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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
ESTONIA

CONTENT

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 SO_x, NO_x, NMVOC, NH_3, plus PM_{10} & $PM_{2.5}$ for the time series years 1990 – 2014 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 Estonia coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 20th June 2016 to 25th June 2016 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. Charlotte Vanpoucke (Belgium), Energy - Ms. Kristina Juhrich (Germany), Transport - Mr. Giorgos Melios (EU), Industry - Mr. Sebastian Plickert (German), Solvents - Ms. Maria Purzner (Austria), Agriculture - Mr. Juan José Rincón Cristóbal (Spain), Waste - Mr. Intars Cakars (Latvia).

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.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf

PART A: KEY REVIEW FINDINGS

5. The ERT recognises the level of effort undertaken by Estonia in providing an inventory with a significant level of detail and an extensive IIR to undertake a detailed review. The ERT thanks the Party for providing comprehensive and timely responses during the review process. Due to the quality of the IIR and Estonia's responsiveness during the review the ERT was able to review the inventory in detail and to provide a number of detailed recommendations.

6. The Estonian inventory is generally in line with the EMEP/EEA Inventory Guidebook and the UNECE Reporting Guidelines. Transport emissions are reported based on fuels sold. The ERT found the inventory to be sufficiently detailed and noted that national methodologies had been used for some sources.

7. The ERT found the 2016 submission to be of good quality and to show improvements in a number of issues. The ERT commends Estonia for the work done. Nevertheless, the ERT identified some need for further improvements as described in Part B of the review report.

8. In this report there is a table in the beginning of the review of each sector. Please note that under the column titled "Recommendations provided" the cross indicate both actual recommendations as well as encouragements.

INVENTORY SUBMISSION

9. Estonia submitted NFR tables under the CLRTAP on 12th February 2016 by the set deadline date of 15th February. The submission included data for the Protocols' base years and a full time series for the years until 2014 (the most recent year) for the Protocol pollutants in the NFR 2014 format.

10. The Informative Inventory Report (hereafter IIR) was submitted on 15th March 2016 within the deadline date of 15th March.

11. The submission under the NECD was reported on 30th December 2015 by the set deadline date of 31st December, and included data for 1990-2014 in NFR 2014 format.

12. Projections with measures up to 2030 in NFR categories were submitted in the NFR 2014 format.

13. Estonia reported gridded emissions for Gothenburg Protocol pollutants as well as LPS data in 2012.

KEY CATEGORIES

14. Estonia has carried out a level Key Category Analysis (KCA) consistent with the EMEP/EEA Guidebook (hereafter Guidebook) and identical to the CEIP analysis

for emissions of the reported pollutants for the year 2014. Heavy metals were not included in the KCA.

15. A trend KCA has been done in 2007 for NEC pollutants. During the review, Estonia indicated they will perform a new trend KCA in the next IIR. The ERT welcomes this development and encourages the Party to implement these improvements.

16. Estonia does not specify in the IIR if the results of the KCA are used to identify priorities in improvements of the inventory. The ERT recommends that Estonia uses the results to prioritise improvements in the inventory.

17. Tier 2 methodologies have been applied to most key categories, but only partly to agriculture. The ERT recommends Estonia 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

18. The ERT found the Estonian inventory to be generally transparent. The Estonian IIR is detailed and mainly follows the recommended structure for the IIR according to Annex II of the Reporting Guidelines. Assumptions and methodologies are clearly described for the majority of sources. The ERT encourages Estonia to compliment the excellent work done on the IIR with some additional descriptions as indicated below at the sector level.

19. The ERT noted that different aggregation is used through the time series for several sources in energy, industrial and waste sectors. Estonia responded on the question raised by the ERT on the issue that inventory data is based on data reported by operators by source of pollution (NFR compatible) representing a facility as a whole from a certain year on. Before, emissions were aggregated under one sector. The ERT understands the difficulty to split up the emissions to the appropriate categories for the earlier years when less detailed information was available. However, the ERT encourages Estonia to find ways to enhance the consistency of the time series as proposed in the energy sector chapter of this review report. ERT also encourages Estonia to include information on the aggregation of activities under the reporting categories throughout the time series as explained during the review, in the IIR.

20. The use of the notation keys 'NE (Not estimated)' and 'IE (Included Elsewhere)' are in most cases justified in the IIR. The ERT provided recommendations on the use of notation keys as explained in the sector chapters below.

Completeness

21. The ERT acknowledges the effort Estonia has taken to provide estimates of emissions for all pollutants for almost all sub-sectors. The ERT found the inventory to be generally complete in terms of sources, pollutants, years and geographical coverage.

22. Estonia uses the notation key “NE” in some cases where methodologies exist in the Guidebook, in the solvent, agriculture and waste sectors, or also the notation key “NA” in the industry sector, as explained in the sector chapters below. As the completeness of the inventory is essential for checking compliance with obligations under the conventions, emission values or at least an assessment of the quantitative importance of the sources currently not estimated is needed. The ERT recommends Estonia to estimate the missing sources and in those cases where calculation of emissions is not possible, to provide an explanation in the IIR on why emissions are not estimated.

23. Estonia uses zero-values in some cases in the reporting tables. During the review, Estonia explained that zero is reported in cases where emissions occur but are minor and that in some cases the zero values should be replaced by a notation key. The ERT recommends Estonia to check the whole time series on the correct and consistent use of notation keys. In case of low emission levels, the ERT recommends Estonia to report the actual value of emissions instead of a plain zero, or to replace the value with an appropriate notation key.

Consistency, including recalculations and time-series

24. Estonia has undertaken recalculations for all pollutants. Justifications for recalculations as well as pollutants and years affected and quantitative information on differences to the previous submission are provided in the IIR. The ERT commends Estonia for this.

25. The IIR includes a detailed presentation of trends by pollutant over the time series with detailed information of the share of sources contributing to the total emissions. Clear explanations are also provided on the reasons of fluctuations, dips and jumps. The ERT commends Estonia for this.

Comparability

26. The ERT notes that the inventory of Estonia is comparable with those of other reporting Parties. The allocation of source categories follows that of the UNECE Reporting Guidelines and the methodologies are consistent with the Guidebook. The ERT encourages Estonia to continue the inventory work with this approach.

