back-calculate the emissions into implied emission factors which could then be compared with Guidebook values.
48. Kyrgyzstan did not respond to questions during the review and so no clarification of any issues was possible.

Completeness

49. Due to the absence of an IIR and the lack of engagement during the review week, it was not possible to arrive at firm conclusions on the overall level of completeness of the Kyrgyzstan inventory for industrial processes. The 2015 NFR table does use NE for some sources so it is certain that some sources are missing, and some of these sources have the potential to be significant sources.
50. A large number of industrial process sources are reported as NO in the NFR table, including all categories for chemicals production. Since Kyrgyzstan reports emissions in 1A2c, it seems certain that some chemical industry activity occurs. As a result, there is the potential for some process emissions that ought to be reported in 2B. Similarly, Kyrgyzstan only reports emissions in one sub-category of 2.C, but reports emissions in both 1.A.2.a & 1.A.2.b so it is not clear to the ERT if there is some potential for gaps in the 2.C part of the Kyrgyzstan inventory.
51. Kyrgyzstan reports that emissions of many pollutants from 2H1 and 2H2 are IE, but no information is available on where the emissions are included. As a result, it is not possible to form a conclusion as to whether estimates for the paper and food sectors are complete.

Consistency including recalculation and time series

52. Kyrgyzstan provided data for one year only, so it is not possible to judge the consistency of the inventory. Since there is no IIR, we have no information on recalculations either.

Comparability

53. There is no IIR and Kyrgyzstan did not respond to questions during the review and so no conclusions can be formed as to the methods used by Kyrgyzstan.

54. The absence of any activity data in the NFR table for 2015 prevented the ERT from back-calculating any implied emission factors which could then have been compared with Guidebook defaults.

Accuracy and uncertainties

55. There is no IIR and Kyrgyzstan did not respond to questions during the review and so no conclusions can be formed as to the accuracy of the Kyrgyzstan inventory or the levels of uncertainty.

Potential Technical Corrections

56. The ERT did not have sufficient information to estimate emissions relating to any gaps or potential errors in the Kyrgyzstan inventory for industrial processes and so no technical corrections have been proposed.

Sub-Sector Specific Recommendations

Category issue 1: 2.A.1 Cement production

57. The ERT notes that cement production appears to be an important source of NO_x, SO₂, particulate matter, and CO in Kyrgyzstan. As with all other sectors, no information was provided on the methods used to generate the estimates, or on the underlying activity data, and so it is not certain how accurate or complete the estimates are. The ERT recommends that Kyrgyzstan provides details of methodology for this and other industrial process estimates in future in an IIR, and provides activity data in the NFR tables.

58. The NFR table reports emissions of metals and POPs as NE (for mercury) and NA (all other metals and POPs). The 2016 Guidebook recommends that 2A1 is used to report emissions of particulate matter only, with other pollutants released from cement production to be reported in 1A2, since the emissions occur primarily from the combustion of fuels. It is not clear if that is the practice here, and if Kyrgyzstan reports emissions of metals and POPs from cement kilns somewhere in 1A2. An IIR should make this clear, and the ERT recommends that Kyrgyzstan also uses IE in the NFR tables for 2A1 in the case of any pollutant where all emissions from cement kilns are reported in 1A2.

Category issue 2: 2.A.2 Lime production

59. Kyrgyzstan uses a variety of notation keys (NA, NE and IE) for 2.A.2 with the result that it is not clear if lime is produced in Kyrgyzstan and where emissions are reported, if at all. As with 2.A.1, the 2016 Guidebook recommends that 2A2 is used to report emissions of particulate matter only, with other pollutants released from lime

production to be reported in 1A2, since the emissions occur primarily from the combustion of fuels. It is not clear if that is the practice here, but Kyrgyzstan uses NA for some of the main pollutants, some metals and for POPS. However, NO_x, SO₂, CO, Hg are reported as NE so this certainly appears to be a gap in the Kyrgyzstan inventory. In the case of particulate matter, TSP and PM_{2.5} are listed as IE whereas PM₁₀ is listed as NE. The ERT recommends that Kyrgyzstan provides a detailed description of methods for the sector in any future IIR, so it is clear: a) if lime production occurs in Kyrgyzstan, and if so, how much; b) how estimates are made; c) where emissions are reported for each pollutant.

