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**Report for the Stage 3 *ad-hoc* review of emission  
inventories submitted under the UNECE LRTAP  
Convention:**

**2023**

**Estonia**

**FINAL REPORT**

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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 'Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention'<sup>(1)</sup> – hereafter referred to as the 'Review Guidelines 2018'.

2. Paragraph 7 (c) of the 'Review Guidelines 2018' defines that Stage 3 Reviews may be annual centralized reviews or ad hoc reviews. Paragraph 18 of the 'Review Guidelines 2018' further specifies that such ad hoc reviews could, for instance, focus on specific source sectors, specific pollutants such as heavy metals or persistent organic pollutants, gridded and projections data, or on other areas as requested by the Implementation Committee and that where appropriate, ad hoc reviews could be conducted in line with the present Methods and Procedures for the In-depth (Stage 3) review.

3. At its eighth joint session in September 2022, the Steering Body and the Working Group on Effects approved the plan that the in-depth review in 2023 focuses on emissions from agriculture with a special emphasis on ammonia, NMVOC and NO<sub>x</sub> emissions including gridded data. While the focus was set on NH<sub>3</sub>, NMVOC and NO<sub>x</sub> emissions, also all other pollutants covered by LRTAP Convention and its protocols (i.e. SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> PM<sub>2.5</sub>, BC, priority HMs and POP<sub>S</sub>) have been checked for the time series years 1990 – 2021 to the extent possible. For these other pollutants especially completeness of reporting was assessed.

4. This report covers the results of the Stage 3 Review (ad hoc review) 2023 of Estonia's air emission inventory submitted under the UNECE LRTAP Convention. The review was coordinated by the EMEP Centre on Emission Inventories and Projections (CEIP) acting as Review Secretariat. The review took place between April and June 2023 and was performed as a desk review between 31 March to 5 May 2023 and an in-person meeting between 22 of May 2023 and 26 May 2023 (centralized review). The following team of nominated experts from the Roster of Experts performed the review.

## **Agriculture experts:**

Ms. Armine ARTENYAN (Republic of Armenia)

Ms. Ajla BASOVIC (Montenegro)

Ms. Aleksandra NESTOROVSKA-KRSTESKA (North Macedonia)

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<sup>1</sup> Decision 2018/1 adopted by EB: *Updated methods and procedures for the technical review of air pollutant emission inventories reported under the Convention*. ECE/EB.AIR/142/Add.1  
[http://www.unece.org/fileadmin/DAM/env/documents/2002/eb/air/EB%20Decisions/Decision\\_2018\\_1.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2002/eb/air/EB%20Decisions/Decision_2018_1.pdf)

Mr. Lasha AKHALAIA (Georgia)

Mr. Hakam AL-HANBALI (Sweden)

Ms. Susana LOPEZ-APARICIO (EU/ETC(EEA))

Ms. Simone MAYER (Austria)

Ms. Andjelka RADOSAVLJEVIC (Serbia)

Ms. Kristina Tonhauzer (Slovakia)

Mr. Tim VAN DER ZEE (Netherlands)

**Experts for gridded emission data:**

Ms. Christine BRENDLE (Austria)

Mr. Christopher EVANGELIDES

Mr. Christian MIELKE (Germany)

5. Mr. Ben RICHMOND (United Kingdom), Ms. Rikke ALBREKTSEN (Denmark), Mr. Etienne MATHIAS (France), Ms. Kristina SAARINEN (Finland) were the lead reviewers. The review was coordinated by Ms. Sabine Schindlbacher and Mr. Bernhard Ullrich (EMEP Centre on Emission Inventories and Projections - CEIP).

6. The review was performed on the basis of CLRTAP emission data officially reported by Estonia, due by 15 February 2023. The Informative Inventory Reports (IIR), reported due by 15 March 2023 under the CLRTAP, informed the review.

7. The EMEP/EEA Guidebook 2019<sup>2</sup> was used as a base for the review.

8. The emission inventory of Estonia was received on 10 February 2023 and thus by the deadline of 15 February. The Informative Inventory Report was received on 14 March 2023 and thus by the deadline of 15 March. Estonia provided a resubmission of the emission inventory, on 14 March 2023. This resubmission has been considered for the review.