CLRTAP/NECD comparability

27. According to the results of inventory comparisons carried out by the CEIP, there are some differences in the data between the submissions under the CLRTAP and NECD. Estonia explained that this is due to the recalculations that were carried

out for the CLRTAP reporting, after the submission of NEC and that these recalculations will be included in the next NECD reporting by the end of December 2016. The ERT welcomes this and proposes a practical solution, i.e. to resubmit the inventory reported under the CLRTAP in February simultaneously to NECD, to enable consistent reporting when changes have been made to the CLRTAP.

Accuracy and uncertainties

28. The ERT did not find any systematic over- or underestimations in the Estonian inventory, however there is need to further improve the completeness of the inventory as described above under “Completeness”.

29. Estonia has performed a quantitative uncertainty analysis as part of the 2016 submission. According to the IIR this uncertainty analysis was the first carried out for the air pollutant inventory. The ERT commends Estonia for this and encourages Estonia to use the results from the uncertainty calculation for prioritizing improvements.

30. Tier 2 or higher methodologies as well as national methods have been applied to most key categories, except for agriculture only partly as explained under part B of the report.

Verification and quality assurance/quality control approaches

31. The quality control and quality assurance (QA/QC) procedures carried out for the air pollutant inventory are briefly described in the IIR. Common statistical quality checks are carried out. The ERT commends Estonia for providing this information and encourages the Party to provide a QA/QC plan including more information in the IIR on quality control checks performed in all phases of the inventory preparation and verification including check of data reported by the plant operators.

FOLLOW-UP TO PREVIOUS REVIEWS

32. Results from Stage 1 and Stage 2 reviews on the 2014 emission data have been used in this Stage 3 review. The ERT invites Estonia also to refer to these previous reviews when examining this review report and when updating its improvement plans.

33. The ERT commends Estonia for replying on the findings of the Stage 2 review.

34. The ERT commends Estonia for improvements in its inventory by implementation of all recommendations made in the previous Stage 3 report.

AREAS FOR IMPROVEMENTS IDENTIFIED BY ESTONIA

35. Sector specific planned improvements are presented per sector the IIR. The ERT encourages the Party to establish a comprehensive inventory improvement plan and report it in the IIR.

36. The ERT welcomes information provided by the Party in the IIR on the following future inventory improvements:

(a) to check POP's emissions from waste incineration;

(b) to provide detailed uncertainty analysis for all activities;

(c) to check activity data and emission factors (hereafter EFs) in energy industries;

(d) to use Tier 2 or Tier 3 methods for the estimation of emissions from agriculture.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

38. The ERT identifies the following cross-cutting issues for improvement in the Estonian inventory, and recommends the Party to:

(a) investigate the relevance of sources currently reported as “NE” and to estimate and report occurring emissions or to assess the quantitative importance of emission from these sources.

(b) undertake a trend assessment in the key category analysis for all pollutants.

(c) check the whole time series on the correct and consistent use of notation keys. In case of low emission levels, the ERT recommends Estonia to report the actual value of emissions instead of a plain zero, or to replace the value with an appropriate notation key.

(d) elaborate a QA/QC plan and to include more information in the IIR on details of QA/QC checks performed in all phases of the inventory preparation.

(e) include an explanation in the IIR about the differences in the allocation and aggregation of sources under reporting categories throughout the time series.

(f) use the results from the uncertainty calculation for prioritizing improvements.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5,}$ Cd, Hg, Pb, PCDD/F, PAH		
Years		1990 – 2014		
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		
1A2b	Non-ferrous metals	X		
1A2c	Chemicals	X		
1A2d	Pulp, Paper and Print	X		
1A2e	Food processing, beverages and tobacco	X		
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	X		
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	X		
1A3ei	Pipeline transport	X		
1A3eii	Other (please specify in the IIR)	X		
1A4ai	Commercial/institutional: Stationary	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		
1B2aiv	Fugitive emissions oil: Refining / storage	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		
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

39. The ERT found the description of methodologies, the EFs and the underlying activity data to be comprehensive and transparent. Data reported by the plants based on measured data were used for many Energy sector sub-categories. The ERT commends the quality of the IIR, which contains comprehensive descriptions of the plants, combustion and abatement technologies, including photos of the plants. The use of oil shale, which is specific to Estonia, is clearly described. The inventory team has detailed knowledge of the plants, which is necessary to understand data.

Completeness

40. Regarding stationary combustion the inventory is considered to be complete. There are some minor gaps in the early 1990's. This is understandable since Estonia was another country at this time. The significant change in the statistics is not really visible in the emission trends and the ERT encourages the country to include a description of this in the IIR.

41. Some zero-values are included in the NFR tables under NFRs 1A and 1B. The ERT recommends Estonia to replace these by the appropriate notation keys.

Consistency including recalculation and time series

42. There are noticeable differences between the greenhouse gas reporting (CRF tables) and the reporting of air quality pollutants (NFR tables). Furthermore, there are differences between point source data and the national statistics. The ERT understands this point and recommends Estonia to discuss this issue with the statistical office and the institution which is responsible for greenhouse gas reporting. There are always different opinions regarding the sector classification of the plants. It should be possible to find an agreement in order to increase the time series consistency and the comparability between both inventories. In many cases it makes sense to follow the classification of the national statistics because the classification of point source data can be changed but the national energy balance has to follow the structure of the national statistics. This could also be a way to increase the time series consistency.

43. The ERT noted that the use of point source data caused some problems with the time series consistency due to different sector classification and fuel consumption data. The ERT encourages Estonia to assess if it is possible to compare statistical data and point source data at plant level as this could be a way to identify possible errors.

Comparability

44. The allocation of source categories follows that of the EMEP/UNECE reporting Guidelines. The ERT considers the methodologies to be consistent with the Guidebook.

45. The data submitted under the CLRTAP and the NECD are consistent in the energy sector.

Accuracy and uncertainties

46. The ERT encourages Estonia to undertake a quantitative uncertainty analysis for the Energy Sector in order to help identify improvement needs and to provide an indication of the reliability of the inventory data.