Category issue 3: 2.A.5.a Quarrying of minerals other than coal

60. The ERT notes that Kyrgyzstan reports emissions of PM₁₀ and PM_{2.5} from 2.A.5.a, but not TSP. As with other sectors, the ERT has no information on the estimation methods and there are no activity data in the NFR table which would have allowed the ERT to compare implied emission factors with the Tier 1 emission factors provided in the 2016 Guidebook. The ERT recommends that Kyrgyzstan provides a detailed description of methods for the sector in any future IIR, that it also provide activity data in the NFR tables, and that estimates are also made for TSP.

Category issue 4: 2.A.5.b Construction and demolition

61. Kyrgyzstan does not estimate emissions of PM_{2.5}, PM₁₀, and TSP from this source category. This source is ubiquitous and the ERT notes that it is a significant source of particulate matter in some other countries so could be a significant source in Kyrgyzstan. The 2016 Guidebook provides a Tier 1 methodology for this source and the ERT recommends that Kyrgyzstan estimate emissions and includes these estimates in future submissions.

Category issue 5: 2.B Chemical production

62. The ERT notes that Kyrgyzstan uses the NO notation key for all sub-categories of 2.B. However, some emissions are reported in 1.A.2.c, so some chemical industry activity does seem to occur in Kyrgyzstan. It is not clear, therefore, if any process emissions might occur and if there are gaps in the 2.B part of the inventory. The ERT has previously recommended that Kyrgyzstan in future provides information on the industrial processes sector in an IIR and the ERT recommends that this should provide sufficient information to justify the use of NO for all sub-sectors of 2.B

Category issue 6: 2.C Metals production

63. The ERT notes that Kyrgyzstan uses the NO notation key for all sub-categories of 2.C except for 2.C.7.c, and that the emissions reported in this category are relatively trivial. Emissions are reported in 1.A.2.a & 1.A.2.b, confirming that both iron & steel and non-ferrous metal industry activity occur in Kyrgyzstan. It is not clear to the ERT, therefore, if any process emissions might occur that should be reported elsewhere in 2.C. The ERT has previously recommended that Kyrgyzstan in future provides information on the industrial processes sector in an IIR and the ERT recommends that

this should provide sufficient information to justify the use of NO for most sub-sectors of 2.C.

Category issue 7: 2.H.1 Pulp & paper industry

64. The ERT notes that Kyrgyzstan reports in the NFR table that emissions from this sector are included elsewhere. Kyrgyzstan does report emissions of some pollutants under 1A2d, so it is possible that process emissions might be reported there as well as combustion emissions, but the ERT notes that the party uses NA for SO₂ and CO from 1A2d, and IE for TSP so it is clear that process emissions from pulp and paper industry is not included in 1A2d for those pollutants. As a result, the ERT is concerned that process emissions from this sector may not be adequately covered by the Kyrgyzstan inventory and therefore recommends that the party provide a full explanation of the methods for this sub-category in an IIR in future.

Category issue 8: 2.H.2 Food & drink production

65. The ERT notes that Kyrgyzstan reports in the NFR table that emissions from this sector are included elsewhere. Kyrgyzstan does report emissions of some pollutants under 1A2e, so it is possible that process emissions might be reported there as well as combustion emissions. However, the ERT notes that the NMVOC emission reported under 1A2e is relatively small (about 1% of the value reported for 1A2gviii, for example). The food and drink industry is a significant source of NMVOC emissions in many countries since emissions occur from the manufacture of alcoholic drinks and from the baking of breads and various other processes. Many of these processes would be expected to occur in most or all countries and as a result, the ERT is concerned that process emissions from the food and drink sector may not be adequately covered by the Kyrgyzstan inventory and therefore recommends that the party provide a full explanation of the methods for this sub-category in an IIR in future.

