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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  
ARMENIA**

|   |           |
|---|-----------|
| <b>CONTENT</b>  |           |
| <b>INTRODUCTION .....</b>   | <b>3</b>  |
| <b>PART A: KEY REVIEW FINDINGS .....</b>  | <b>4</b>  |
| <b>INVENTORY SUBMISSION .....</b>   | <b>4</b>  |
| <b>KEY CATEGORIES .....</b>   | <b>4</b>  |
| <b>QUALITY.....</b>   | <b>5</b>  |
| Transparency .....  | 5         |
| Completeness .....  | 5         |
| Consistency, including recalculations and time-series .....                         | 5         |
| Comparability .....   | 6         |
| CLRTAP/NECD comparability .....   | 6         |
| Accuracy and uncertainties.....   | 6         |
| Verification and quality assurance/quality control approaches .....                 | 6         |
| <b>FOLLOW-UP TO PREVIOUS REVIEWS .....</b>  | <b>6</b>  |
| <b>AREAS FOR IMPROVEMENTS IDENTIFIED BY ARMENIA.....</b>                            | <b>6</b>  |
| <b>TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY ERT .....</b>              | <b>7</b>  |
| <b>PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY .....</b>                  | <b>8</b>  |
| <b>CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT .....</b>                       | <b>8</b>  |
| <b>SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT.....</b>      | <b>9</b>  |
| <b>ENERGY .....</b>   | <b>9</b>  |
| <b>TRANSPORT .....</b>  | <b>14</b> |
| <b>INDUSTRIAL PROCESSES.....</b>  | <b>17</b> |
| <b>SOLVENTS.....</b>  | <b>22</b> |
| <b>AGRICULTURE .....</b>  | <b>25</b> |
| <b>WASTE.....</b>   | <b>26</b> |
| <b>MATERIALS USED BY THE REVIEW TEAM.....</b>                                       | <b>28</b> |
| <b>LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW .....</b> | <b>28</b> |
| <b>ANNEX I POTENTIAL TECHNICAL CORRECTIONS .....</b>                                | <b>28</b> |
| <b>REFERENCES.....</b>  | <b>29</b> |

## 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*' <sup>(1)</sup> – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review, has concentrated on SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> & PM<sub>2.5</sub> for the time series years 1990 – 2016 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 Armenia coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 18<sup>th</sup> June 2018 to 21<sup>th</sup> June 2018 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 – Ben Pearson (UK), Energy – Marion Pinterits (EC) and Isabelle Higuët (Belgium), Transport – Magdalena Zimakowska-Laskowska (Poland) and Giorgos Melios (Greece), Industry – Julien Jabot (Norway) and Ben Pearson (UK), Agriculture & Nature – not reviewed, Waste – Kees Peek (Netherlands).
4. Elisabeth Rigler (Austria) was the lead reviewer. The review was coordinated by Katarina Marečková (EMEP Centre on Emission Inventories and Projections - CEIP).

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<sup>1</sup> Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols. Note by the Task Force on Emission Inventories and Projections.  
ECE/EB.AIR/GE.1/2007/16  
[http://www.ceip.at/fileadmin/inhalte/emep/review/RevGuid\\_ece.eb.air.ge.1.2007.16.e.pdf](http://www.ceip.at/fileadmin/inhalte/emep/review/RevGuid_ece.eb.air.ge.1.2007.16.e.pdf)

## **PART A: KEY REVIEW FINDINGS**

5. The ERT commends effort and improvements achieved by Armenia to report inventory data to the Convention in the NFR14 format. However the CLRTAP inventory submission of Armenia is not yet in line with UNECE Reporting Guidelines. Indeed, the 2018 submission does not include the IIR inventory report and includes only emissions for the last reporting year 2016. The ERT, however, commends Armenia for submitting an IIR in August of 2018 and encourages Armenia to submit the next IIR on time.

6. Although, in particular the ERT could not assess the transparency of the inventory and the used methodologies, the ERT was in the position to assess other TCCCA criteria of the inventory, to point out some priorities and to help Armenia to set its improvement plan.

7. Especially, concerning completeness and accuracy, some potential technical corrections were identified, relating to significant underestimations of emissions (i.e. more than 2% of the national total).

8. Beyond the well identified technical corrections where the ERT was able to estimate emissions, there is still a need to improve activity data and the use of the EMEP/EEA 2016 Guidebook to further complete the national inventory.

9. In summary, the ERT encourages Armenia to further develop its inventory system for its future inventory submissions and to further complete its CLRTAP submissions (IIR, complete time series including its recalculations...), year after year as much as possible, through an annual improvement plan.

### **INVENTORY SUBMISSION**

10. In 2018 Armenia has reported emissions for 2016 only (the latest year) in the NFR format.

11. Emissions are reported in NFR14 categories, however the majority of categories are reported as “NO”, and around a quarter are reported as “NE”. Of the remaining categories, a large proportion is reported as “IE”.

12. Armenia did not provide an informative inventory report (IIR) on time but submitted a draft version in Russian language after the centralized review week. The ERT commends Armenia for sending an IIR in August 2018 which could, however, not be taken into account for the review.

### **KEY CATEGORIES**

13. The ERT commends Armenia for providing details of a Key Source Category Analysis as part of its IIR report, using information from the REPDAB tool (<http://www.ceip.at>). However, it is not clear from the Party's IIR in what way this has been used to inform methodologies for each sector. The ERT would encourage Armenia to elaborate on this in future IIR submissions.

## **QUALITY**

### **Transparency**

14. The ERT thanks the Party for providing 2016 emissions in the LRTAP template format, and providing a draft IIR as requested during the review, however notes that no information on trends and previous submissions. The ERT encourages Armenia to expand upon the work done on its inventory by providing these important information in future submissions. In addition, the ERT would encourage the inclusion of a summary in English for future IIRs produced by the Party.

15. The ERT regrets that Armenia did not respond to questions raised by the ERT during the Stage 3 review process, and would strongly encourage the Party to ensure resources are in place to address queries in any future reviews.

16. Armenia uses notation keys extensively throughout the submission, which the ERT commends as an aid to identifying gaps in the inventory. There are however a limited number of instances (e.g. PAHs & metals in 1A1a, 1A2b & 1A4bi) where zero emissions have been reported. The ERT would encourage the Party to use a notation key if these emissions are in fact zero, or report emissions to a higher precision if this is due to rounding of a number less than 0.0005.