47. The ERT encourages Estonia to create some quality checks for the measurement data. The data which the ERT received on request from the Party were found to be plausible and consistent. Only the SO_2 EFs in fluidized combustion systems seem to be low compared to plants from other countries using similar technology. In such a case there should be an explanation. The ERT encourages the inventory agency to request for background information from operators and/or the supervising authority to verify the emission levels. The ERT also encourages the Party to calculate implied emission factors for measured data and to compare EFs with EFs from other countries. Although it will be challenging to find comparable data, since the use of oil shale is not so common, SO_2 EFs for combustion of lignite and oil shale are at a similar level as for oil shale. The ERT encourages the inventory agency to discuss the results of such a comparison with the operators in order to find errors or technical explanations for the above mentioned differences.

Improvement

48. Estonia identifies as priority areas for future improvements in the stationary combustion sector the checking of activity data and EFs. The main problem appears to be a discrepancy in the data regarding fuel consumption between statistical energy balance and the reports of the facilities. Furthermore Estonia plans to improve the QA/QC procedure. Regarding fugitive emissions the Party plans to check the annual average RVP of gasoline and to provide an uncertainty analysis. It's also planned to update the EFs for NFRs 1A1, 1A2, 1A4ai and 1A4ci by using new measurement data and EFs of the Guidebook 2013. The ERT welcomes these improvements.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1 - Main pollutants, Transparency

49. The ERT encourages Estonia to include EFs or IEFs for all fuels and sectors where measurement data is used in the IIR. In the case of mixed fuels the ERT encourages to include information about the fuel mix (for example X % coal, Y % wood, Z % gas…). In cases where one fuel is dominant (> 90%), EFs can be allocated to this fuel.

Category issue 2: 1.A.1.b & 1.A.1.c - Allocation of emissions, Transparency

50. The IIR includes a comprehensive description of the plants which were reported under NFR 1.A.1.c. However, the description only includes two sentences about NFR 1.A.1.b. While NFR 1.A.1.b contains also emissions from the oil shale industry it is not clear how activities have been allocated between NFRs 1.A.1.b and 1.A.1.c. The ERT encourages Estonia to include a relevant description in the IIR of the allocation and to improve the time series consistency by using a consistent approach in the allocation.

Category issue 3: 1.A.4.bi Wood Combustion - All pollutants, Accuracy and Transparency

51. The ERT appreciates the information provided in the Estonian IIR on measurement data for wood combustion in small combustion plants. The ERT considers the values to be of a high quality, plausible and consistent and to show a good correlation between NMVOC, CO and PAH as well as PCDD/F and HCB. The ERT notes that the low SO_2 EF for advanced small boilers needs a further consideration because in principle the sulphur content of wood shows fewer fluctuations than coal. Moreover small combustion plants are usually not equipped with desulfurization and dust abatement systems. The ERT therefore encourages Estonia to provide an explanation of the technical equipment of advanced small boilers in the IIR. Moreover, the ERT encourages Estonia to include information on the use of the different stoves in the IIR and to explain how the emissions were calculated from the EFs presented in the IIR, to increase the transparency of the inventory.

Category issue 4: 1.B.1.a Fugitive emissions – NMVOC, Accuracy

52. According to the IIR NMVOC emissions are reported but in the NFR tables NMVOC is flagged as “NA”. While EFs for oil shale are not provided in the Guidebook and NFR 1.B.1.a “Coal mining and handling” is not the appropriate place to report emissions from oil shale production, the IPCC Guidelines for greenhouse gases allocate oil shale under NFR 1.B.2.a (oil). However, according to the fuel definition oil shale is solid and not liquid. Therefore the ERT considers NFR 1.B.1.c “Other fugitive emissions from solid fuels” or NFR 1.B.2.d “Other fugitive emissions from energy production” as the most appropriate subcategories for reporting fugitive emissions from oil shale production. The ERT encourages Estonia to develop country specific methods and EFs for oil shale production in order to increase the accuracy of the reporting.

TRANSPORT

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	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		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	
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

53. Estonia has provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all transport subsectors. Estonia's methodology and EFs in the IIR are considered by the ERT to be transparent and well described.

54. Estonia uses zero-values in a small number of cells in the reporting tables. The ERT encourages Estonia to use the appropriate notation keys (e.g. "NO" where

the source does not exist in Estonia (Not Occurring), “NE” where emissions are “Not Estimated” and “IE” where emissions are “Included Elsewhere”).

Completeness

55. The ERT considers the Transport sector to be complete and comprehensive with good levels of detail in the methodology descriptions. Sufficient explanations are provided in the IIR for all NEs reported.

Consistency including recalculation and time series

56. Estonia has recalculated the road transport sector using the latest version (v11.3) of the COPERT 4 model and has provided the related information in the IIR. Estonia has also recalculated the emissions for selected pollutants and years in other subsectors based on updated information for activity data. The differences in emissions are well documented in the IIR.

57. The ERT considers the time series of emissions to be consistent with few exceptions. The ERT encourages Estonia to correct the few inconsistencies observed in specific subsectors.

Comparability

58. The ERT considers the methodologies to be consistent with the Guidebook. Transport sector emissions have been calculated based on fuel sold.

59. The data submitted under the CLRTAP and the NECD are consistent in the transport sector.

Accuracy and uncertainties

60. The ERT did not identify any over- or underestimates.

61. ERT commends Estonia for having undertaken a quantitative uncertainty analysis for the Transport Sector. This was based on the Tier 1 methodology as described in the guidance document of the Guidebook. The IIR does not specify if the results are used to prioritize improvements in the transport sector. The ERT notes that the inherently high uncertainty of some of the default EFs needs to be kept in mind when interpreting the results of the uncertainty analysis.

62. Estonia has undertaken some basic QA/QC checks for the Transport sector. The ERT encourages Estonia to implement sector specific OA/QC procedures and to provide a description and the relevant information in the IIR.

63. The ERT also encourages Estonia to perform a review with external experts to verify the emission levels in the transport sector.

Improvement

64. The ERT commends Estonia for improvements in the transport sector and in particular for using the latest COPERT 4 version for calculating road transport

emissions. The ERT also notes that Estonia has addressed the recommendations from the previous review.

65. The ERT encourages Estonia to implement the planned improvements and to include information on the timeline for these improvements.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.3.b Road Transport - Activity data, Transparency

66. The ERT noted that zero values are reported for the consumption of gaseous fuels in the road transport sector. Estonia responded to the question of the ERT on the issue that gaseous fuels are not used in the road transport sector and hence the notation key “NO” should be used. Estonia intends to correct this in next year’s submission. The ERT welcomes this improvement and recommends the Party to correct the zero values to “NO”.