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	x		x
2D3f	Dry cleaning	x		
2D3g	Chemical products	x		x
2D3h	Printing	x		x
2D3i	Other solvent use	x		
2G	Other product use	x		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

66. Kyrgyzstan provided emissions data for 2015 only, and did not provide an IIR and so there is a lack of any transparency for the inventory.

67. The NFR table for 2015 either contains emissions data or uses notation keys for all source categories within the solvent sector.

68. Kyrgyzstan does not provide any activity data in the NFR table for 2015 so it is not possible to back-calculate the emissions into implied emission factors which could then be compared with Guidebook values.

69. Kyrgyzstan did not respond to questions during the review and so no clarification of any issues was possible.

Completeness

70. Due to the absence of an IIR and the lack of engagement during the review week, it was not possible to arrive at firm conclusions on the overall level of completeness of the Kyrgyzstan inventory for the solvent sector. The 2015 NFR table does use NE for some solvent sources so it is certain that some sources are missing, and some of these sources have the potential to be significant sources.

71. Kyrgyzstan uses the NA notation key for NMVOC emissions from several categories of solvent use. These categories of solvent use relate to activities that would be expected to occur in all countries to some extent and so the ERT believes that NMVOC emissions should be included for these categories as well.

72. Kyrgyzstan uses the NO notation key for emissions from 2.G, however this category covers at least one emission source (use of tobacco) that is ubiquitous and the ERT therefore believes that emissions from 2.G will occur in Kyrgyzstan. Another sub-category of source within 2.G is use of fireworks and the ERT believes that fireworks may also be used to some extent in Kyrgyzstan, so this is probably another gap in the Kyrgyzstan inventory.

Consistency including recalculation and time series

73. Kyrgyzstan provided data for one year only, so it is not possible to judge the consistency of the inventory. Since there is no IIR, we have no information on recalculations either.

Comparability

74. There is no IIR and Kyrgyzstan did not respond to questions during the review and so no conclusions can be formed as to the methods used by Kyrgyzstan.

75. The absence of any activity data in the NFR table for 2015 prevented the ERT from back-calculating any implied emission factors which could then have been compared with Guidebook defaults.

Accuracy and uncertainties

76. There is no IIR and Kyrgyzstan did not respond to questions during the review and so no conclusions can be formed as to the accuracy of the Kyrgyzstan inventory or the levels of uncertainty.

Potential Technical Corrections

77. The ERT notes that emissions of NMVOC are not estimated for 2D3a (domestic solvent use including fungicides). The 2016 Guidebook gives a Tier 1 per capita emission factor for this source and this has been used to make a technical correction for this sector (cf. also part 1, table 1 and annex I - Technical Corrections).

78. The ERT encourages the party to review this and to consider collecting country-specific data in order to generate a higher tier estimate in future.

Sub-Sector Specific Recommendations

Category issue 1: 2.D.3.a Domestic solvent use including fungicides

79. The Kyrgyzstan inventory uses the NA notation key for NMVOC emissions from this category. The ERT considers this source category to be ubiquitous and expects emissions to occur in all countries. The 2016 Guidebook gives a per capita Tier 1 emission factor for this source category and so the ERT have generated a technical correction for this category using the Tier 1 factor and population data available from the website of the National Statistical Committee of Kyrgyz Republic (at <http://www.stat.kg/en/>).

Category issue 2: 2.D.3.d Coating applications

80. The Kyrgyzstan inventory uses the NA notation key for NMVOC emissions from this category. The ERT considers this source category to be ubiquitous and expects emissions to occur in all countries. The 2016 Guidebook gives Tier 1 factors, but these require activity data in the form of quantities of coating use. Since the ERT do not have suitable activity data, no technical correction can be made. The ERT recommends that Kyrgyzstan gather activity data for coatings and estimate NMVOC emissions from this source category in future submissions.

