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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
GEORGIA**

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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 – 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 Georgia 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 – Ieva Sile (Latvia), Energy – Garnt Jans Venhuis (Netherlands), Transport – Jean-Marc Andre (France), Industry – Mirela Poljanac (Croatia), Solvents – Maria Purzner (Austria), Agriculture + Nature – Mette H Mikkelsen (Denmark), Waste – Katja Pazdernik (EC).
4. Kevin Hausmann 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. Georgia submitted time series of air pollutant emissions from 2007 to 2014, the UNECE notification form, as well as an Informative Inventory Report. The emissions are reported in the NFR tables (NFR 2014-1), covering all pollutants. In addition, large point source (LPS) data for the year 2014 were reported.
6. Emissions data and the IIR were submitted with a slight delay with respect to the timeframe set in the UNECE Reporting Guidelines.
7. The ERT noted that recalculations have been applied, but they are not consistent across the time series. The recalculations and issues regarding time series are described in the IIR.
8. The 2016 submission shows improvements on a number of issues highlighted in the previous Stage 3 review. Nevertheless, the ERT identified a need for further improvements regarding transparency and completeness.
9. Georgia provided support to the ERT during the 2016 centralised Stage 3 review, responding in a timely manner.

INVENTORY SUBMISSION

10. Georgia submitted NFR tables, the UNECE notification form, as well as an Informative Inventory Report. However, the ERT noticed that NFR tables were reported only for the years 2007 to 2014, therefore the ERT was only partly able to review the Georgian inventory. The ERT reiterates its recommendation that Georgia should report NFR tables for every year for the complete time series from 1990-2014.
11. The inventory is partly in line with the EMEP/EEA Emission Inventory Guidebook and the UNECE Reporting Guidelines. In this year's (2016) submission, Georgia has provided a national inventory for the years 2007-2014 in NFR14 categories for all pollutants. For the following sectors emissions have been reported: 1A1-1A4, 1B1, 1B2, 2A-2D, 2H, 2I, 3B, 3D, 5C, 5D. No emissions have been reported in the sectors 2G, 2J-2L, 3F, 3I, 5A, 5B, 5E, 6A. In addition, Georgia has reported LPS data for 2014.
12. The ERT commends Georgia for the effort made to improve their inventory. Compared with the Stage 3 review in 2012, Georgia has provided more complete time series and covered more categories and pollutants. Georgia has now also published an Informative Inventory Report describing the most relevant topics.

KEY CATEGORIES

13. Georgia has compiled and presented, in its 2016 IIR, a level KCA for the following pollutants: NO_x, NMVOC, SO_x, NH₃, TSP, and CO. The ERT commends Georgia on its effort made since the 2012 Stage 3 review regarding its Key Category Analysis.

14. The KCA shows that the transport sector dominates the emissions of NO_x, NMVOC, and CO. SO_x and TSP emissions are mainly produced by the energy and IPPU sectors. For NH₃, agriculture is the only key category.

15. The KCA performed by Georgia is consistent with the EMEP/EEA Emission Inventory guidebook for all reported pollutants of 2014. The ERT commends Georgia on having Tier 2/3 in several key categories (IPPU, transport) and encourages Georgia to improve categories that still use a Tier 1 approach, especially in the residential sector.

16. Regarding improvements in key categories, Georgia responded to the ERT that for further improvements, sub-sectors where there were no emission factors for some pollutants would be addressed first and the main polluting sub-categories afterwards.

17. As stated in Georgia's 2016 IIR, page 9, a trend KCA does not make sense, because from 2013 more detailed methodological approaches have been used and emissions for more categories and pollutants calculated. However, the ERT recommends performing a trend KCA after Georgia has analysed its activity data and re-estimated emissions as planned for the next submissions.

QUALITY

Transparency

18. The ERT commends Georgia on the substantial improvements made since the 2012 Stage 3 review. Georgia still uses the notation keys NE and IE in a number of areas, but provides an explanation for particular notation keys for each sub-sector in its 2016 IIR.

19. The ERT indicates that transparency could be improved, both of the methodology taken from the EMEP/EEA Emission Inventory Guidebook and the national methodology. In response to questions raised by the ERT about the national methodology, Georgia stated that it was developed in 2003, mostly based on methods established during the former Soviet Union. It contains a methodology for measurements of emissions from stationary sources, methods for the determination of the efficiency of abatement techniques, a list of measurement equipment as well as an emission calculation methodology (emission factors for different activities). The ERT recommends that Georgia includes this information in the next submission.

20. The ERT notes that there are no emission factors or activity data presented in Georgia's 2016 IIR. It is recommended that detailed information should be provided on particular emission factors used in sub-sectors, as well as trends in activity data in the next submissions for transparency purposes.

21. The ERT recommends that Georgia puts more detailed information on improvements in its next IIR.

Completeness

22. Georgia does not report emissions for 1990 to 2006. In response to a question raised by the ERT, Georgia stated that the main problem with reporting historical data before 2007, besides a lack of time and human resources, is the absence of appropriate activity data (statistical information). Georgia will try to use information gathered under the 2nd and 3rd National Communication in the context of the UNFCCC to calculate emissions for missing years and cover as many years as possible before 2007.

23. The ERT acknowledges the problems related to the availability of historical data, and encourages Georgia to continue to further investigate the historical data and provide complete time series in the next submissions.

24. The ERT commends Georgia on having compiled an inventory for all pollutants, including those whose reporting is optional, as well as on having reported activity data. However, the inventory cannot be considered fully complete due to the sub-categories and pollutants that are not estimated. The main reasons for not estimating emissions are a lack of emission factors in the national methodology or a lack of statistical data. Georgia stated that further updates to the national methodology to cover missing pollutants were planned. The ERT encourages Georgia to perform these improvements.