Category issue 2: 1.A.3.a.i(ii) International aviation cruise – BC, Accuracy

67. The ERT noted a sudden drop in the IEF of BC in the years 2010 and 2014. To the question on the issue Estonia responded that there was a mistake in the EF used for 2014 and in the activity data (fuel used) used for 2010. Estonia intends to correct both mistakes in next year’s submission. The ERT welcomes this information and recommends the Party to carry out the correction.

Category issue 3: 1.A.4.c.iii Agriculture/Forestry/Fishing: National fishing – PCB, Accuracy

68. The ERT noted a sudden drop in the IEF of PCB in 2013. Estonia has responded that there was a mistake in the activity data (fuel used) used for 2013. Estonia intends to correct this mistake in next year’s submission. The ERT welcomes this information and recommends the Party to carry out the correction.

Category issue 4: 1.A.4.b.ii Residential: Household and gardening (mobile) & 1.A.4.c.ii Agriculture/Forestry/Fishing: Off-road vehicles and other machinery – CO, Transparency

69. The ERT noted that the IEFs for CO from these two off-road sectors are much lower compared to other Parties. During the review Estonia has responded that this is due to the fuel mix used in Estonia which is most likely very different compared to other Parties. The ERT recommends Estonia to further investigate this issue and to provide more information in the IIR in order to increase the transparency of the inventory.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, CO, TSP, PM_{10} & $PM_{2.5}$, heavy metals		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2A1	Cement production	X		X
2A2	Lime production	X		
2A3	Glass production	X		X
2A5a	Quarrying and mining of minerals other than coal	X		
2A5b	Construction and demolition	X		
2A5c	Storage, handling and transport of mineral products	X		
2A6	Other mineral products (please specify in the IIR)	X		X
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 (please specify in the IIR)	X		
2B10b	Storage, handling and transport of chemical products (please specify in the IIR)	X		X
2C1	Iron and steel production	X		X
2C2	Ferroalloys production			
2C3	Aluminium production	X		X
2C4	Magnesium production			
2C5	Lead production	X		X
2C6	Zinc production	X		X
2C7a	Copper production	X		X
2C7b	Nickel production			
2C7c	Other metal production (please specify in the IIR)	X		X
2C7d	Storage, handling and transport of metal products (please specify in the IIR)	X		
2H1	Pulp and paper industry	X		X
2H2	Food and beverages industry	X		X
2H3	Other industrial processes (please specify in the IIR)			
2I	Wood processing	X		X
2J	Production of POPs			
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 (please specify in the IIR)	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 Industrial Processes sector emissions inventory is in general transparent. Recommendations and encouragements to further improve the transparency are provided in the sector specific recommendations below.

71. The ERT notes that Estonia reports zero-values in a number of cells in the reporting tables, namely for NO_x, NMVOC and CO emissions from NFRs 1A1b, 1A2 and several source categories under NFR 2. The ERT encourages Estonia either to complete the reported emission values, or to use the appropriate notation keys for reporting where estimates are not available or necessary, e.g. “NO” where the activity is not occurring in the country, “NA” where the pollutant is not emitted from this activity, “NE” where emissions are not estimated and “IE” where emissions are included elsewhere (i.e. under a different NFR code). This issue was discussed during the Stage 3 review and the Party agreed to use the appropriate notation keys in the next submission.

72. The ERT notes that Estonia reports emissions from NFRs 2I, 2K and 2L but that except for Table 4.1 no information on these source categories is included in the IIR. The ERT encourages Estonia to improve the transparency of the inventory by describing the activities covered by these source categories as well as to document the applied methodology in the IIR.

Completeness

73. The ERT considers the industry sector to be in general complete and comprehensive with good levels of detail regarding the descriptions in the IIR. The ERT, however, encourages Estonia to complete the IIR with more information on the estimation methods (e.g. choice of EFs) as well as regarding descriptions of industrial activities which are not covered yet (e.g. glass production), and to complete the inventory by estimating missing emissions.

Consistency including recalculation and time series

74. The ERT found the time-series to be in general transparent, however, related to the current inconsistencies, the ERT also found some room for further improvements.

75. The ERT noted that according to Table 4.3 of the IIR, the notation key "NA" is occasionally used for emissions from NFR 2A in those years, when no emissions are reported. According to the Reporting Guidelines the notation key "NA" should only be applied in cases where activity in the given sector does not result in emissions of a specific pollutant. In cases where emissions of the same pollutant are reported for the earlier and later years, "NA" does not seem to be the appropriate notation key. Therefore the ERT recommends Estonia to complete the inventory by reporting emissions throughout the time series, or to use the appropriate notation keys and to

explain them in the IIR. The ERT found the recalculations to be consistent and sufficiently justified and documented.

Comparability

76. The methods used by Estonia are consistent with the EMEP/EEA Guidebook and country specific methods are sufficiently described in the IIR.

77. The ERT found the CLRTAP inventory to be comparable with that reported under the NECD.

Accuracy and uncertainties

78. The ERT encourages Estonia to undertake a quantitative uncertainty analysis for the industry sector in order to support the improvement process and to provide an indication of the reliability of the reported data.

79. The ERT notes that Estonia carries out QA/QC procedures in the IP sector in order to detect calculation errors, errors in the data reported by the operators or in the allocation. The ERT encourages Estonia to include more information on the applied QA/QC methods and their findings in the IIR.

Improvement

80. According to the IIR Estonia plans to re-allocate historical emissions from wood and furniture industries from NFRs 2A6 and 2L to NFR 2I Wood processing. This improvement was already recommended in the previous review report. The ERT welcomes the indicated improvement and encourages Estonia to clearly document the allocation emissions from this source in the IIR, because currently furniture production is also mentioned in the IIR in the context of NFR 2H.

Sub-Sector Specific Recommendations

Category issue 1: 2.A.1 Cement production - Particles and ammonia, Completeness, transparency

81. The ERT noted that for all pollutants but PM and NH_3 the notation key "IE" is used, and according to the IIR these emissions are reported under NFR 1A2f. TSP, $PM_{2.5}$ and PM_{10} emissions are reported both under NFR 1A2f and NFR 2A1. In the Guidebook no EF is provided for ammonia emissions from NFR 2A1. However, as cement kilns can be a source for NH_3 emissions, either from the raw material or from the use of ammonia liquor as a reduction agent for NO_x abatement, the ERT encourages Estonia to use the notation key „NE“, or, to estimate these emissions.