Category issue 3: 2.D.3.e Degreasing

81. The Kyrgyzstan inventory uses the NA notation key for NMVOC emissions from this category. The ERT considers this source category to be ubiquitous and expects emissions to occur in all countries. The 2016 Guidebook gives a Tier 1 factor, but this requires activity data in the form of quantities of cleaning product used. Since the ERT do not have suitable activity data, no technical correction can be made. The ERT recommends that Kyrgyzstan gather activity data and estimate NMVOC emissions from this source category in future submissions.

Category issue 4: 2.D.3.g Chemical products

82. The Kyrgyzstan inventory uses the NA notation key for NMVOC emissions from this category. The ERT considers that this source category, which covers a wide range of industrial activities, would be expected to occur in many countries and so recommends that the party review whether this source does occur in Kyrgyzstan and, if this is the case, gather activity data and estimate NMVOC emissions from this source category in future submissions.

Category issue 5: 2.D.3.h Printing

83. The Kyrgyzstan inventory uses the NA notation key for NMVOC emissions from this category. The ERT considers that this source category would be expected to occur in most, if not all, countries and so recommends that the party review whether this source does occur in Kyrgyzstan and, if this is the case, gather activity data and estimate NMVOC emissions from this source category in future submissions.

Category issue 6: 2.G Other product use

84. Sector 2.G. covers at least one emission source (use of tobacco) that is ubiquitous and the ERT therefore believes that emissions from 2.G will occur in Kyrgyzstan. The 2016 Guidebook provides Tier 2 factors for this source, covering a wide range of pollutants and the ERT recommends that Kyrgyzstan gather activity data and estimate emissions from this source category in future submissions.

85. Another sub-category of source within 2.G is use of fireworks and the ERT believes that fireworks may also be used to some extent in Kyrgyzstan. The 2016 Guidebook provides Tier 2 factors for this source, covering a wide range of pollutants and the ERT recommends that the party review whether this source does occur in

Kyrgyzstan and, if this is the case, gather activity data and estimate emissions from this source category in future submissions.

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		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		X
3Da3	Urine and dung deposited by grazing animals	X		X
3Da4	Crop residues applied to soils	X		X
3Db	Indirect emissions from managed soils	X		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		X
3De	Cultivated crops	X		X
3Df	Use of pesticides	X		X
3F	Field burning of agricultural residues	X		X
3I	Agriculture other	X		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

86. The ERT was unable to comment on the transparency of the emission inventory for the agriculture sector as the Party did not report the Informative Inventory report

(IIR) for 2015. The ERT recommends that Kyrgyzstan prepares its IIR and includes methodologies, emission factors and assumptions used for estimating emissions and provide information on the allocation of emissions of a number of subcategories that are reported as included elsewhere 'IE' under Manure management (3B) and Agriculture soils (3D) in the NFR tables in future submissions.

Completeness

87. Kyrgyzstan reported just one year inventory, 2015 for the agriculture sector (submission 2017). The inventory covers a wide set of pollutants with respect to the most important sources of emissions. Activity data was not reported in the NFR. The full time series of air emissions from the Agriculture sector was not provided. The ERT recommends that Kyrgyzstan provides a full time series (1990- 2015) of air pollutants emissions including the activity data in its future submissions.

Consistency including recalculation and time series

88. The ERT was unable to check the consistency of the emission inventory for the agriculture sector as the reported emission data covers 2015 inventory only. Furthermore, the ERT recommends that Kyrgyzstan provides a detailed description of the recalculation of the emission inventory of the sector in its future submissions.

Comparability

89. The ERT was unable to assess the comparability of the inventory as methodologies, emission factors, references and information on the data used for estimating emissions have not been provided. The ERT recommends that Kyrgyzstan provides a separate chapter on the agriculture sector with detailed description of the methodologies applied for estimating emissions in its future submissions.

Accuracy and uncertainties

90. The ERT encourages Kyrgyzstan to undertake an uncertainty analysis for the agriculture sector in order to steer the improvement process and to provide an indication of the reliability of the inventory data.

Improvement

91. The ERT was unable to assess whether Kyrgyzstan has made any improvement to its inventory or not. The ERT encourages Kyrgyzstan to list the planned improvements and the done improvements in its future submissions in order to enhance the quality of its emission inventory.