Consistency, including recalculations and time series

25. Georgia has submitted a list of recalculations made since its 2015 submission. The main recalculations are due to the newly developed National Energy Balance, and more detailed car fleet data that has become available from a specific survey. A new sector – waste – is has been added to Georgia's inventory. The ERT commends Georgia on having a detailed list of recalculations, and encourages Georgia to include the description of the recalculations made also under the sectoral chapters.

26. Georgia's inventory data before and after 2013 are not consistent and comparable within the time series due to the new categories and the updated approach. In response to a question raised by the ERT, as to how Georgia was planning to make its inventory data more consistent and comparable in the next submissions, Georgia stated that they would analyse the activity data trend and re-estimate the emissions. The ERT encourages Georgia to use other data available to extrapolate back to 1990.

Comparability

27. Due to limited information regarding emission factors and activity data, comparability with other countries' inventories is limited.

CLRTAP/NECD comparability

28. Georgia does not report emissions under the National Emission Ceilings (NEC) Directive.

Accuracy and uncertainties

29. Georgia does not perform an uncertainty analysis. In response to the ERT's question regarding this issue, Georgia responded that the main challenges were a lack of experience in performing uncertainty analysis as well as insufficient time and human resources. Georgia stated that it would try to perform an uncertainty analysis for the next submissions. The ERT encourages Georgia to perform a Tier 1 uncertainty analysis for the next submission.

Verification and quality assurance/quality control approaches

30. Georgia has QA/QC procedures which are described in their IIR. However, the ERT recommends that Georgia should provide a more detailed description on how they are planning and prioritising the improvements.

31. The ERT encourages Georgia to provide detailed information on emission factors, activity data and a description of the methodologies that have been used, to allow the ERT to verify the emissions that have been reported.

FOLLOW-UP TO PREVIOUS REVIEWS

32. Georgia has significantly improved its inventory since the 2012 Stage 3 review. The ERT acknowledges that many recommendations have been taken into account, and commends Georgia on the great effort made to improve its inventory.

AREAS FOR IMPROVEMENTS IDENTIFIED BY GEORGIA

33. Georgia plans to recalculate emissions in the energy sector once the newly introduced National Energy Balance will show some trend that will enable a review of the energy consumption in previous years. This will improve both the consistency and comparability of the emissions. The ERT encourages Georgia to carry out these improvements and include the results in the next IIR.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

34. The ERT has identified the following cross-cutting issues for improvement:
- (a) The ERT recommends that Georgia provides a complete time series from 1990 onwards.
 - (b) The ERT encourages Georgia to further update its national methodology to cover missing pollutants.
 - (c) The ERT encourages Georgia to provide more detailed information on emission factors, activity data and a description of the methodologies in its IIR.
 - (d) The ERT recommends that Georgia reviews the use of the appropriate notation keys. In the NFR tables, "NO" is used in several cells, while in the same sub-sector "NA" is reported as well. This not in line with the Reporting Guidelines, which state that "NO" should be used "for categories or processes within a particular source category that do not occur within a Party". ERT recommends that Georgia should correct these notation keys according to the Reporting Guidelines. There are also a few zero values reported in NFR tables. The ERT suggests replacing them with appropriate notation keys in the next submission.
 - (e) The ERT encourages Georgia to perform and present an uncertainty analysis. In the EMEP/EEA 2013 Guidebook, chapter "Uncertainties", approximate uncertainty values for activity data (Table 3-1 "Indicative error ranges for uncertainty analysis") are given. The sectoral chapters of the 2006 IPCC Guidelines, as well as the general chapters, also contain information about the uncertainty range for activity data. Regarding emission factors, an expert's judgement for the national emission factors can be used, but it should be well documented and archived (an expert judgement documentation form is available on the 2006 IPCC Guidelines, Volume 1 "General guidance and reporting", Chapter 2 "Approaches to data collection", Annex 2A.1 "A protocol for expert elicitation"). In the EMEP/EEA 2013 Guidebook, there are also rating definitions for emission factors that could help to determine uncertainty for a particular source category. If a certain range is given, the mean value can be taken. With these values, Georgia will be able to perform a Tier 1 uncertainty analysis. A calculation example is available in the EMEP/EEA Guidebook, Chapter "Uncertainties", Table 6-1 "Uncertainty calculation and reporting in Tier 1".

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		NO _x , NMVOC, SO _x , PM _{2.5} , PM ₁₀ , TSP, CO, HM, Diox, PAH, HCB, PCB		
Years		1990 – 2014		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A1a	Public electricity and heat production	x		x
1A1b	Petroleum refining	NO		
1A1c	Manufacture of solid fuels and other energy industries	NO		
1A2a	Iron and steel	x		x
1A2b	Non-ferrous metals	IE		x
1A2c	Chemicals	NA		x
1A2d	Pulp, Paper and Print	x		x
1A2e	Food processing, beverages and tobacco	x		x
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	x		x
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	NA		x
1A3ei	Pipeline transport	NE		x
1A3eii	Other	NO		
1A4ai	Commercial/institutional: Stationary	x		x
1A4bi	Residential: Stationary	x		x
1A4ci	Agriculture/Forestry/Fishing: Stationary	x		x
1A5a	Other stationary (including military)	NA		x
1B1a	Fugitive emission from solid fuels: Coal mining and handling	x		x
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	x		x
1B1c	Other fugitive emissions from solid fuels	NO		
1B2ai	Fugitive emissions oil: Exploration, production, transport	x		x
1B2aiv	Fugitive emissions oil: Refining / storage	NA		x
1B2av	Distribution of oil products	NA		x
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	NA		x
1B2c	Venting and flaring (oil, gas, combined oil and gas)	NE		x
1B2d	Other fugitive emissions from energy production	NO		

General recommendations on cross-cutting issues

Transparency

35. The ERT notes that Georgia included information on source category description and methodology per sub-sector. To improve future submissions, the ERT encourages Georgia to include also detailed descriptions on activity data, emission factors, recalculations and planned improvements per sub-sector.