17. The ERT did however note some instances where it appeared that inappropriate notation keys had been used, for example the use of “NO” for a number of sectors which would be considered highly likely to result in emissions. The ERT encourages Armenia to review the usage of notation keys and the notation key “NE” in instances where emissions exist but have not or cannot be estimated.

### **Completeness**

18. The ERT acknowledges the effort to which Armenia has gone to provide estimates of emissions for a number of significant sectors.

19. Armenia's inventory for most years, pollutants and sectors appears to be currently incomplete, however completeness was difficult to fully assess because of the limited use of notation keys in the reported tables, and the lack of emission data from previous years in the latest submission.

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

### **Consistency, including recalculations and time-series**

21. The ERT was unable to assess whether Armenia has undertaken any recalculations for the 2018 submission. The ERT encourages Armenia to provide emissions for historic year including any revisions, and to include the details of any recalculations in its future IIR submissions.

22. Similarly, no assessment of time series consistency was possible as part of the review due to the lack of emissions from previous years in the latest submission.

## **Comparability**

23. The ERT considered that the inventory of Armenia is not comparable with those of other reporting parties, due to a high degree of incompleteness, and the grouping of NFR codes in many instances with the use of the “IE” notation key. The ERT encourages Armenia to address these issues in order to improve comparability in future submissions.

## **CLRTAP/NECD comparability**

24. As a non-EU country, Armenia does not report emissions under the NEC Directive.

## **Accuracy and uncertainties**

25. Armenia has indicated that uncertainty estimates have not been compiled for the UNECE submission, and has not provided any information about when or whether this might be planned. The ERT encourages Armenia to compile at least Tier 1 estimates for future submissions, and include details of the results and methodology in future IIR reports.

## **Verification and quality assurance/quality control approaches**

26. Armenia has provided some general information regarding its quality assurance/quality control (QA/QC) plan. This information indicates that there are top-level checks on accuracy, completeness and comparability, as well as sector-specific checks at a national and sub-national level, however it is not specified which sectors are covered and what QA/QC methods have been used.

27. The ERT encourages the Party to describe the details of QA/QC more precisely in its IIR, including general QC procedures (Tier 1), as well as source category-specific procedures (Tier 2) for key categories and for those individual categories for which significant methodological and/or data revisions have occurred. Furthermore the ERT would encourage the Party to make any necessary improvements to QA/QC procedures so that those are in accordance with the guidance in the EMEP/EEA Guidebook (Inventory Management Chapter).

## **FOLLOW-UP TO PREVIOUS REVIEWS**

28. No Stage 3 review has been carried out for Armenia before.

## **AREAS FOR IMPROVEMENTS IDENTIFIED BY ARMENIA**

29. Armenia has not provided any information regarding future areas for improvement for consideration as part of the review. The ERT would encourage the Party to develop an improvement plan, to incorporate recommendations from the ERT in this report, and to prioritise resources for undertaking these improvements.

## TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY ERT

30. The ERT identifies gaps in information on fuel consumption for some categories and the corresponding emissions in the energy sector and calculated potential technical corrections for categories 1A1a, 1A4ai and 1A4bi by using publicly available energy statistics and the methodologies of the 2016 EMEP/EEA Guidebook. More detailed information is provided in the sectoral chapter for "Energy".

31. The ERT identifies several emission sources within the industrial processes and solvents sector which are not estimated. Potential technical corrections have been carried out for categories 2A1, 2C2, 2C6, 2C7a, 2C7b and 2D3a by using publicly available statistics and the methodologies of the 2016 EMEP/EEA Guidebook. More detailed information is provided in the sectoral chapters for "Industrial Processes" and "Solvents".

**Table 1 Summary of potential technical corrections identified by ERT for country**

| NFR category (s) | Pollutants   | Years     | Calculated by country/ ERT/ Not calculated | Potential contribution to NT (%) |
|------------------|--|-----------|--|----------------------------------|
| 1A1a             | NO <sub>x</sub> , NMVOC, SO <sub>x</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , CO, Hg, PCDD/PCDF  | 2016      | ERT  |                                  |
| 1A4ai            | NO <sub>x</sub> , NMVOC, SO <sub>x</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , CO, Pb, Cd, Hg, PCDD/PCDF, PAHs                              | 2016      | ERT  |                                  |
| 1A4bi            | NO <sub>x</sub> , NMVOC, SO <sub>x</sub> , NH <sub>3</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , CO, Pb, Cd, Hg, PCDD/PCDF, PAHs, HCB, PCBs | 2016      | ERT  |                                  |
| 2A1              | TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , BC   | 1997-2016 | ERT  |                                  |
| 2C2              | TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , BC   | 2003-2015 | ERT  |                                  |
| 2C6              | SO <sub>x</sub> , Pb, Cd, Hg, As, Zn, TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , PCBs, PCDD/PCDF  | 2003-2016 | ERT  |                                  |
| 2C7a             | SO <sub>x</sub> , Pb, Cd, Hg, As, Ni, Cr, Cu, TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , BC, PCBs, PCDD/PCDF                                  | 2003-2016 | ERT  |                                  |
| 2C7b             | SO <sub>x</sub> , TSP  | 1997-2016 | ERT  |                                  |
| 2D3a             | NMVOC, Hg  | 2003-2016 | ERT  |                                  |

## **PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY**

### **CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT**

32. The ERT identifies the following cross-cutting issues for improvement:
- (a) More detailed description of trends particularly for key categories in the IIR.
  - (b) Further sector-specific details of methodologies, particularly for key categories, currently missing from the IIR.
  - (c) Provision of sub category level chapters to aid navigation in the document.
  - (d) The use the appropriate notation keys (e.g. “NO” where emissions are “Not Occurring”, “NE” where emissions are “Not Estimated” and “IE” where emissions are “Included Elsewhere”.
  - (e) Inclusion of missing sources which may be erroneously reported as “NO”.
  - (f) Provision of details on the rationale and explanation of recalculations in the IIR report, and their implication to trends in the national total and sectors.
  - (g) To perform and present an uncertainty assessment and to use it as a tool to focus planned improvements to the key categories on.
  - (h) Recommended improvements relating to specific source categories are presented in the relevant sector chapters of this report.



## SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

### ENERGY

#### Review Scope

| Pollutants Reviewed  |  | SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, CO, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , Cd, Hg, Pb, Dioxin, PAH, HCB, PCBs |              |                         |
|--|--|--|--------------|-------------------------|
| Years  |  | 2016   |              |                         |
| 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   | X  |              | X                       |
| 1A2c   | Chemicals  | X  |              | X                       |
| 1A2d   | Pulp, Paper and Print  | X  |              | X                       |
| 1A2e   | Food processing, beverages and tobacco   | X  |              | X                       |
| 1A2f   | Stationary combustion in manufacturing industries and construction: Non-metallic minerals                                | X  |              | X                       |
| 1A2gviii   | Stationary combustion in manufacturing industries and construction: Other  | X  |              | X                       |
| 1A3ei  | Pipeline transport   | X  |              | X                       |
| 1A3eii   | Other  | X  |              | X                       |
| 1A4ai  | Commercial/institutional: Stationary   | X  |              | X                       |
| 1A4bi  | Residential: Stationary  | NO   | X            |                         |
| 1A4ci  | Agriculture/Forestry/Fishing: Stationary   | NO   | X            |                         |
| 1A5a   | Other stationary (including military)  | NO   |              |                         |
| 1B1a   | Fugitive emission from solid fuels: Coal mining and handling   | NO   |              |                         |
| 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   | NO   |              |                         |
| 1B2aiv   | Fugitive emissions oil: Refining / storage   | X  |              | X                       |
| 1B2av  | Distribution of oil products   | X  |              | X                       |
| 1B2b   | Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other) | NO   |              |                         |
| 1B2c   | Venting and flaring (oil, gas, combined oil and gas)   | NO   |              |                         |
| 1B2d   | Other fugitive emissions from energy production  | 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**

33. Armenia did not submit an IIR which makes it impossible to verify the applied methodologies and trends behind the emission estimates.

### **Completeness**

34. Armenia provided limited information on stationary combustion in its 2016 and 2018 inventory submission to LRTAP for only one reported year (2014 and 2016 respectively). Only the emissions coming from the natural gas combustion were estimated. The ERT noted that energy balances for the years 2015 and 2016 are available on the website of the Ministry of Energy Infrastructures and Natural Resources of the Republic of Armenia (<http://www.minenergy.am>). The ERT believes that this activity data could be used as a good basis for estimating air pollutant emissions according to the Guidelines for Reporting Emission Data under the LRTAP. Default emission factors from the 2016 EMEP/EEA Guidebook could be used in combination with the activity data from the energy balance to produce Tier 1 emission estimates.

### **Consistency including recalculation and time series**

35. Time series consistency and justification of recalculations could not be checked because Armenia did not submit an IIR. Armenia only reported data for the years 2014 and 2016 in the NFR14 format and as such a complete time series was not available to review.

### **Comparability**

36. The ERT could not check comparability because there was no information on the sources and methods used by Armenia. The ERT encourages Armenia to compile and submit an IIR to address the used methodology and data sources in the future.

### **Accuracy and uncertainties**

37. The ERT commends Armenia for the calculation of the emissions by using the default emission factors from the 2016 EMEP/EEA Guidebook.

38. The ERT could not check for uncertainties because of the missing IIR. The ERT encourages Armenia to provide an IIR including an uncertainty analysis and to develop a quality system for the inventory in order to perform an improvement process.

### **Improvement**

39. Armenia has not provided an IIR so the ERT cannot determine whether improvements have been made to the inventory. However, the ERT commends

Armenia for using the new NFR14 format and that it has estimated emissions from natural gas consumption for the sectors 1A1a, 1A2b, 1A2e, 1A2f, 1A2gviii and 1A4bi.

### Potential Technical Corrections

40. The ERT noted that the activity data used by Armenia is not consistent with the “Energy balance of the Republic of Armenia, 2016”. According to the NFR tables only natural gas combustion is considered in the estimates but the 2016 energy balance for Armenia also shows the consumption of solid fuels, liquid fuels and biomass combustion in the energy sector. For all NFR categories, a calculation has been realized and in the case of an underestimate above the threshold of significance, a technical correction for the NFR category has been performed. The relevant categories with technical corrections are the following categories: 1A1a, 1A4ai and 1A4bi. The ERT recommends that Armenia estimates emissions from these sectors by means of activity data from the energy balance of Armenia. Methodologies to estimate emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2016).

41. In particular, in the sector 1A1a, the ERT notes that the activity data used in 1A1a is not comparable with the natural gas consumption as provided in the energy balance 2016. In the NFR table, the value is 14.158 PJ while in the energy balance, the value is 20.9 PJ (495 ktoe + 4,4 ktoe). In the sector 1A4ai and 1A4bi, the ERT notes the activity data used in these sectors is not comparable with the natural gas consumption as provided in the energy balance. According the NFR tables, there is no solid fuels, liquid fuels or biomass consumption in the sector 1A4 while the energy balance shows consumption data for these fuels. Regarding the other categories, recommendations are presented in the sub-sector-specific recommendations.

### Sub-Sector Specific Recommendations

#### **Category issue 1: 1.A.1a, 1.A.2., 1.A.3.ei and 1.A.4. – NH<sub>3</sub>, HCB, PCBs**

42. The ERT noted that in the NFR table the notation key “NO” is used for NH<sub>3</sub>, HCB and PCBs for some energy sub-sectors while the source exists for these sectors. The notation key “NO” (not occurring) has to be used when the source or process doesn’t exist within a country. As there are no EFs available in the EMEP/EEA Emission Inventory Guidebook 2016 for these emissions in the case of the combustion of gaseous fuels or liquid fuels, the right notation keys are “NE” or “NA” instead of “NO” in the NFR tables. ERT recommends Armenia to write “NE” or “NA” when the sub-sector exists.

#### **Category issue 2: 1.A.2a, 1.A.2c and 1.A.2d – All pollutants**

43. The ERT noted that in the NFR tables, the notation keys for this sector are “NO”. But according to the “Energy balance of the Republic of Armenia”, 2016, there are natural gas consumptions in the iron and steel sector, in the chemical and petrochemical sector and in the paper, pulp and printing sector. ERT recommends that Armenia estimates these emissions to increase the completeness.