Potential Technical Corrections

92. The ERT notes that the reported emissions of NO_x, NMVOC and PM of some sub-categories under 3B are not correct as they have negative values. The ERT requested Kyrgyzstan to provide description on the methodologies used to estimate the emission from these sub-categories (3B1b & 3B4d) and clarify why the emission of these pollutants are negative. The Party provided the ERT during the review week with

a calculation sheet for manure management (3.B) that includes negative values. The ERT assessed that the calculation sheet is erroneous and carried out a technical correction of the emission estimates for all sub-categories under 3.B and later requested the Party if they agree with corrected emission estimates or not. Kyrgyzstan agreed on the new emission estimates after the technical correction (see part 1, table 1 and annex I - Technical Corrections).

93. The ERT strongly recommend that Kyrgyzstan implements the under taken technical correction by the ERT and conducts QA/QC procedures in its inventory in next annual submission.

Sub-Sector Specific Recommendations

Category issue 1: Activity data

94. The ERT notes that the activity data that was used for estimating the emission inventory of agriculture sector was not reported in the IIR or in the NFR tables. ERT recommends to report the activity data in the future inventories for the different sub-sectors of agriculture.

Category issue 2: The use of Pesticides (3Df): HCB

95. The ERT notes that Kyrgyzstan does not estimate emissions of HCB from the use of pesticides (3Df) as it was reported as not occurring "NO". However, the ERT informed the Party that the use of particular pesticides in agriculture can be a source of POPs emission due to the presence of HCB in some pesticides as a contaminant. The ERT encourages the Party to revise the use of "NO" and make efforts to report emission of HCB from the use of the pesticides in future submissions.

Category issue 3: Manure management (3B) and Agriculture soils (3D): NO_x, NH₃, NMVOC and PM.

96. The ERT notes that Kyrgyzstan reported emission of NO_x, NH₃, NMVOC and PM from a number of sub-categories under 3B and 3D using the notation key included elsewhere "IE" in the NFR Tables submission 2017. The ERT recommends that the Party provides information on the allocations of these IEs in future submissions.

Category issue 4: Field burning of agricultural residues (3F): NO_x, CO, NMVOC, SO₂, NH₃, PM, BC and heavy metals.

97. The ERT notes that Kyrgyzstan reported emission from 3F as not occurring "NO" for all pollutants. The ERT recommends that the Party estimates emission of these pollutants in its future submission in order to enhance the completeness and the quality of the inventory.

WASTE

Review Scope

Pollutants Reviewed		All		
Years		2015		
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		
5C1a	Municipal waste incineration	X		
5C1bi	Industrial waste incineration	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		X
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	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

98. Kyrgyzstan does not report emissions in waste sector for year 2015. In NFR for year 2015 Kyrgyzstan reports – 4 sub-sectors as NE, 9 sub-sectors as NO and 2 sub-sectors as NA.

Transparency

99. Kyrgyzstan do not provide descriptions and explanations of reasons why emissions in waste sector are not calculated.

Completeness

100. The ERT notes that the Waste sector is not complete. The ERT encourages to start calculate emissions in waste sector.

Consistency, including recalculation and time series

101. Kyrgyzstan does not provide information about recalculations. Time series is not possible to review.

Comparability

102. Information in NFR is not comparable.

Accuracy and uncertainties

103. Information is not available.

Improvement

104. Information is not available.

Sub-Sector Specific Recommendations

Category issue 1: 5.A - Solid waste disposal on land

105. Landfills disposal could be one of sources for emissions in air that Kyrgyzstan could estimate. According to information in Kyrgyzstan's statistical office web page (<http://www.stat.kg/en/>) some waste statistics is available. Annual waste survey "№1-отходы" take place in Kyrgyzstan. Data from this survey together with expert judgement could be used for emission calculations. To estimate landfilled amounts assessments from generated amounts is needed. When disposed amounts are estimated, EMEP/EEA guidebook 2016 EF could be used (Volume 5A, Table 3-1 Tier 1 emission factors for source category 5.A Biological treatment of waste - Solid waste disposal on land). NMVOC, PM_{2.5}, PM₁₀ and TSP could be calculated. ERT encourages Kyrgyzstan to estimate emissions for this source in its future inventories.