Completeness

36. The ERT considers the energy sector to be generally complete and comprehensive with good levels of detail in the methodology descriptions.

37. The ERT commends Georgia for the improvements made to upgrade the completeness and comprehensiveness of the IIR and the modest use of notation keys. The ERT encourages Georgia to further minimise the use of NE, IE and NA and use available activity data and emission factors (from the Guidebook) to estimate emissions where possible,, especially in those cases where only some of the pollutants are IE in other sub-sectors.

38. The ERT commends Georgia for including clear tables with information on the use of the notation keys NE and IE.

39. The ERT encourages Georgia to synchronise the table on IE with the notation keys used in the NFR. For example, for sub-sector 1A2f only TSP was IE according to the NFR and not the other pollutants mentioned in the table. For sub-sector 1B1b, BC and not TSP was reported as IE in the NFR.

40. The ERT also encourages Georgia not to include emissions from combustion (sector 1A) in the process emissions from industry (sector 2). Available activity data and emission factors (from the Guidebook) can be used to estimate emissions where possible.

Consistency including recalculation and time series

41. Based on the newly developed National Energy Balance, recalculations were done for recent years. With regard to planned improvements, Georgia states that recalculations are foreseen for previous years as well. The ERT commends Georgia for the improvements already made and encourages Georgia to follow up on this and perform recalculations for the entire time series.

42. The ERT has noticed that the time series for TSP, PM10, PM2.5, heavy metals and POPs are not complete for all the way back to 1990. The ERT encourages Georgia to complete the time series, in accordance with the Guidelines.

Comparability

43. The methodologies used by Georgia in their inventory are generally consistent with those proposed in the EMEP/EEA Guidebook. Country-specific

measures have been explained in the IIR. In general, the IIR contains enough information to understand how the emissions were estimated.

44. The ERT notes that the inventory of Georgia is comparable with those of other reporting parties. The ERT encourages Georgia to continue providing comparable inventory data.

Accuracy and uncertainties

45. The ERT noticed that a chapter on QA/QC is included in the review IIR, but concludes that the information given is very broad and generic. The ERT encourages Georgia to include more detailed descriptions of the QA/QC measures taken, as well as information on how they are implemented and how standards are maintained, assured and verified.

46. The ERT also encourages Georgia to undertake uncertainty analysis for the energy sector in order to inform the improvement process and to provide an indication of the reliability of the inventory data.

Improvement

47. The ERT commends Georgia for all the improvements made so far both in the IIR and the NFR.

48. The ERT notes that Georgia included in the IIR a general paragraph on planned improvements. The ERT encourages Georgia to describe and report planned improvements per sub-sector in order to improve completeness, comparability and transparency.

Sub-sector Specific Recommendations

Category issue 1: All sectors – Heavy metals and POPs

49. The ERT notes that a key source analysis table is not included in the IIR. In the text, the (key) pollutants NO_x, NMVOC, NH₃, TSP and CO are described, but other pollutants with values in the NFR are not mentioned in the IIR. Georgia was asked to provide the ERT with additional information with regards to these pollutants, or to state the reasons why no description was included in the IIR. During the review week, Georgia responded that key source analysis had been provided only for these pollutants because of a lack of time and limited human resources. Georgia also responded that a key source analysis could be performed for HMs and POPs as well and included in future submissions. The ERT recommends that Georgia includes this in their planned improvements and follow it up accordingly.

Category issue 2: 1A2b – All pollutants

50. The ERT notes that Georgia used the notation key IE for all activity data and pollutants in 1A2b. The ERT recommends that Georgia uses the available activity data and emission factors (from the Guidebook) to calculate emission for this sub-sector to improve completeness.

Category issue 3: 1A2c – NO_x, SO_x, TSP, CO

51. The ERT notes that Georgia used the notation key NA for most activity data and IE for NO_x, SO_x, TSP, CO in 1A2c. The ERT recommends that Georgia investigates and collects activity data and uses emission factors (from the Guidebook) to calculate emissions for this sub-sector to improve completeness. The ERT also recommends reporting emissions from combustion in sector 1A (Energy) rather than including them in other sectors like sector 2 (process emissions from Industry) in order to improve completeness and transparency.

Category issue 4: 1A2f – TSP

52. The ERT notes that Georgia uses the notation key IE for TSP in 1A2f. The ERT recommends that Georgia uses emission factors (from the Guidebook) to report emissions from combustion in sector 1A (Energy) and rather than including them in other sectors like sector 2 (process emissions from industry) to improve completeness and transparency.

Category issue 5: 1A4bi – NMVOC, TSP, CO, HM, POPs

53. The ERT notes that the key source analysis shows that NFR sector 1A4bi is a key source for the pollutants NMVOC, TSP, CO, HM and the POPs. For a key source a Tier 2 or 3 methodology should be used. Georgia, however, reports that a Tier 1 method was used for this sector and pollutants. The ERT asked Georgia for additional information on why Tier 1 had been used instead of Tier 2 or 3. During the review week, Georgia responded that due to a lack of statistical data it was impossible to use a Tier 2 or 3 methodology. Information provided by the statistics office covers only amounts of used fuel, but not the combustion technologies. In this context, it should be mentioned that calculations of emissions from this sub-category were made available only after the reintroduction of the Energy Balance in the country in 2014 and Georgia hopes that in the future more detailed information will be gathered, enabling the use of a more advanced methodology. Georgia will also try to find out information on the combustion technologies used in surveys provided under the UNFCCC. The ERT recommends that Georgia includes this in their planned improvements and follows it up accordingly.