### **Category issue 3: 1.A.2b (including 1A2e, 1A2f, 1A2gviii) – All pollutants**

44. The ERT notes that the activity data used in 1A2b is not comparable with the natural gas consumption presented in the “Energy balance of the Republic of Armenia, 2016”. In the NFR table, the value is 4295 TJ and in the Energy balance, the value is (140,7 ktoe) = 5890 TJ. The ERT performed a calculation but as the difference of emissions for all pollutants was below the threshold of significance, a technical correction hasn’t been realized. The ERT recommends that Armenia estimates emissions from these sectors with the Armenian energy balance.

### **Category issue 4: 1.A.2 Stationary combustion – All pollutants**

45. The ERT notes that according the NFR tables, there is no consumption of liquid fuels or biomass in the sector 1A2 but following the Energy balance of the Republic of Armenia, 2016, these consumptions exist. The ERT recommends that Armenia estimates these emissions to increase the completeness. The EMEP/EEA Emission Inventory Guidebook 2016 suggests emission factors for these fuels.

### **Category issue 5: 1.A.3.ei and 1.A.4.ai – NO<sub>x</sub>, NMVOC, SO<sub>x</sub>, BC, CO, Pb, Cd**

46. The ERT noted that in the NFR table the notation key “IE” is used for these sectors, but no explanation is given as to where the emissions are included. The ERT encourages Armenia to give explanations for this in its future IIR and at least in the NFR tables

### **Category issue 6: 1.B.1.c Other fugitive emission from solid fuels – NMVOC**

47. The ERT noted that in the NFR tables, the notation keys for this sector are “NO”. But according to the website: <http://www.factfish.com/statistic-country/armenia/peat%2C%20production> and to information in the energy balance of Armenia, peat production exists. The ERT recommends to estimate these emissions to increase the completeness or to write “NE” if there isn’t a country specific methodology, as currently there is no methodology to estimate these emissions in the Guidebook

### **Category issue 7: 1.B.2.av Distribution of oil products – NMVOC**

48. The ERT noted that in the NFR tables, the notation keys for this sector are “NO”. However according to the Armenian energy balance, the consumption of motor gasoline exists for road transportation. The ERT recommends that Armenia estimates these emissions to increase the completeness. The EMEP/EEA Emission Inventory Guidebook 2016 suggests a Tier 1 methodology for this source (Table 3-1: Tier 1 emission factor for source category 1B2av distribution of oil products). Regarding the other pollutants, the notation key is “NA”.

### **Category issue 8: 1.B.2.b Fugitive emissions from natural gas – NMVOC**

49. The ERT noted that in the NFR tables, the notation keys for this sector are “NO”. However following the Armenian energy balance, fugitive emissions from natural gas (transmission, storage, distribution and other) occur in Armenia (line

“distribution losses” in the energy balance). The ERT recommends that Armenia estimates these emissions to increase the completeness. The NMVOC emissions are estimated by using the content of NMVOC in the natural gas leaks. Regarding the other pollutants, the notation key is “NA” .

## TRANSPORT

### Review Scope

| Pollutants Reviewed  |   | All        |              |                         |
|--|---|------------|--------------|-------------------------|
| Years  |   | 2014, 2016 |              |                         |
| Code   | Name  | Reviewed   | Not Reviewed | Recommendation Provided |
| 1A2gvii  | Mobile Combustion in manufacturing industries and construction        | X          |              | X                       |
| 1A3ai(i)   | International aviation LTO (civil)                                    | X          |              | X                       |
| 1A3ai(ii)  | International aviation cruise (civil)                                 | X          |              | X                       |
| 1A3aii(i)  | Domestic aviation LTO (civil)   | X          |              | X                       |
| 1A3aii(ii)   | Domestic aviation cruise (civil)                                      | X          |              | X                       |
| 1A3bi  | Road transport: Passenger cars  | X          |              | X                       |
| 1A3bii   | Road transport: Light duty vehicles                                   | X          |              | X                       |
| 1A3biii  | Road transport: Heavy duty vehicles and buses                         | X          |              | X                       |
| 1A3biv   | Road transport: Mopeds & motorcycles                                  | X          |              | X                       |
| 1A3bv  | Road transport: Gasoline evaporation                                  | X          |              | X                       |
| 1A3bvi   | Road transport: Automobile tyre and brake wear                        | X          |              | X                       |
| 1A3bvii  | Road transport: Automobile road abrasion                              | X          |              | X                       |
| 1A3c   | Railways  | X          |              | X                       |
| 1A3di(ii)  | International inland waterways  | X          |              | X                       |
| 1A3dii   | National navigation (shipping)  | X          |              | X                       |
| 1A4aii   | Commercial/institutional: Mobile                                      | X          |              | X                       |
| 1A4bii   | Residential: Household and gardening (mobile)                         | X          |              | X                       |
| 1A4cii   | Agriculture/Forestry/Fishing: Off-road vehicles and other machinery   | X          |              | X                       |
| 1A4ciii  | Agriculture/Forestry/Fishing: National fishing                        | X          |              | X                       |
| 1A5b   | Other, Mobile (including military, land based and recreational boats) |            | X            |                         |
| 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**

50. Transparency could not be checked because Armenia did not provide an IIR and only reported emission data for two years (2014 and 2016). Consequently, the methodology employed cannot be checked by the ERT. No explanations of the emission trends over time are given. The ERT encourages Armenia to provide an IIR with all future submissions.

## **Completeness**

51. Armenia provided limited information for transport sector in its 2016 and 2018 inventory submission to LRTAP each only reporting emission data for one year (2014 and 2016 respectively). The Party has all emissions from the road transport sector allocated in one category and submitted as 1A3bi road transport: passenger cars. The ERT recommends Armenia to carry out calculations separately for each transport category. The ERT also recommends Armenia to use default emission factors from the 2016 EMEP/EEA Guidebook.

## **Consistency including recalculation and time series**

52. Consistency could not be checked because Armenia didn't provide an IIR, Armenia only reported emission data for two years (2014 and 2016) and didn't report recalculations. The ERT recommends Armenia to update emissions from previous submissions if necessary.

## **Comparability**

53. The ERT could not check comparability because there was a lack of information on the sources and methods used by Armenia. The ERT recommends Armenia to compile and submit an IIR to address source descriptions and methods used.