Category issue 2: 5B — Biological treatment of waste

106. Composting could be one of sources for emissions in air in Kyrgyzstan. The ERT assumed that data for home composting will not be available for Kyrgyzstan. As annual waste survey "№1-отходы" take place in Kyrgyzstan the ERT encourages Kyrgyzstan to include information about industrial composting in this survey. When data are collected then EMEP/EEA guidebook 2016 EF could be used (Volume 5B1, Tables 3-1, 3-2, 3-3). NH₃ as main pollutant should be estimated. Regarding anaerobic digestion (sub-sector 5B2) the ERT recommends Kyrgyzstan to investigate situations in its country. Does such kind of activity take place? The ERT recommends to describe situations regarding biological treatment in Kyrgyzstan's IIR.

Category issue 3: 5C — Incineration of waste

107. Kyrgyzstan reports NO for 7 sub-sectors and NE for Clinical waste incineration. The ERT assumed that Clinical waste incineration without energy recovery takes place in Kyrgyzstan hospitals. To calculate emissions data from hospitals should be collected. Annual waste survey "№1-отходы" could be used for that purposes. When data are collected EMEP/EEA guidebook 2016 EF could be used (Volume 5.C.1.b.iii Clinical waste incineration 2016). The ERT encourages Kyrgyzstan to start calculates emission from clinical waste incineration. Regarding open burning of wastes Kyrgyzstan reports NO. In sub-sector Open burning EF for agricultural waste burning is provided in

EMEP/EEA guidebook 2016 Volume 5.C.2 Open burning of waste 2016. The ERT believes that such kind of activity take place in Kyrgyzstan agricultural sector as it is common practice for many Asia region countries. The ERT encourages to investigate situation together with Agricultural institutions about possible amounts of burned agricultural waste. Please remember, that these amounts could not overlap with amounts which could be reported under Agricultural sector.

Category issue 4: 5.D - Wastewater handling

108. Kyrgyzstan do not calculate emission this sub-sector. The ERT found in Kyrgyzstan's Statistical office data about water use in waste waters (table 5.07.00.06 - Protection and rational use of water resources). The ERT encourages using these data for emission calculations for sector 5D. In simplest way Wastewater emission could be calculated according to EMEP/EEA Guidebook 2016 (Volume 5D – Waste water handling). Also, estimation of latrines uses in country will be required. The ERT recommends obtaining data from Kyrgyzstan's statistical bureau table – Provision of housing fund by sewerage. According to this information amounts of population who used latrines could be estimated. Default emissions factors from EMEP/EEA Guidebook 2016 for calculation then could be used.

Category issue 5: 5E – Other waste

109. Kyrgyzstan reports in 5E – NO. In EMEP/EEA Guidebook 2016 sludge spreading, car fires and building fires emissions calculations are described in this sub-sector. The ERT encourages investigating possibility to get activity data for car and building fires. Default emission factors for calculations could be used. In most countries Fire and rescue services collects information about fires. In EMEP/EEA Guidebook 2016 EF regarding number of fire accidents are provided.

MATERIALS USED BY THE REVIEW TEAM

1. KG_NFR report 2017 (Excel file 16-02-2017)
2. Kyrgyzstan Stage 2 S&A report
3. Kyrgyzstan Stage 1 report 2017
4. Data and tools developed by CEIP (<http://unece-stage3.wikidot.com/data-analysis>)

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

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

ANNEX I POTENTIAL TECHNICAL CORRECTIONS

Technical corrections have been proposed by the ERT during the review week in the frame of the trial 2017 "Technical Correction" exercise for the energy, solvent use and agriculture sectors.

Detailed related information is provided separately in the 3 Excel files:

- TC-KG-2017-Energy-1.xlsx
- TC-KG-2017-IPPU-1.xlsx
- TC-KG-2017-Agri-1.xlsx