TRANSPORT

Review Scope

Pollutants Reviewed		NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, CO, HMs, PCDD/PCDF, PAHs		
Years		1990 – 2014		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A2gvii	Mobile Combustion in manufacturing industries and construction	NA		
1A3ai(i)	International aviation LTO (civil)	NE/NO		
1A3ai(ii)	International aviation cruise (civil)	NE/NO		
1A3aii(i)	Domestic aviation LTO (civil)	NE		
1A3aii(ii)	Domestic aviation cruise (civil)	NE		
1A3bi	Road transport: Passenger cars	x		x
1A3bii	Road transport: Light duty vehicles	x		x
1A3biii	Road transport: Heavy duty vehicles and buses	x		x
1A3biv	Road transport: Mopeds & motorcycles	x		x
1A3bv	Road transport: Gasoline evaporation	x		x
1A3bvi	Road transport: Automobile tyre and brake wear	x		x
1A3bvii	Road transport: Automobile road abrasion	NE		
1A3c	Railways	x		x
1A3di(ii)	International inland waterways	NO		
1A3dii	National navigation (shipping)	x		x
1A4aii	Commercial/institutional: Mobile	NE		
1A4bii	Residential: Household and gardening (mobile)	NE		
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	x		x
1A4ciii	Agriculture/Forestry/Fishing: National fishing	NE		
1A5b	Other, Mobile (including military, land based and recreational boats)	NA		
1A3di(i)	International maritime navigation	NE		
1A3	Transport (fuel used)	NE		

General recommendations on cross-cutting issues

Transparency

54. In contrast to the last review in 2012, Georgia now submits an IIR and the ERT commends Georgia for this improvement in transparency. The IIR could, however, be more detailed if descriptions of activity data such as fleet, mileage, traffic, fuel consumption, etc. and explanations of the trends of these data were added. Georgia could do the same for emission factors and all the hypotheses used. This would help the ERT to understand the inventory and enable reviewers to fully assess underlying assumptions and the rationale for choices of data, methods and other inventory parameters.

Completeness

55. The ERT finds that the transport sector could be more complete and more comprehensive if it contained methodology descriptions with good levels of detail.

56. Since the last review, Georgia has provided more pollutant emissions. The ERT commends Georgia for the improvement and encourages Georgia to complete the NFR tables with appropriate notation keys for the memo items in the corresponding NFR code (1A3ai(ii) and 1A3aii(ii) cruise in aviation, 1A3di(i) international navigation, 1A3 calculations based on fuel used in transport). The ERT also encourages Georgia to be consistent in the use of the notation keys, i.e. if "NO" is used for one pollutant, "NE" cannot be used for another one.

57. The ERT recommends that Georgia submits reporting templates with consistent emission data for the complete time series (from 1990 to last year).

58. The ERT commends Georgia for providing more estimates for other mobile sources such as railways and national navigation.

Consistency including recalculation and time series

59. Georgia recalculated its inventory for almost all sectors in the year 2015. The IIR includes explanations, but the ERT encourages Georgia to provide much more detailed explanations of the recalculations, including impacts on the sector and implications for trends in the transport sector in its IIR.

Comparability

60. The ERT notes that the inventory of Georgia is comparable with those of other reporting parties. The ERT commends Georgia for using methodologies in accordance with the Guidebook for the transport sector.

61. The ERT encourages Georgia to improve its National Energy Balance to be able to provide a complete, consistent, comparable time series.

Accuracy and uncertainties

62. Georgia has not provided any uncertainty estimates, but has plans to improve QA/QC and uncertainty analysis in the next submissions. The ERT encourages Georgia to undertake an uncertainty analysis for the transport sector to help inform the improvement process and to provide an indication of the reliability of the inventory data.

63. There is a description of general QA/QC activities. The ERT re-iterates its encouragement to implement and report on sector-specific QA/QC procedures in future submissions.

Improvement

64. Since the last review, Georgia has provided, within the IIR, a chapter about planned improvements. The ERT commends Georgia on this. However, the chapter could be more detailed and include sector-specific actions.

Sub-sector Specific Recommendations

Category issue 1: All transport sectors - All pollutants

65. In its new IIR, Georgia does not provide any activity data (AD) or emission factors (EF) to enable comparison with other countries. Georgia answered during the review that AD were provided in the NFR tables. The ERT encourages Georgia to provide such information within the IIR along with all the necessary explanations (such as fleet and traffic estimates, etc.).

Category issue 2: 1A3a - All pollutants

66. For the aviation sector, Georgia's Third National Communication to the UNFCCC (2015) provides GHG emissions since 2006 (international bunkers) and 2011 (domestic from AIE), but air pollutant emissions are not provided in the NFR tables. Georgia answered during the review that they would try to cover these emissions in the next submissions. The ERT encourages Georgia to improve emission reporting by estimating these sector emissions.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2A1	Cement production	x		x
2A2	Lime production	x		x
2A3	Glass production	x		x
2A5a	Quarrying and mining of minerals other than coal	x		x
2A5b	Construction and demolition	NE		
2A5c	Storage, handling and transport of mineral products	NA		
2A6	Other mineral products	x		x
2B1	Ammonia production	NO		
2B2	Nitric acid production	NO		
2B3	Adipic acid production	NO		
2B5	Carbide production	NO		
2B6	Titanium dioxide production	NO		
2B7	Soda ash production	NO		
2B10a	Chemical industry: Other	x		x
2B10b	Storage, handling and transport of chemical	NA		
2C1	Iron and steel production	x		
2C2	Ferroalloys production	x		
2C3	Aluminium production	x		
2C4	Magnesium production	NO		
2C5	Lead production	x		
2C6	Zinc production	NO		
2C7a	Copper production	NO		
2C7b	Nickel production	NO		
2C7c	Other metal production	NO		
2C7d	Storage, handling and transport of metal products	NA		
2D3b	Road paving with asphalt	x		x
2D3c	Asphalt roofing	NE		
2H1	Pulp and paper industry	x		x
2H2	Food and beverages industry	x		x
2H3	Other industrial processes	NA		
2I	Wood processing	x		x
2J	Production of POPs	NO		
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	NE		x
2L	Other production, consumption, storage, transportation or handling of bulk products	NA		

General recommendations on cross-cutting issues

67. Georgia has improved emission reporting in NFR tables and upgraded the IIR for the industrial sector since the previous Stage 3 review. However, the NFR tables and the IIR are still not complete; some sources and pollutants have not been

estimated and emissions prior to 2007 are missing. Recommendations and encouragements are given below to improve the completeness, transparency and consistency of reporting for the industrial sector.