## **Accuracy and uncertainties**

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

## **Improvement**

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

## **Potential Technical Corrections**

56. The ERT was not able to calculate technical corrections because of the limited data provided.

## **Sub-Sector Specific Recommendations**

### **Category issue 1: 1A2gvii, 1A3c, 1A3di(ii), 1A3dii, 1A4aii, 1A4bii, 1A4cii, 1A4ciii**

57. The ERT noted that in the NFR table the notation key "NO" is used for NO<sub>x</sub>, NMVOC, SO<sub>x</sub>, NH<sub>3</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, DIOX, benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno(1,2,3-cd)pyrene and the notation key "NA" is used for Aldrin, Chlordane, Chlordecone, Dieldrin, Endrin, Heptachlor, Hexabromo- biphenyl, Mirex, Toxaphene, HCH, DDT,

PCBs, HCB, PCP, SCCP. The notation key “NO” (not occurring) has to be used when the source or process doesn’t exist within a country. The ERT recommends Armenia to write “NE” or “NA” when the sub-sector exists.

**Category issue 1: 1A3bi, 1A3bii, 1A3biii, 1A3biv, 1A3bv, 1A3bvi, 1A3bvii**

58. The ERT noted that all road transport emissions are allocated in 1A3bi road transport: passenger cars. ERT recommends Armenia to calculate emissions separately. The ERT recommends Armenia to carry out calculations with the default emission factors from the 2016 EMEP/EEA Guidebook (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2016>).

**Category issue 3: 1A3bi, 1A3bii, 1A3biii, 1A3biv, 1A3bv, 1A3bvi, 1A3bvii for PM<sub>2.5</sub>, PM<sub>10</sub> and TSP emissions**

59. The ERT noted that in the NFR table for the all road transport sector for PM<sub>2.5</sub>, PM<sub>10</sub> and TSP emission are used the notation key “NE”. The ERT recommends Armenia to carry out calculations with the default emission factors from the 2016 EMEP/EEA Guidebook (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2016>).

**Category issue 1: 1A3aii(i), 1A3ai(i)**

60. The ERT noted that in the NFR table the notation key “NE” is used. The ERT notes that in the “National Greenhouse Gas Inventory Report of the Republic of Armenia for 2014” ([http://www.mnp.am/uploads/1/1526477578NIR%202014\\_eng\\_FINAL.pdf](http://www.mnp.am/uploads/1/1526477578NIR%202014_eng_FINAL.pdf)) there are information about GHG emissions from 1A3aii(i), 1A3ai(i). In the Eurocontrol database the fuel consumption data from Armenia are available. The ERT recommends Armenia to use this data to calculate emissions from the 1A3aii(i), 1A3ai(i) categories. The ERT also recommends Armenia to carry out calculations with the default emission factors from the 2016 EMEP/EEA Guidebook (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2016>).



## INDUSTRIAL PROCESSES

### Review Scope

| Pollutants Reviewed   |   | SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , HMs and POPs |              |                         |
|---|---|--|--------------|-------------------------|
| Years   |   | 2016   |              |                         |
| Code  | Name  | Reviewed   | Not Reviewed | Recommendation Provided |
| 2A1   | Cement production   | X  |              |                         |
| 2A2   | Lime production   | X  |              | X                       |
| 2A3   | Glass production  | X  |              |                         |
| 2A5a  | Quarrying and mining of minerals other than coal                                    |  |              |                         |
| 2A5b  | Construction and demolition   |  |              |                         |
| 2A5c  | Storage, handling and transport of mineral products                                 |  |              |                         |
| 2A6   | Other mineral products  |  |              |                         |
| 2B1   | Ammonia production  |  |              |                         |
| 2B2   | Nitric acid production  |  |              |                         |
| 2B3   | Adipic acid production  |  |              |                         |
| 2B5   | Carbide production  |  |              |                         |
| 2B6   | Titanium dioxide production   |  |              |                         |
| 2B7   | Soda ash production   |  |              |                         |
| 2B10a   | Chemical industry: Other  | X  |              | X                       |
| 2B10b   | Storage, handling and transport of chemical products                                |  |              |                         |
| 2C1   | Iron and steel production   |  |              |                         |
| 2C2   | Ferroalloys production  | X  |              |                         |
| 2C3   | Aluminium production  |  |              |                         |
| 2C4   | Magnesium production  |  |              |                         |
| 2C5   | Lead production   |  |              |                         |
| 2C6   | Zinc production   | X  |              | X                       |
| 2C7a  | Copper production   | X  |              | X                       |
| 2C7b  | Nickel production   |  |              |                         |
| 2C7c  | Other metal production  | X  |              | X                       |
| 2C7d  | Storage, handling and transport of metal products                                   |  |              |                         |
| 2D3b  | Road paving with asphalt  | X  |              |                         |
| 2D3c  | Asphalt roofing   |  |              |                         |
| 2H1   | Pulp and paper industry   | X  |              | X                       |
| 2H2   | Food and beverages industry   | X  |              |                         |
| 2H3   | Other industrial processes  |  |              |                         |
| 2I  | Wood processing   |  |              |                         |
| 2J  | Production of POPs  |  |              |                         |
| 2K  | Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)     |  |              |                         |
| 2L  | Other production, consumption, storage, transportation or handling of bulk products |  |              |                         |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns. |   |  |              |                         |

## General recommendations on cross cutting issues

### **Transparency**

61. Armenia provided emission data for 2016 only, but did not provide an IIR. There is therefore a lack of transparency in the inventory provided by Armenia.

62. The NFR table for 2016 either contains emissions data or uses notation keys where estimates are not available or necessary for all source categories within the industrial processes sector. The notation keys “NO” and “NE” have been used for several potentially significant sources. The notation key “IE” is also used and no information is available on where these emissions are included. The ERT recommends Armenia to use appropriate notation keys (e.g. “NO” where emissions are “Not Occurring”, “NE” where emissions are “Not Estimated”, “IE” where emissions are “Included Elsewhere” and “NA” where emissions are “Not Applicable”) for reporting where estimates are not available or necessary.

63. Armenia did not provide activity data for categories where emissions have been reported in the NFR table for 2016. For those categories, it has not been possible to compare the implied emission factors with the values provided by the Guidebook.

64. Armenia did not respond to the questions sent by the ERT during the review.

65. Armenia did not provide a detailed and generally transparent emission inventory for the industrial processes sector. No methodology description has been made available to the ERT before and during the review. The ERT recommends Armenia to include detailed descriptions of methodologies, emission factors and activity data in the IIR.