Category issue 2: 2.A.3 Glass production - All pollutants, Transparency

82. Particle emissions are reported as “IE” under NFR 1A2f, while other emissions are reported under NFR 2A3 as "NA". From the IIR it is not clear if glass production is carried out in Estonia and why only PM emissions are reported under this category. During the review Estonia clarified that there is one glass producing

facility in Estonia and that the operator reports all combustion and process emissions aggregated. The ERT encourages Estonia to complete the IIR with a clear description of the activity, in order to improve the transparency of the inventory. The ERT also recommends Estonia to improve the completeness of the inventory with the help of the Guidebook, where there are methods for estimating NO_x, SO_x and CO emissions under NFR 1A2f, and for particles and heavy metals (Pb, Cd, As, Cr, Ni, Se) under NFR 2A3.

83. The ERT recommends Estonia to use the notation key "IE" for pollutants for which emission figures are reported under a different NFR code (whether it is NFR 1A2f or 2A3) and to use the notation key „NE" for pollutants if no emissions are reported (neither under NFR 1A2f nor under NFR 2A3) in order to increase the transparency of the inventory.

Category issue 3: 2.A, in particular 2.A.6 Other mineral products - Particles, Transparency

84. The ERT noted that TSP emissions from NFR 2A decreased to the level of about one third since the turn of 2007/2008. In particular, the TSP emissions reported from NFR 2A6 shrunk from about 1500 t to about 25 t. During the review, Estonia explained that the reason was a change in emission allocation due to the change from NFR09 to NFR14. The ERT recommends Estonia to clarify the reasons for the emission level changes in the IIR in order to improve the transparency of the inventory.

Category issue 4: 2.C Metal production - Heavy metals, Completeness

85. The ERT noted that Estonia only reports particle, NO_x and CO emissions for individual source categories under 2C while the other pollutants are reported with the notation key "NA". The ERT recommends Estonia to complete the inventory of NFR 2C, at least for the sub-sectors and pollutants where EFs are provided in the Guidebook, such as heavy metal emissions, and to use the appropriate notation keys for emissions not being reported. "NA" should only be used when a particular pollutant is not likely to occur from the process in question.

Category issue 5: 2.C Metal production - Allocation of sources, Transparency

86. The ERT noted that the level of detail provided in the IIR differs from sub-sector to sub-sector in the metal industry. E.g. it was not clear from the IIR which activities are included under NFR 2C7c. During the review, Estonia clarified that these emissions are based on reports from the individual operators for processes, such as welding, galvanizing, electroplating and polishing. Estonia also explained that since NFR 2C is not a key category, emissions of pollutants not reported by the operators have not been estimated and reported. The ERT encourages Estonia to complete the information in the IIR concerning activities covered by the inventory, on the choice of estimation methods as well as on the use of notation keys in order to improve the transparency of the inventory.

SOLVENTS

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2D3a	Domestic solvent use including fungicides	x		
2D3b	Road paving with asphalt	x		x
2D3c	Asphalt roofing	x		x
2D3d	Coating applications	x		
2D3e	Degreasing	x		
2D3f	Dry cleaning	x		x
2D3g	Chemical products	x		
2D3h	Printing	x		
2D3i	Other solvent use (please specify in the IIR)	x		
2G	Other product use (please specify in the IIR)	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

87. The information provided in the solvent sector of the IIR is transparent and emission calculations are well documented. The ERT encourages Estonia to make only minor improvements in transparency as indicated below.

88. The order of subchapters in this part of the IIR does not follow the order of NFRs and is partly scattered (for instance, documentation of NFR 2D3b comes after NFR 2C, documentation of NFR 2D3a is between NFR 2D3h and NFR 2D3i).The ERT encourages Estonia to follow the order of NFRs.

89. Party describes the general trend of NMVOC emissions at the beginning of the solvents chapter and deviations from the general trend are well documented.

90. Party's methodology and EFs in the IIR are considered by the ERT to be transparent and well documented.

Completeness

91. The ERT considers the Solvent sector to be complete and comprehensive with good levels of detail in the methodology descriptions. The ERT encourages Estonia to include a short paragraph justifying the absence of NFR 2Dc, Asphalt Roofing (reported as "NO") as a matter of completeness**.**

Consistency including recalculation and time series

92. Estonia reports recalculations for the period of 1999 – 2013 due to corrections of statistical data. All relevant changes are transparently documented and reported in the recalculations chapter. The time series throughout the Solvents chapter is consistent and transparently described

Comparability

93. The methods used in the inventory are consistent with the Guidebook and country specific methods are sufficiently described in the IIR.

94. The ERT found the CLRTAP inventory to be comparable with that reported under the NECD.

Accuracy and uncertainties

95. The ERT commends Estonia for including a quantitative uncertainty assessment for the Solvents sector. The IIR does not specify if the results were used to prioritize improvements in the inventory.

96. According to the IIR QA/QC and verification are carried out for each solvent use sub-category.

Improvement

97. The ERT notes that Estonia has carried out the improvements recommended in the previous Stage 3 review.

98. The ERT takes note of the improvements scheduled by Estonia and encourages Estonia to continue this process, particularly to take into account the recommendations in the following chapters.

Sub-Sector Specific Recommendations

Category issue 1: 2.D.3.b – PM, TSP, Transparency

99. The ERT noted that the methods used are consistent with the Guidebook. However, in the IIR a Tier 1 approach is described while a Tier 2 method applied. The ERT encourages Estonia to change the description in their next report, as suggested by the Party in their reply to the ERT on the issue, and to provide information on the EFs used in the IIR.

Category issue 2: 2.D.3.f Dry Cleaning – NMVOC, Transparency

100. Estonia uses a Tier 1 methodology for estimating emissions from dry cleaning. The ERT recommends Estonia to include information of the source of the EFs (Guidebook 2013 and 2006) in the IIR.