Transparency

68. Georgia uses country-specific national methodologies for almost all emission calculations in the industry sector or uses plant specific emissions that are also mostly calculated according to a national methodology. The IIR does not provide descriptions of these methods. The ERT recommends that Georgia improves the transparency of its reporting by including information on the methodology and the emission factors used in emission calculation.

69. Georgia uses the appropriate notation keys in the reporting tables and the ERT commends Georgia for that.

Completeness

70. Georgia has included all important industrial sources in the inventory and the ERT commends Georgia for that. However, there are a few sources (e.g. NFR 2.A.5.b, 2.D.3.c, 2.K) reported as NE that are likely to be emitting sources. The ERT encourages Georgia to try to collect data for these source categories and to calculate all relevant emissions in its next submission.

71. The ERT considers Georgia's inventory of PM10 and PM2.5 emissions not complete. PM10 and PM2.5 emissions are missing in the following source category: 2.A.1, 2.A.2, 2.A.3, 2.A.5.a, 2.A.6, 2.B.10.a, 2.C.2, 2.D.3.b, 2.H.1, 2.H.2, 2.I. The ERT recommends that Georgia calculates missing PM10 and PM2.5 emissions using the ratios TSP/PM10 and TSP/PM2.5 from the 2013 EMEP/EEA Guidebook by source category in combination with plant-specific or country-specific emission factors (or emissions) for total TSP by source category. For cement production, Georgia can use TSP/PM10 and TSP/PM2.5 ratios from the 2009 version of the EMEP/EEA Guidebook that are based on cement production instead of clinker production. As soon as Georgia calculates PM2.5 emissions, the ERT recommends that BC emissions should also be included in the inventory.

Consistency including recalculation and time series

72. Georgia uses different methodologies - one for calculating emissions from 2007 to 2012 based on the national methodology, and another one for calculating emissions from 2013 onwards based on plant-specific emissions. Using different methodologies in the time series results in outliers and inconsistencies in historical trends. The ERT encourages Georgia to re-check all emissions and provide only one methodology for the emission calculations for the complete historical trend to ensure consistency and accuracy. The ERT recommends that Georgia includes this activity in the plan for recalculation and improvement in the industrial sector for the next submission in 2017.

73. Georgia has recalculated its inventory for the industrial sector for the year 2013. However, the IIR does not include all the necessary explanations, e.g. what the

specific changes/updates in the national methodology are that have been done and for which source category they have been done. The ERT encourages Georgia to provide more detailed explanations of recalculations, including a rationale, the impact on the sector and the implications for trends in the industry sector in its IIR.

Comparability

74. The ERT notes that the inventory of Georgia is comparable with those of other reporting parties for some source categories (2.C.1, 2.C.3, 2.C.5), while for other categories, due to the lack of information regarding the national methodology, comparability cannot be assessed. However, the ERT commends Georgia for providing completed NFR tables with a minimal use of the notation keys IE and NE.

Accuracy and uncertainties

75. Georgia has provided neither a quantitative nor a qualitative uncertainty analysis for the industrial sector. The ERT encourages Georgia to include a quantitative or at least a qualitative uncertainty analysis for the industrial sector in its next submission.

76. Georgia's IIR does not include information on specific QA/QC checks for the industrial sector. During the review, Georgia provided the ERT with information on specific QA/QC checks for the industrial sector and the ERT commends Georgia on that. The ERT recommends that Georgia includes all the information it provided on QA/QC checks for the industrial sector in its IIR.

Improvement

77. Georgia does not list any planned improvements for the industrial sector in the IIR. However, during the review, Georgia provided information about improvements for a few source categories within the scope of NFR 2. The ERT encourages Georgia to implement these improvements in one of the next submissions.

Sub-sector Specific Recommendations

Category issue 1: 2.A.2 Lime production – TSP

78. The ERT notes that in the NFR table for 2011 there are no TSP emissions or AD, nor is the notation key "NA" used. Georgia provided an explanation for this during the review and the ERT commends Georgia for that. The ERT recommends that Georgia includes this explanation in next year's report and encourages Georgia to seek information on lime production for 2011 in annual reports provided by stationary sources.

Category issue 2: 2.A.3 Glass production – Activity data

79. The ERT finds that in the NFR tables for 2013 and 2014, Georgia submitted activity data on gaseous fuel, along with data on glass production. The ERT recommends that Georgia reports data on fuel consumption in the energy source categories and data on product production in the industry source categories.

Category issue 3: 2.A.6 Other mineral products – Activity data

80. During the review week, the ERT found that Georgia reported two activity datasets on a disaggregated level (for brick and for concrete) in the same cell for all reported years except 2009. The ERT recommends that Georgia reports activity data on an aggregated level (sum of brick and concrete) in the NFR tables and reports activity data on brick and concrete production in the IIR on a disaggregated level in the future.