### **Completeness**

66. Armenia has reported emissions for six different sources in the 2016 NFR table. Armenia also uses notation keys for potentially significant emission sources for which production statistics are available at Statistical Committee of the Republic of Armenia. The inventory provided by Armenia is therefore not considered complete. The ERT recommends Armenia to estimate emissions for all categories using emission factors provided in the 2016 EMEP/EEA Guidebook.

### **Consistency including recalculation and time series**

67. Armenia provided data for the year 2016 only. It is therefore not possible to assess the consistency of the inventory. Since no IIR has been provided, recalculations could not be assessed by the ERT.

### **Comparability**

68. As no IIR has been provided by Armenia and Armenia did not respond to the questions during the review, comparability could not be assessed by the ERT.

## **Accuracy and uncertainties**

69. As no IIR has been provided by Armenia and Armenia did not respond to the questions during the review, accuracy and uncertainties could not be assessed by the ERT.

## **Improvement**

70. As no IIR have been reported by Armenia and as Armenia did not respond to the questions during the review, improvement could not be assessed by the ERT.

## **Potential Technical Corrections**

71. The ERT noted that Cd, Zn, PCBs and PCDD/PCDF emissions from NFR 2C6 (zinc production) have been reported as “NO” although methodology is available in the 2016 EMEP/EEA Guidebook. Armenia did not provide any answer to the question raised on the issue by the ERT. Because Cd, Zn, PCBs and PCDD/PCDF emissions from zinc production would be significant compared to the Armenia's national total (5%, 3%, 100%, 103%, respectively), the ERT calculated a technical correction. The ERT recommends Armenia to include the technical correction as a revised estimate into the next submission.

72. The ERT noted that Cd, Hg, Cr, Ni, PCBs and PCDD/PCDF emissions from NFR 2C7a (copper production) have been reported as “NO” while PM<sub>10</sub> and PM<sub>2.5</sub> has been reported as “NE” although methodology is available in the 2016 EMEP/EEA Guidebook for these pollutants. Armenia did not provide any answer to the question raised on the issue by the ERT. Because PM<sub>10</sub>, PM<sub>2.5</sub>, Cd, Hg, Zn, PCBs and PCDD/PCDF emissions from copper production would be significant comparing to the Armenia's national total (7%, 16%, 71 000%, 56%, 50 000%, 35 000%, 100% and 5 000%, respectively), the ERT calculated a technical correction. The ERT recommends Armenia to include the technical correction as a revised estimate into the next submission.

73. The ERT noted that TSP emissions from NFR 2C7c (Other metal production) have been reported as “NO” although methodology is available in the 2016 EMEP/EEA Guidebook for this pollutant. Armenia did not provide any answer to the question raised on the issue by the ERT. Because TSP emissions from molybdenum production would make up to around 4 % of the Armenia's total TSP emissions, the ERT calculated a technical correction. The ERT recommends Armenia to include the technical correction as a revised estimate into the next submission.

## Sub-Sector Specific Recommendations

### **Category issue 1: 2.A.2 Lime production**

74. The ERT noted that Armenia reported emissions from Lime production (2A2) as NO. Nevertheless, the ERT has noted that lime production seems to occur in Armenia and that production is available in published statistics by the statistical committee of the republic of Armenia. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to check the availability of lime production in the national statistics and to estimate emissions from that category according to the 2016 EMEP/EEA Guidebook.

### **Category issue 2: 2.B.10a Chemical industry-Other**

75. The ERT noted that Armenia reported emissions from all chemical industry sectors (2B) as “NO”. Nevertheless, the ERT has noted that chemical production seems to occur in Armenia and that data are available in published statistics by the statistical committee of the republic of Armenia. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to check the availability of chemical production in the national statistics and to estimate emissions from that category according to the 2016 EMEP/EEA Guidebook.

### **Category issue 3: 2.C.6 Zinc production**

76. The ERT noted that Armenia reported emissions from zinc production (2C6) as “NO”. Nevertheless, the ERT has noted that zinc production is available in a published yearbook statistic by the statistical committee of the Republic of Armenia. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to include the proposed technical correction from the ERT as a revised estimate into the next submission.

### **Category issue 4 2.C.7a Copper production**

77. The ERT noted that Armenia reported Pb and As emissions from copper production in the NFR table. The ERT commends Armenia for it. As no activity data were reported in the NFR table, the ERT used the copper production published by the statistical committee of the Republic of Armenia in the statistical yearbook to calculate an implied emission factor for that category. The ERT noted that calculated implied emission factors are much lower than the default emission factors proposed in the 2016 EMEP/EEA Guidebook. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to include an assessment of these emissions factors in the IIR for the next submission.

### **Category issue 5: 2.C.7c Other metal production**

78. The ERT noted that Armenia reported emissions from other metal production (2C7c) as “NO”. Nevertheless, the ERT has noted that molybdenum production occurs in Armenia, as production data are available in published yearbook statistic by the statistical committee of the Republic of Armenia. Armenia did not provide any

answer to the question raised on the issue by the ERT. The ERT recommends Armenia to include the proposed technical correction from the ERT as a revised estimate into the next submission.

### **Category issue 6: 2.H.1 Pulp and paper production**

79. The ERT noted that Armenia reported emissions from Pulp and paper production (2H1) as “NO”. Nevertheless, the ERT has noted that paper production seems to occur in Armenia since paper production is available in published statistics by the statistical committee of the Republic of Armenia. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to check the availability of activity data from pulp and paper production and to estimate emissions from that category according to the 2016 EMEP/EEA Guidebook.

## SOLVENTS

### Review Scope

| Pollutants Reviewed   |   | SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> |              |                         |
|---|---|---|--------------|-------------------------|
| Years   |   | 2016  |              |                         |
| Code  | Name                                      | Reviewed  | Not Reviewed | Recommendation Provided |
| 2D3a  | Domestic solvent use including fungicides | X   |              | X                       |
| 2D3d  | Coating applications                      | X   |              | X                       |
| 2D3e  | Degreasing                                | X   |              | X                       |
| 2D3f  | Dry cleaning                              |   |              |                         |
| 2D3g  | Chemical products                         |   |              |                         |
| 2D3h  | Printing                                  |   |              |                         |
| 2D3i  | Other solvent use                         |   |              |                         |
| 2G  | Other product use                         |   |              |                         |
| 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**

80. Armenia provided emissions data for 2016 only, and did not provide an IIR. There is therefore a lack of transparency in the inventory provided by Armenia.