Category issue 3: 2.D.3.a Domestic Solvent Use including Fungicides/2.D.3.e Degreasing/2.D.3.f Dry Cleaning/2.D.3.h Printing – $PM_{2.5}$, PM_{10}, TSP, Completeness and transparency

101. Estonia reports “NE” for the above mentioned sectors in the NFR tables. In the Guidebook EFs are provided, although not for all pollutants. The ERT recommends Estonia to either estimate and report emissions occurring in the country or to change the notation key to “NE” for those not estimated and to provide information on why the emissions were not calculated, e.g. justify why emissions do not occur.

AGRICULTURE

Review Scope:

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
3B1a	Dairy cattle	X		X
3B1b	Non-dairy cattle	X		
3B2	Sheep	X		X
3B3	Swine	X		
3B4a	Buffalo	X		
3B4d	Goats	X		X
3B4e	Horses	X		X
3B4f	Mules and asses	X		X
3B4gi	Laying hens	X		
3B4gii	Broilers	X		
3B4giii	Turkeys	X		
3B4giv	Other poultry	X		X
3B4h	Other animals (please specify in IIR)	X		
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		X
3Da2b	Sewage sludge applied to soils	X		X
3Da2c	Other organic fertilisers applied to soils (including compost)	X		
3Da3	Urine and dung deposited by grazing animals	X		
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		X
3F	Field burning of agricultural residues	X		X
3I	Agriculture other (please specify in the IIR)	X		
11A	Volcanoes		X	
11B	Forest fires		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

102. Estonia has provided a detailed and generally transparent emissions inventory. Estimates are provided for most of the categories in the Agriculture sector. The Party's methodology and EFs in the IIR are considered by the ERT to be generally transparent and well described. The ERT encourages the Party to include more detailed information in the IIR as presented below under the sub-sector specific

recommendations and to improve the explanation of the rationale of selecting the notation keys.

Completeness

103. The ERT considers the Agriculture sector to be generally complete. However, the ERT noted that there are some categories and pollutants not covered by the current estimates.

Consistency including recalculation and time series

104. Estonia has provided a detailed explanation of the recalculation in its IIR.

Comparability

105. The methods used in the inventory are consistent with the EMEP/EEA Guidebook. However, in some cases methods from the 2009 Guidebook version are used. The ERT recommends Estonia to use methods from Guidebook 2013, as according to the Reporting GLs the Parties shall as a minimum use the methodologies in the latest version of the Guidebook.

Accuracy and uncertainties

106. Most of the estimates are based on Tier 1 methodologies. However, this year for the first time the most relevant animal species (cattle and swine) have been estimated using a Tier 2 2013 Guidebook methodology for NH_3 and NO_x. The ERT commends Estonia for this and recommends Estonia to apply Tier 2 methodologies for all key categories to improve the accuracy of the inventory.

107. Estonia has carried out a quantitative uncertainty analysis for emissions in the Agriculture sector. The ERT noted that the uncertainty analysis does not differentiate between the sub-categories and pollutants. The ERT encourages Estonia to improve the uncertainty analysis for the Agriculture sector by taking into account the characteristics of the different categories and the uncertainties of the EFs included in the 2013 Guidebook. The ERT also encourages Estonia to use the results of the uncertainty analysis to prioritize improvements in the inventory and to provide an indication of the reliability of the inventory data.

108. Estonia has carried out some basic QA/QC checks. The checks are not clearly described in the IIR. The ERT encourages Estonia to continue implementing the sector specific OA/QC procedures and to improve the information on these checks in the IIR.

Improvement

109. The ERT commends Estonia for improvements carried out thus far. During the review, the Party expressed their intention to improve estimates in several categories as well as the transparency of the inventory for its next submission. The ERT commends Estonia for this and encourages Estonia to include more detailed information of its planned improvements for its next inventory submission.

Sub-Sector Specific Recommendations

Category issue 1: 3.B.1.a Manure management - Dairy Cattle, particulate matter, Transparency and comparability

110. Estonia reports in the IIR that it uses Tier 1 EFs from the 2013 version of the Guidebook for estimating particulate matter emissions from NFR 3B1a. The ERT, however, noted that the IEFs do not match the 2013 Guidebook default EFs. During the review, Estonia acknowledged that EFs of the 2009 version of the Guidebook were being used and that it will revise the estimates in its next submission. The ERT encourages Estonia to undertake this initiative and to report on its new estimates using 2013 Guidebook methodology in the next submission.

Category issue 2: 3.B.3 Manure management, Swine - NH_3 and NO_x, Transparency

111. The ERT noted that the methodology description for NH_3 and NO_x emissions from NFR 3B3 was not clearly presented. During the review Estonia informed the ERT to revise the description in its next submission and to improve the transparency of Table 5.1 of the IIR. The ERT encourages Estonia to undertake the revision of the description of the methodology and Table 5.1.

Category issue 3: 3.B Manure management - NMVOC, Transparency and comparability

112. Estonia reports in the IIR that it uses Guidebook 2013 Tier 1 EFs for estimating NMVOC emissions from NFR categories 3B1a, 3B1b, 3B3 and 3B3. The ERT noted that the IEFs obtained using the data in the NFR tables do not match the EFs in Guidebook 2013. During the review, Estonia acknowledged that Guidebook 2009 EFs were being used instead and that it will revise the estimates in its next submission. The ERT recommends Estonia to undertake this initiative and to report these new estimates in the next submission.

Category issue 4: 3.B.4.d Manure management, Goats - All pollutants, Transparency

113. Estonia reports emissions from NFR 3B4d as “IE” and includes them under NFR 3B2 – Manure Management Sheep. The ERT noted that information on the number of goats is available in national statistics, FAO and CRF tables. Estonia acknowledged the issue and replied to disaggregate these emissions and to report them in the next submission under the correct NFR categories. The ERT recommends Estonia to undertake this initiative and to report separate estimates in the next submission to increase the transparency of the inventory.

Category issue 5: 3.B.4.e Manure management, Horses - NMVOC, Completeness

114. Estonia reports NMVOC emissions from NFR 3B4e as “NA”. This is not in line with the Guidebook 2013 methodology that provides an EF for this animal. During the review, Estonia acknowledged the issue and indicated that it would estimate and

report these emissions in the next submission. The ERT recommends Estonia to undertake this initiative and to report emissions estimates in the next submission to increase the completeness of the inventory.