Category issue 4: 2.B.10.a Chemical industry: Other – Activity data

81. During the review, the ERT noted that source category 2.B.10.a in Georgia covered emissions from fertiliser production but that in the IIR there was no detailed information about which fertilisers are produced in Georgia. During the review week, Georgia provided the information that fertiliser produced in Georgia is ammonium nitrate fertiliser. The ERT commends Georgia for providing this information and recommends including it in the next IIR in 2017. The ERT also recommends that Georgia includes all information on outliers in trends of activity data or in trends of emissions.

Category issue 5: 2.D.3.b Road paving with asphalt – Activity data

82. The ERT found a 2013 outlier in the activity data for road paving with asphalt. Georgia provided an explanation for this spike in the trend. The ERT recommends that Georgia includes this explanation in the next inventory report.

Category issue 6: 2.H.2 Food and beverages industry

83. During the review, the ERT asked Georgia to provide detailed data on its food and beverages production and on the emission factors used. Georgia provided detailed data on its food and beverages production in 2014, along with the EFs used and the ERT commends Georgia on this effort. The ERT recommends that Georgia includes the detailed data (AD and EFs) in the IIR for the next submission.

Category issue 7: 2.K Consumption of POPs and HM – Hg, PCB

84. During the review, the ERT found that for activities under NFR code 2.K Georgia had not calculated Hg or PCB emissions. However, for the Tier 1 approach for calculating emissions of Hg and PCB, according to the 2013 EMEP/EEA Guidebook, Georgia only needs the country's total population as activity data. Georgia agreed to calculate emissions of Hg and PCB using the proposed approach for the next submission in 2017.

SOLVENTS

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2D3a	Domestic solvent use including fungicides	NA		x
2D3d	Coating applications	NE		x
2D3e	Degreasing	NE		x
2D3f	Dry cleaning	NE		x
2D3g	Chemical products	NE		x
2D3h	Printing	NE		x
2D3i	Other solvent use	NA		x
2G	Other product use	NA		x

General recommendations on cross-cutting issues

85. Georgia does not report any emissions from solvents as part of its current submission. The ERT encourages Georgia to collect data for the calculation of NMVOC emissions for this sector.

86. Georgia reports NE for 2.D.3.d-h, and NA for 2.D.3.a, i; as well as 2G. It is unlikely that there are no emissions in Georgia from domestic products containing solvents, or from tobacco use or fireworks. During the review, Georgia informed the ERT about the fact that no statistical data had been available for any of the sectors. The ERT encourages Georgia to make every effort to work with the national statistics office in order to collect basic data necessary for a Tier 1 approach, and recommends that Georgia calculates emissions for 2.D.3.a, where a Tier 1 method is available based on the country's population.

87. The ERT also encourages Georgia to provide a chapter on 2.D.3 in its IIR with a description on the efforts made and problems faced in the calculation of emissions from this sector.

AGRICULTURE

Review Scope

Pollutants Reviewed		NH ₃ , NO _x , NMVOC, PM _{2.5} , PM ₁₀ and TSP		
Years		1990 – 2014		
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	IE		x
3B4d	Goats	IE		x
3B4e	Horses	NE		
3B4f	Mules and asses	NE		x
3B4gi	Laying hens	IE		x
3B4gii	Broilers	x		x
3B4giii	Turkeys	NE		
3B4giv	Other poultry	NA		
3B4h	Other animals	NA		
3Da1	Inorganic N fertilisers (includes also urea application)	x		x
3Da2a	Animal manure applied to soils	NA		x
3Da2b	Sewage sludge applied to soils	NA		
3Da2c	Other organic fertilisers applied to soils (including compost)	NA		
3Da3	Urine and dung deposited by grazing animals	NA		x
3Da4	Crop residues applied to soils	NA		
3Db	Indirect emissions from managed soils	NA		
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	NA		x
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA		
3De	Cultivated crops	NA		x
3Df	Use of pesticides	NA		
3F	Field burning of agricultural residues	NE		x
3I	Agriculture other	NA		
11A	Volcanoes	NA		
11B	Forest fires	NA		

General recommendations on cross-cutting issues

88. The inventory covers emissions of NH₃, NO_x, NMVOC, PM_{2.5}, PM₁₀ and TSP from the most important livestock categories and from the use of mineral fertilisers. The ERT encourages Georgia to continue including more emission sources and to improve the transparency of its IIR by including information on activity data.

Transparency

89. The ERT notes that Georgia has been working on its emissions inventory and expanded it to include more pollutants and that Georgia has made improvements in its IIR. The ERT encourages Georgia to continue with this positive development and to include more pollutants and more emission sources. However, some improvements can still be achieved in the IIR, e.g. adding references which are missing for activity data and providing explanations for emission trends.

Completeness

90. The agriculture sector in Georgia's inventory includes emissions for 2007 - 2014 from NH₃, NO_x, NMVOC, PM_{2.5}, PM₁₀ and TSP and estimates emission from the following NFR categories: 3B1a, 3B1b, 3B2, 3B3, 3B4a, 3B4d, 3B4gi, 3B4gii and 3Da1. Key sources were identified for NH₃ emissions: 3B1a, 3B1b and 3Da1, for NMVOC emissions: 3B1a and for TSP emissions: 3B1a. No key source analysis has been provided for PM_{2.5} and PM₁₀ emissions, which covers 3 % and 9 % respectively of the total national emissions.

Consistency including recalculation and time series

91. The ERT asked Georgia during the review process to clarify the reasons for the significant increases in NH₃, NMVOC, and TSP emissions from 3B for 2011 – 2014. The Party responded that from 2012, incentives had been introduced by the government in the agriculture sector, resulting in an increase in livestock production. The Party also provided a table showing the development of number of animals. The ERT recommends that the Party includes activity data on livestock production combined with an explanation of emission trends in future inventory submissions to increase transparency.

Comparability

92. The calculation of Georgia's agricultural emissions follows the recommendations of the EMEP/EEA Emission Inventory Guidebook 2013 and data 2007 – 2014 are represented in the 2014 NFR format.