81. The NFR table for 2016 only contains notation keys for all source categories within the solvent sector. The notation keys “NO” and “NE” are used for several potentially significant sources while the notation key “NA” is used for NMVOC emissions from coating application and degreasing. The ERT recommends Armenia to use appropriate notation keys (e.g. “NO” where emissions are “Not Occurring”, “NE” where emissions are “Not Estimated”, “IE” where emissions are “Included Elsewhere” and “NA” where emissions are “Not Applicable”) for reporting where estimates are not available or necessary.

82. Armenia did not respond to the questions sent by the ERT during the review.

83. Armenia did not provide a detailed and generally transparent emission inventory for the solvent sector. No methodology description has been made available to the ERT before and during the review. The ERT recommends Armenia to report an IIR, which includes detailed descriptions of methodologies, emission factors and activity data.

#### **Completeness**

84. Armenia did not report any emission value for the solvent sector. The inventory provided by Armenia can therefore not be considered complete. The ERT recommends Armenia to estimate emissions for all relevant categories and pollutants using emission factors provided by the 2016 EMEP/EEA Guidebook.

### **Consistency including recalculation and time series**

85. Armenia has not reported any emission for the solvent sector. Since no IIR has been provided, recalculations could not be assessed either by the ERT.

### **Comparability**

86. As neither emissions nor IIR have been reported by Armenia and as Armenia did not respond to the questions raised during the review, comparability could not be assessed by the ERT.

### **Accuracy and uncertainties**

87. As neither emissions nor IIR have been reported by Armenia and as Armenia did not respond to the questions raised during the review, accuracy and uncertainties could not be assessed by the ERT.

### **Improvement**

88. As neither emissions nor IIR have been reported by Armenia and as Armenia did not respond to the questions raised during the review, improvement could not be assessed by the ERT.

## **Potential Technical Corrections**

89. The ERT noted that NMVOC and Hg emissions from NFR 2D3a (Domestic solvent use including fungicides) have been reported as “NE” although methodology is available in the 2016 EMEP/EEA Guidebook for these pollutants. Armenia did not provide any answer to the question raised on the issue by the ERT. Because NMVOC and Hg emissions from domestic solvent use would make up to around 10 % and 100% of Armenia's total, respectively, the ERT calculated a technical correction for these pollutants. The ERT recommends Armenia to include the technical correction as a revised estimate into the next submission.

## **Sub-Sector Specific Recommendations**

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

90. The ERT noted that Armenia did not report emissions from domestic solvent use including fungicides and that the notation key “NE” is used although a methodology is available in the 2016 EMEP/EEA Guidebook using population as activity data. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to include the proposed technical correction from the ERT as a revised estimate into the next submission.

## **Category issue 2: 2.D.3d Coating applications and 2.D.3.e Degreasing**

91. The ERT noted that Armenia did not report emissions from domestic solvent use including fungicides and used the notation key "NA" for NMVOC emissions in the NFR table and "NO" for the other pollutants. According to the 2016 EMEP/EEA Guidebook, both categories are NMVOC emission sources. Armenia did not provide any answer to the question raised on the issue by the ERT. The ERT recommends Armenia to use the appropriate notation keys (e.g. "NO" where emissions are "Not Occurring", "NE" where emissions are "Not Estimated", "IE" where emissions are "Included Elsewhere" and "NA" where emissions are "Not Applicable").



## AGRICULTURE

### Review Scope

| Pollutants Reviewed   |   | All      |              |                         |
|---|---|----------|--------------|-------------------------|
| Years   |   | 2016     |              |                         |
| Code  | Name  | Reviewed | Not Reviewed | Recommendation Provided |
| 3B1a  | Dairy cattle  |          | X            |                         |
| 3B1b  | Non-dairy cattle  |          | X            |                         |
| 3B2   | Sheep   |          | X            |                         |
| 3B3   | Swine   |          | X            |                         |
| 3B4a  | Buffalo   |          | X            |                         |
| 3B4d  | Goats   |          | X            |                         |
| 3B4e  | Horses  |          | X            |                         |
| 3B4f  | Mules and asses   |          | X            |                         |
| 3B4gi   | Laying hens   |          | X            |                         |
| 3B4gii  | Broilers  |          | X            |                         |
| 3B4giii   | Turkeys   |          | X            |                         |
| 3B4giv  | Other poultry   |          | X            |                         |
| 3B4h  | Other animals   |          | X            |                         |
| 3Da1  | Inorganic N-fertilizers (includes also urea application)  |          | X            |                         |
| 3Da2a   | Animal manure applied to soils  |          | X            |                         |
| 3Da2b   | Sewage sludge applied to soils  |          | 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            |                         |
| 3F  | Field burning of agricultural residues  |          | X            |                         |
| 3I  | Agriculture other   |          | X            |                         |
| 11A   | Volcanoes   |          | X            |                         |
| 11B   | Forest fires  |          | X            |                         |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns. |   |          |              |                         |

### General recommendations on cross cutting issues

92. Due to resource limitations in the 2018 review process, the agriculture sector could not be reviewed.

## WASTE

### Review Scope

| Pollutants Reviewed   |  | SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> |              |                         |
|---|--|---|--------------|-------------------------|
| Years   |  | 2016  |              |                         |
| Code  | Name   | Reviewed  | Not Reviewed | Recommendation Provided |
| 5A  | Solid waste disposal on land   | X   |              | X                       |
| 5B1   | Biological treatment of waste - Composting                               | X   |              | X                       |
| 5B2   | Biological treatment of waste - Anaerobic digestion at biogas facilities | X   |              | X                       |
| 5C1a  | Municipal waste incineration   | X   |              | X                       |
| 5C1bi   | Industrial waste incineration  | X   |              | X                       |
| 5C1bii  | Hazardous waste incineration   | X   |              | X                       |
| 5C1biii   | Clinical waste incineration  | X   |              | X                       |
| 5C1biv  | Sewage sludge incineration   | X   |              | X                       |
| 5C1bv   | Cremation  | X   |              | X                       |
| 5C1bvi  | Other waste incineration   | X   |              | X                       |
| 5C2   | Open burning of waste  | X   |              | X                       |
| 5D1   | Domestic wastewater handling   | X   |              | X                       |
| 5D2   | Industrial wastewater handling   | X   |              | X                       |
| 5D3   | Other wastewater handling  | X   |              | X                       |
| 5E  | Other waste  | X   |              | X                       |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns. |  |   |              |                         |

### General recommendations on cross cutting issues

#### **Transparency**

93. Armenia did not provide any emissions for the waste sector (NFR 6). The ERT encourages Armenia to develop an inventory for these sectors in accordance with the methodology provided in the EMEP/EEA Guidebook, 2016, and to report the emissions in NFR tables, and also to develop an IIR in accordance with the Reporting Guidelines for the Convention.