Category issue 6: 3.B.4.f Manure management, Mules and Assess - All pollutants, Transparency

115. Estonia reports emissions from NFR 3B4f as "NO", without further explanation in the IIR. During the review, Estonia explained that the notation key is based on an expert opinion and statistics from Estonian Agricultural Registers and Information Board, where the number of heads of mules and asses in Estonia is less than 10. The ERT encourages Estonia to include the justification of the use of this notation key in its next IIR.

Category issue 7: 3.B.4.g.iv Manure management, Other Poultry - All pollutants, Transparency

116. Estonia provides estimates for NFR 3B4giv covering ducks, geese and turkey. Estonia uses the duck's specific 2013 Guidebook EF for NO_x, not taking into account the geese's and turkey's EFs. However, the IEF for PM_{10} does not match the EF for duck in the 2013 Guidebook, nor the geese's and turkey's EFs. Additionally, Estonia does not provide information on the numbers of these animals in the IIR. During the review, Estonia replied to consider calculating emissions from these animals separately. The ERT encourages Estonia to provide detailed information on the breakdown of "other poultry" into the relevant animal species in the IIR and to estimate and report the revised estimates in the next submission.

Category issue 8: 3.D Agricultural Soils - NMVOC and NH_3, Comparability

117. Estonia uses Guidebook 2009 EFs instead of Guidebook 2013 EFs for estimation of NMVOC and NH_3 emissions from NFR 3D. During the review Estonia replied to revise the estimates according to Guidebook 2013 to its next submission. The ERT recommends Estonia to undertake this initiative and to report the new estimates in the next submission.

Category issue 9: 3.D.a.2.a - Animal manure applied to soils - NH_3 and NO_x, Transparency

118. Estonia explains in the IIR that NH_3 and NO_x emissions from NFR 3Da2a are reported separately from NFR 3B. Estonia also uses the notation key "IE" for NH_3 and the notation key "NA" for NO_x under NFR 3Da2a. During the review Estonia acknowledged this inconsistency and replied that this will be corrected in the next submission. The ERT recommends Estonia to report these emissions disaggregated under the correct NFR categories in its next submission.

Category issue 10: 3.D.a.3 - Urine and dung deposited by grazing animals - NO_x, Transparency

119. NO_x emissions from NFR 3Da3 are reported as "NA". However, during the review Estonia confirmed that these emissions were reported under NFR 3B and that the proper notation key should have been "IE". Estonia replied to provide disaggregated emissions in the next submission. The ERT recommends Estonia to undertake this initiative and to report to these emissions disaggregated between NFR 3B and 3D categories in its next submission.

Category issue 11: 3.D.a.2.b - Sewage sludge applied to soils, NH_3 and NO_x, Transparency

120. The ERT noted that the NH_3 and NO_x emissions are reported as "NA". During the review, Estonia replied to correct the notation key in the next submission. The ERT recommends Estonia to undertake this initiative and to correct the notation key and encourages Estonia to provide an explanation of the selection of the notation key in its next submission.

Category issue 12: 3.D.f - Use of pesticides - HCB, Transparency

121. Estonia reports the notation key "NA" under NFR 3Df. This is not in line with the Guidebook 2013 methodology that provides an EF for this category. During the review, Estonia acknowledged that the issue is already under consideration and that a short explanation will be included in the next IIR. The ERT commends Estonia for the approach and encourages Estonia to correct the notation key and to provide an explanation for the use of the notation key in the IIR in its next submission.

Category issue 13: 3.D- Agricultural soils - Particulate matter, Transparency

122. Estonia reports particulate matter emissions from NFR 3D under NFR 3Da1 - Inorganic N-fertilizers. According to the Guidebook 2013, the main sources of PM emissions are soil cultivation and crop under NFR 3Dc - Farm-level agricultural operations including storage, handling and transport of agricultural products. During the review, Estonia explained that this issue would be taken into account in the next submission. The ERT encourages Estonia to allocate PM emissions from NFR 3D under NFR 3Dc. Nevertheless, the ERT acknowledges that this allocation is not clear in the current version of the Guidebook. The ERT encourages Estonia to revise this allocation once the new guidance in the Guidebook is released.

Category issue 14: 3.D- Agricultural soils - NMVOC, Transparency

123. Estonia reports NMVOC emissions from NFR 3D under NFR 3Da1 - Inorganic N-fertilizers. The ERT noted that, as explained in the 2013 Guidebook, NMVOC emissions from crops are not related with the fertilization of the crops, but with the crops themselves. Therefore, it seems reasonable to include NMVOC emissions from crops under NFR 3De – Cultivated Crops. During the review, Estonia explained that this issue would be taken into account in the next submission. The ERT encourages Estonia to allocate NMVOC emissions from NFR 3D under NFR 3De. Nevertheless, the ERT acknowledges that this allocation is not clear in the current version of the

Guidebook. Therefore the ERT encourages Estonia to revise this allocation once the new guideline in the Guidebook is released.

Category issue 15: 3.F.: Field burning of agricultural residues - All pollutants, Completeness

124. Estonia reports emissions from NFR 3F as “NE” for all pollutants. This is not in line with the Guidebook 2013 methodology that provides an EF for this category. Additionally, the ERT noted that there was a recommendation to Estonia in the 2011 Stage 3 Review Report to estimate these emissions for its next submission. During the review, Estonia informed of a plan to estimate these emissions. The ERT commends Estonia for the plan and recommends Estonia to estimate these emissions and report them in its next submission.

Category issue 16: 11.B.: Forest fires - All pollutants, Completeness

125. Estonia reports emissions from NFR 11.B. as “NE” for all pollutants. The inventory Guidebook 2013 provides a Tier 1 methodology to estimate these emissions. The ERT encourages Estonia to consider estimate these emissions and report them in its next submission, to increase completeness of the inventory.

WASTE

Review Scope:

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
5A	Biological treatment of waste - 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	
5C1biii	Clinical waste incineration		X	
5C1biv	Sewage sludge incineration		X	
5C1bv	Cremation	X		
5C1bvi	Other waste incineration (please specify in the IIR)		X	
5C2	Open burning of waste	X		
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		
5D3	Other wastewater handling		X	
5E	Other waste (please specify in IIR)	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

126. In the IIR emission calculations are described and general references to activity data sources provided. The activity data used in the calculations originate from the Estonian Waste Data Management System. Plant specific emission data reported by plant operators is also used in the inventory in all NFR waste sectors. The ERT encourages the Party to explain in more detail the calculation methods and EFs used.