Accuracy and uncertainties

93. The ERT encourages Georgia to undertake an uncertainty analysis (quantitative where possible) for the agriculture sector, to steer the improvement process and to provide an indication of the reliability of the inventory data.

Improvement

94. The ERT encourages Georgia to undertake some improvements such as providing additional information on activity data, e.g. the number of animals, the amount of nitrogen used in mineral fertilisers and data on the area under cultivation. Furthermore, it is recommended that explanations of emission trends and descriptions of planned and performed improvements are included in the IIR in future submissions.

Sub-sector Specific Recommendations

Category issue 1: 3.B Manure management: NH₃, NO_x, NMVOC, TSP

95. The ERT observes that emissions of NH₃ and TSP from dairy cattle (3Ba1) are estimated as a key source. It is recommended that the Tier 2 methodology should be used for key sources, which requires information on the allocation of liquid and solid manure.

96. During the review, Georgia provided a table showing the number of animals 2007 – 2014. To improve transparency, the ERT recommends that Georgia includes this table in its IIR and also includes information on trends in both activity data and emissions.

97. The notation key “NA” is used for NH₃, NO_x and NMVOC emissions for the NFR categories 3Da2a “Animal manure applied to soils” and 3Da3 “Urine and dung deposited by grazing animals”. However, Georgia uses a Tier 1 emission factor, which includes emissions from the application of manure and animal on grass. Therefore, the ERT recommends using the notation key “IE” instead.

Category issue 2: 3.D Agricultural Soils: All pollutants

98. The ERT notes that the amount of nitrogen used in mineral fertilisers, which is used as activity data for the estimation of NH₃ and NO_x emissions, is given in the NFR table. The ERT recommends including a table in the IIR showing the N content in fertilisers.

99. In 2014, NO_x emissions from the use of mineral fertilisers are estimated to be 1.59 kt NO. However, the unit in the NFR tables is given in NO_x and therefore a conversion from NO to NO_x is needed. Thus, the 2014 emissions should amount to 2.44 kt NO_x (1.59 x 46/30 due to differences in molecular weight). The ERT recommends revising the emissions for all years.

100. The Party calculates NMVOC emissions from agricultural soils, registered in the NFR category 4Da1. The level of NMVOC emissions depends on the area under cultivation and the ERT recommends reporting these emissions in NFR 4De “Cultivated crops”. During the review, the ERT received a table covering the area under cultivation for 2007 – 2014. The ERT recommends that Georgia provides information on activity data (area under cultivation) in its IIR.

101. Georgia calculates PM_{2.5} and PM₁₀ emissions from agricultural operations on fields (e.g. harvesting, soil cultivation and ploughing) based on a Tier 1 approach. These emissions should be reported under NFR category 3Dc instead of NFR 3Da1.

WASTE

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
5A	Solid waste disposal on land	x		x
5B1	Biological treatment of waste - Solid waste disposal on land	x		x
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities		x	
5C1a	Municipal waste incineration	x		x
5C1bi	Industrial waste incineration	x		x
5C1bii	Hazardous waste incineration	x		x
5C1biii	Clinical waste incineration	x		x
5C1biv	Sewage sludge incineration	x		x
5C1bv	Cremation	x		x
5C1bvi	Other waste incineration		x	
5C2	Open burning of waste	x		x
5D1	Domestic wastewater handling	x		x
5D2	Industrial wastewater handling	x		x
5D3	Other wastewater handling		x	
5E	Other waste	x		x

General recommendations on cross-cutting issues

102. The submission of Georgia's waste sector under CLRTAP has improved since the previous Stage 3 review. Some emissions from solid waste disposal, waste incineration and wastewater handling have been determined and reported in line with the EMEP/EEA 2013 Guidebook, and basic information is provided in the IIR. The submission is, however, still not complete. Some sources and pollutants have not been estimated, and historical emissions for the years prior to 2007 are missing. Recommendations and encouragements have been given to improve the completeness and transparency of reporting.

Transparency

103. Georgia reports emissions from solid waste disposal, waste incineration and wastewater handling and has submitted an IIR providing basic information on trends and methodologies. The ERT commends the Party for this improvement since the previous Stage 3 review. However, the transparency of reporting should be improved by providing more detailed information on methodologies, sources and values of activity data and the emission factors applied.

Completeness

104. Georgia reports emissions from 5.A. and 5.D only for the years since 2007, and data on 5.C. only for 2013 and 2014 due to data constraints. The EMEP/EEA 2013 Guidebook, however, provides techniques for compensating for incomplete or missing data, e.g. by extrapolation or using surrogate data (please refer to Part A, chapter 4 of the EMEP/EEA Guidebook on "Time series consistency"). The ERT

recommends that Georgia improves the completeness of its reporting and makes further efforts to gather or derivate the necessary activity data and estimates emissions for the whole period.

105. Georgia does not report emissions of particulate matter, heavy metals and the majority of POPs. The ERT encourages the Party to continue with its emission calculations for all relevant pollutants where EFs are available from the EMEP/EEA Guidebook.

Consistency, including recalculation and time series

106. Georgia has taken up the recommendations from the 2012 Stage 3 review and made good progress in reporting. However, the ERT notes that no consistent time series 1990-2014 in the NFR format is available. Georgia only reported emissions for certain years. Historical emissions for the years prior to 2007 are completely missing. The ERT recommends that Georgia implements further improvements and provides a consistent time series of emissions in its future submissions.

107. For some categories and pollutants, the Party has not reported emissions data. The ERT recommends that Georgia implements further improvements in its reporting in accordance with the revised 2014 Reporting Guidelines (ECE/EB.AIR.125 and Annexes) and the 2013 EMEP/EEA Guidebook.