94. In the NFR tables all the emission cells of the waste sector, except 5C1biii, are filled with “NO” and activity data are not provided, while the ERT noted that some activity data are available. For more information and recommendations see the Sub-sector Specific Recommendations.

#### **Completeness**

95. Armenia did not provide an Informative Inventory Report and only submitted NFR tables for the years 2007, 2014 and 2016 and some emission overviews without emissions from the waste Sector. The ERT strongly recommends Armenia to prepare an IIR with all necessary information and NFR Tables for the whole time series for the next submission.

## **Consistency, including recalculation and time series**

96. Armenia did not provide an IIR with information on recalculations and therefore the ERT is not able to comment on them. The ERT recommends that Armenia provides information on recalculations as part of its next submission.

97. As already mentioned, the ERT notes that Armenia has not provided a full time series of emissions. Therefore, it is not possible to analyse the time series.

## **Comparability**

98. Due to the lack of emission data and an IIR, the ERT was unable to conclude whether the methodologies used in the waste sector are in accordance with the EMEP/EEA Guidebook, 2016 and comparable with inventories from other countries.

## **Accuracy and uncertainties**

99. Armenia did not provide an IIR with information on QA/QC and uncertainties and therefore the ERT is not able to comment on them. The ERT recommends that Armenia provides information on recalculations and uncertainties as part of its next submission.

## **Improvement**

100. Armenia did not provide an IIR with information on planned improvements, and therefore the ERT is not able to comment on them. The ERT recommends that Armenia provides information on improvements as part of its next submission.

## **Potential Technical Corrections**

101. No technical corrections are recommended.

## **Sub-Sector Specific Recommendations**

### **Category issue 1: 5.A Municipal solid waste**

102. In Armenia's First Biennial Update Report (Yerevan, 2016), activity data and CH<sub>4</sub> emissions from municipal solid waste (5A) are included. The ERT encourages Armenia to estimate NMVOC emissions, with the help of these activity data, according to the methodology provided in the EMEP/EEA Guidebook 2016.

### **Category issue 2: 5.B Wastewater handling**

103. In Armenia's First Biennial Update Report (Yerevan, 2016), activity data and CH<sub>4</sub> emissions from wastewater handling (5B) are included. The ERT encourages Armenia to estimate NMVOC emissions, with the help of these activity data, according to the methodology provided in the EMEP/EEA Guidebook 2016.

## **MATERIALS USED BY THE REVIEW TEAM**

1. Annex 1 NFR tables; 12.03.2018,
2. 4-annex IV reporting template 2014, submitted 22.02.2016
3. Armenia emissions 2013, submitted 13.02.2015
4. Armenia Stage 1 report 2018
5. Data and tools developed by CEIP (<http://unece-stage3.wikidot.com/data-analysis>)

## **LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW**

104. Armenia did not respond to the questions raised by ERT (wiki) and did not provide any additional materials during the review.
105. ERT commends Armenia for submitting an IIR (August 2018) , however the report could be not considered in this review.

## **ANNEX I POTENTIAL TECHNICAL CORRECTIONS**

106. Technical corrections have been proposed by the ERT during the review week for the energy, industry and solvent use sectors.
107. Detailed related information is provided separately in the 2 excel files:
  - TC-AM-2017-Energy-1.xlsx
  - TC-AM-2017-Industry and Solvents-1.xlsx

## REFERENCES

- EMEP/EEA, 2016. EMEP/EEA air pollutant emission inventory guidebook – 2016. EEA Technical report No 21/2016. Available at: [www.eea.europa.eu/publications/emep-eea-guidebook-2016](http://www.eea.europa.eu/publications/emep-eea-guidebook-2016)
- EMEP/EEA, 2013. EMEP/EEA air pollutant emission inventory guidebook – 2013. EEA technical report No. 1209/2013. European Environment Agency, Copenhagen. Available at: [www.eea.europa.eu/publications/emep-eea-guidebook-2013](http://www.eea.europa.eu/publications/emep-eea-guidebook-2013)
- TFEIP, 2017. A Process for Technical Revisions During CLRTAP Emissions Inventory Review. Available at: [http://webdab1.umweltbundesamt.at/Inventory\\_Review\\_2017/00\\_General/Technical%20corrections%20guidance/CLRTAP\\_Technical\\_Revisions\\_v3.pdf](http://webdab1.umweltbundesamt.at/Inventory_Review_2017/00_General/Technical%20corrections%20guidance/CLRTAP_Technical_Revisions_v3.pdf)
- TFEIP, 2016. Proposal for updating the 'Methods and procedures' document laying down the process for the EMEP emission inventory review. Available at: [www.unece.org/fileadmin/DAM/env/documents/2016/AIR/EMEP/Informal\\_Document/3\\_Methods\\_Procedures\\_update\\_proposal\\_May2016\\_ISSUE1\\_TFEIP.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2016/AIR/EMEP/Informal_Document/3_Methods_Procedures_update_proposal_May2016_ISSUE1_TFEIP.pdf)
- UNECE, 2007. Methods and procedures for the technical review of air pollutant emission inventories reported under the Convention and its protocols (EB.AIR/GE.1/2007/16). Available at: [www.ceip.at/fileadmin/inhalte/emep/review/RevGuid\\_ece.eb.air.ge.1.2007.16.e.pdf](http://www.ceip.at/fileadmin/inhalte/emep/review/RevGuid_ece.eb.air.ge.1.2007.16.e.pdf)
- UNECE, 2014. Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/125). Available at: [www.ceip.at/fileadmin/inhalte/emep/reporting\\_2009/Rep\\_Guidelines\\_ECE\\_EB\\_AIR\\_97\\_e.pdf](http://www.ceip.at/fileadmin/inhalte/emep/reporting_2009/Rep_Guidelines_ECE_EB_AIR_97_e.pdf)