127. The ERT encourages Estonia to document more transparently emission estimation methodologies of pollutants for which no methodology is provided in the Guidebook 2013. The ERT encourages Estonia to review the actual source of emissions, such as the SNAP Code relevance for the emissions reported by facilities in the OSIS database, and to provide brief description in IIR about methodologies used to estimate emissions at point sources.

128. The ERT encourages Estonia to further develop the waste sector inventory with elaborated information on all necessary activity data, used EFs and methodologies.

129. Estonia reports municipal and clinical waste incineration as "IE" and has explained the allocation of emissions in Table 1.7. For municipal incineration the allocation is repeated in Table 6.1. For clarity, it would be good to repeat also the allocation of clinical waste incineration in Table 6.1.

Completeness

130. The inventory for the Waste sector is complete for all years and for all sub-categories.

Consistency, including recalculation and time series

131. For the period of 1990-2013, NMVOC, TSP, $PM_{2.5}$ and PM_{10} emissions have been recalculated for some of the later years due to inclusion of new data on landfilled solid waste data from the National Waste Data Management System. The time series is therefore not consistent in terms of detail and allocation of emissions under the reporting categories. The ERT encourages the Party to recalculate the whole time series using the same methodology if possible, or to explain in the IIR why this was not possible.

132. Based on information given in the NFR tables and in the IIR, and as explained in the previous paragraph, the ERT concludes that the inventory for the Waste sector is not completely consistent due to the varying use of notation keys between the years reported. No further explanation is provided in the IIR. The ERT encourages Estonia to examine the use of notation keys and to provide explanations for their application in the IIR.

Comparability

133. The methods used in the inventory are consistent with the Guidebook. However, the ERT encourages Estonia to include more details on the use of plant specific methods in the IIR.

134. The ERT found the CLRTAP inventory to be comparable to that reported under the NECD.

Accuracy and uncertainties

135. A quantitative uncertainty analysis was carried out to the year 2014 inventory. The ERT encourages Estonia to use the results of the uncertainty analysis to identify areas for further improvement and to assess the reliability of the inventory data.

136. Estonia states in the IIR that common statistical quality checks related to the assessment of trends has been carried out. The ERT encourages Estonia include a brief description of quality checks carried out in the next IIR.

Improvement

137. The ERT commends the Party for its planned improvements in Waste Sector related to the use of data from the Waste Management System. The ERT encourages Estonia to provide descriptions of the improvements in the next IIR's.

Sub-Sector Specific Recommendations

Category issue 1: 5.A. Solid waste disposal on land – NO_x, SO_x, CO, NH_3, Transparency

138. Estonia indicates in the IIR to include emissions reported by point sources in the inventory. In 2014 emission data from 7 operators in the waste sector were used in the preparation of the inventory. The ERT encourages Estonia to review the SNAP code relevance for the reported emissions to check if the data includes emissions to be reported under other sectors, e.g. in the energy sector, and to provide an explanation on the allocation of emissions in the IIR.

Category issue 2: 5.A. Solid waste disposal on land – NH_3 and CO, Completeness, transparency

139. Ammonia is included in the inventory since the year 2009. For the previous years the notation key "NE" is used. The ERT recommends Estonia to calculate and report emissions also for the years before 2009 or, if not possible, encourages Estonia to provide an explanation in the next IIR on why emissions from the previous years are not reported.

140. Carbon monoxide is reported since 2013. For the previous years (except 2009) the notation key "NE" is used. The ERT recommends Estonia to calculate and report emissions also for these years, or if not possible, encourages Estonia to provide an explanation in next IIR on why emissions for the previous years are not reported.

Category issue 3: 5.B.1– Biological treatment of waste, Composting - NMVOC, Completeness, Transparency

141. The ERT noted that NMVOC emissions are reported as "NE" till the year 2005. The ERT recommends Estonia to calculate and report emissions for years before 2005 or, if not possible, to provide an explanation in next IIR on why emissions are not reported.

Category issue 4: 5.B.1– Biological treatment of waste, Composting - All pollutants, Transparency

142. During the review, Estonia provided the ERT as reply to the question raised on the issue, further information on waste composted in diffuse sources. The ERT encourages Estonia to provide a brief description in the IIR or a reference to information on how composted amounts from households are estimated.

Category issue 5: 5.B.2. Biological treatment of waste, Anaerobic digestion at biogas facilities – NH_3, Completeness

143. In NFR tables for the years 2013-2014 a zero value is provided. The ERT recommends to review the correctness of this value and to provide an emissions estimate or an appropriate notation key in the next submission.

Category issue 6: 5.B.2. Biological treatment of waste, Anaerobic digestion at biogas facilities - Transparency

144. Estonia provides emissions for the years 2013-2014. However, no explanation about the process is provided in the IIR. The ERT encourages Estonia to provide a description about the emission estimation methods used at Anaerobic digestion facilities in the IIR.

Category issue 7: 5.D.1 Domestic Wastewater handling – NH_3, Transparency

145. According to information received from Estonia during the review on the question raised by the ERT, ammonia emissions from NFR 5D1 are based on data reported by enterprises. The ERT encourages Estonia to review the relevance of SNAP codes for the provided emissions and to provide an explanation on the allocation of emissions in the IIR.

Category issue 8: 5.D.1 Domestic Wastewater handling, Latrines – Completeness

146. Estonia does not calculate emissions from latrines. The ERT encourages Estonia to develop a methodology to estimate activity data and to start calculating these emissions according to the methodology in the Guidebook.

Category issue 9: 5.E Other wastes - Transparency

147. The ERT commends Estonia’s initiative to provide emission estimates in this sub-category. The ERT encourages Estonia to provide a more detailed explanation in the IIR about activities and facilities included under this sector and about the methods used to calculate emissions.

LIST OF ADDITIONAL MATERIALS PROVIDED BY ESTONIA DURING THE REVIEW

1. Responses to questions raised by the ERT both prior to and during the review:
2. Estonian Stage 2 S&A report 2016
3. Estonian Stage 1 report 2016
4. Previous Stage 3 Review Report of Estonia
5. Estonian IIR 2016
6. The Copert file used to calculate road transport emissions
7. FAO Statistics
8. Estonian Agriculture Statistics
9. Estonian Greenhouse gas inventory