Comparability

108. For 5.A solid waste disposal and 5.D wastewater handling Georgia applies the EF of the EMEP/EEA 2013 Guidebook for its calculations; emissions can thus be regarded as comparable. For 5.C. waste incineration, however, no assessment of comparability could be made as plant-specific data is used.

Accuracy and uncertainties

109. Georgia has not provided an uncertainty analysis. The ERT encourages the Party to undertake an uncertainty assessment for the waste sector in order to support the improvement process and to provide an indication of the reliability of the inventory data.

110. Georgia has been encouraged to provide some description of the QA/QC activities performed on category level in the next submission.

Improvement

111. Georgia has made improvements compared to previous inventories and has provided emissions data for some of the major waste sources. The ERT commends the Party for their progress and encourages Georgia to proceed in this way.

112. The ERT recommends that Georgia includes a section on planned improvements in the IIR and that it provides sector-specific information in future submissions.

Sub-sector Specific Recommendations

Category issue 1: 5.A Solid waste disposal – NMVOC, TSP, PM₁₀, PM_{2.5}

113. The ERT commends Georgia for providing NMVOC emission data for category 5.A., thus making progress in reporting since the previous Stage 3 review. However, some gaps have been identified:

114. No NMVOC emissions have been reported for 2014 (reported as “NE”). In Georgia's IIR, it is stated that no activity data are available for this year. During the review, it was explained that at the time of NFR/IIR compilation data on CH₄ emissions were not yet available from Georgia's National Communication to the UNFCCC. Moreover, no emissions have been reported for the years prior to 2007. The EMEP/EEA 2013 Guidebook, however, provides techniques for compensating for incomplete or missing data (please refer to Part A, chapter 4 of the EMEP/EEA Guidebook on “Time series consistency”). The ERT recommends that Georgia tries to obtain relevant activity data or considers gap filling for the missing years and provides a full time series in future submissions.

115. Georgia refers to the Third National Communication as source of activity data for the calculation of NMVOC from solid waste disposal, but no details are provided in the IIR. In response to a question by the ERT, the Party responded that the NMVOC per m³ landfill gas ratio (5.65 g NMVOC per m³ landfill gas) was applied. The ERT encourages Georgia to include this information more clearly in the IIR and to provide the underlying data in its next submission.

116. Georgia reports no TSP, PM₁₀ and PM_{2.5} emissions from solid waste disposal, although the EMEP/EEA 2013 Guidebook provides default emission factors. In response to a question during the review, Georgia explained that data on waste amounts in Mg were not available and informed the ERT that they were planning to obtain this information via surveys conducted for reporting under the National Communications to the UNFCCC. The ERT commends Georgia for this plan and encourages the Party to report on emissions of particulate matter in future submissions as soon as activity data is available.

Category issue 2: 5.B Biological treatment of waste - composting - NH₃

117. NH₃ emissions from 5.B.1 Composting are reported as “NE” because no activity data is available. The ERT encourages the Party to clarify the significance of this activity in Georgia and to include this information in its next submission. In case of any occurrences of composting in Georgia, the ERT encourages Georgia to try and gather relevant activity data and to calculate emissions applying the default emission factor of the EMEP/EEA 2013 Guidebook.

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

118. Emissions from 5.C.1.b.i industrial and 5.C.1.b.iii clinical waste incineration are only reported for 2013 and 2014. Historical years are reported as “NE”. In the IIR, a lack of activity data is provided as the reason the missing years. In response to a question raised by the ERT, Georgia explained that for historical years data was only

available on paper and difficult to access, but that from 2017 onwards data would be available on an annual basis through an electronic reporting system. The ERT appreciates the availability of annual activity data in the future, and recommends that Georgia provides emission data for historical years by using at least part of the available data and/or applying techniques for compensating for incomplete or missing data, e.g. by extrapolation or using surrogates.

119. Only NO_x, NMVOC, and SO_x emissions have been calculated and reported under 5.C.1.b.i industrial waste incineration and 5.C.1.b.iii clinical waste incineration although other pollutants are also expected to be emitted from these sources according to the EMEP/EEA 2013 Guidebook. The ERT encourages Georgia to include emission estimates for all relevant pollutants in its future submissions.

120. "NE" is used for municipal waste incineration (5.C.1.a), hazardous waste incineration (5.C.1.b.ii) and sewage sludge incineration (5.C.1.b.iv) as well as for open burning of waste (5.C.2) due to a lack of activity data. The ERT recommends that Georgia clarifies the occurrence of these activities in the country, investigates relevant activity data and provides estimates or adapts the notation keys (to "NO") accordingly.

121. Emissions from cremation 5.C.1.b.v are reported as "NO", although the majority of parties report emissions under this category. The ERT encourages Georgia to provide an explanation in its next IIR.

Category issue 4: 5.D Wastewater handling – NMVOC, NH₃

122. The ERT commends Georgia for providing NMVOC emissions data for wastewater handling and thus for making progress in reporting since the previous Stage 3 review. However, the transparency of reporting should be improved by providing activity data in the NFR format and clearly stating the emission factor applied. The ERT encourages Georgia to extend its reporting activities accordingly.

123. Georgia reports NH₃ emissions from wastewater handling as not applicable "NA". However, according to the EMEP/EEA 2013 Guidebook, NH₃ emissions do occur from the collection of wastewater in latrines. The ERT recommends that Georgia investigates whether latrines are used in the country and estimates emissions for the relevant part of the population, or that it adapts the notation key to "NO" in its future submissions.

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

124. Georgia does not report emissions from other waste and does not provide an explanation for using the notation key "NE" in the IIR. The ERT encourages Georgia to investigate the occurrence of the activities covered under this category and to provide relevant information in its next submission.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Tables with livestock (answer to Agriculture Q1) and land use data (Agriculture Q5)