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<sup>2</sup> EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2019, EEA Report No. 13/2019 European Environment Agency, Copenhagen. Available at: <https://www.eea.europa.eu/publications/emep-eea-guidebook-2019> EU 2019

## **PART A: GENERAL RECOMMENDATIONS FOR THE CHAPTER AGRICULTURE**

9. The ERT recognises the level of effort undertaken by Estonia in providing an inventory including a significant level of detail.

The IIR describes the methods used for the sector agriculture transparently. The ERT considers the agriculture part of the inventory submission to be of very good quality in terms of completeness and of good quality in terms of accuracy, comparability and consistency.

To improve the overall quality of the agriculture air emission inventory the ERT recommends Estonia to:

- provide transparent information on recalculations.
- ensure that the time series are consistent
- increase the capacities of the air pollution inventory team in order to manage transparent, complete, comparable, consistent and accurate inventory submission within deadlines set up in the UNECE reporting Guidelines.
- provide detailed information on its QA/QC plan for its air emission inventory in future submissions.

## **PART B: SPECIFIC RECOMMENDATIONS FOR THE SECTOR AGRICULTURE**

10. Table 1 provides the findings from the 2023 CLRTAP Stage 3 Review including those not implemented from previous CLTRAP Stage 3 Reviews. While the focus was set on NH<sub>3</sub>, NMVOC and NO<sub>x</sub> emissions, also all other pollutants covered by the LRTAP Convention and its protocols (i.e. SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> PM<sub>2.5</sub>, BC, priority HMs and POP<sub>s</sub>) have been checked for the years 1990 – 2021 to the extent possible, especially regarding the completeness of reporting. The implementation of the recommendations will be followed up in a future CLRTAP inventory review.

**Table 1: Findings from the CLRTAP Stage 3 Review 2023 for the Sector Agriculture<sup>3</sup>**

| ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Pollutants      | NFR category | Key Category | Tier level    | Type | TAC <sub>1</sub> C <sub>2</sub> C <sub>3</sub> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|--------------|---------------|------|------------------------------------------------|
| EE-2023-3B-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | NO <sub>x</sub> | 3B           | No           | Tier 2        | R    | C <sub>3</sub>                                 |
| <p><b>Observation</b></p> <p>The ERT noticed that in the sector 3B4giv, which is not a key category, NO<sub>x</sub> emissions from other poultry increase between 2019 and 2020 by over 300%. During the review Estonia explained that there was an error in the calculation module and the problem did not impact the whole timeseries, some years including the most recent are accurate. The ERT notes that this trend is not visible for any other pollutant. During the review, the Party stated that this will be addressed in the next submission.</p> <p><b>Recommendation</b></p> <p><b>The ERT recommends the Party address this error in sector 3B4giv for NO<sub>x</sub> and report the correct emission estimates in the 2024 submission.</b></p> |                 |              |              |               |      |                                                |
| ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Pollutants      | NFR category | Key Category | Tier level    | Type | TAC <sub>1</sub> C <sub>2</sub> C <sub>3</sub> |
| EE-2023-3B-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | NH <sub>3</sub> | 3B           | Yes          | Tier 2-Tier 3 | R    | T                                              |
| <p><b>Observation</b></p> <p>The ERT has reviewed the Figure 5.4 'NH<sub>3</sub> emissions from manure management in the period of 1990-2021' in the IIR. On the second axis</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |              |              |               |      |                                                |

<sup>3</sup> Note: There are four possible types of findings: R: Recommendation, TC: Technical Correction, PTC: Potential Technical Correction; RE : Revised Estimate

The findings have been assigned to one or more of the following criteria: TACCC T (Transparency), A (Accuracy), C<sub>1</sub> (Completeness), C<sub>2</sub> (Comparability), C<sub>3</sub> (Consistency) for definitions of these criteria see EMEP/EEA Guidebook 2019

the milk production in kt is presented. During the review, Estonia explained that this secondary axis concerns only milk production from dairy cattle. The milk production from other categories than dairy cattle is not significant in Estonia.

**Recommendation**

**The ERT encourages the Party to specify in the figure that milk production only relates to dairy cows, in order to improve the transparency of the IIR and reported data.**

## **PART C: SPECIFIC RECOMMENDATIONS FOR THE GRIDDED EMISSION DATA FOR THE SECTOR AGRICULTURE**

For the 2023 Review of the gridded emission data the focus was set on ammonia, NMVOC, NO<sub>x</sub> and PM<sub>2.5</sub> emissions

11. The methods used by Estonia to spatially resolve sectoral emissions are not described transparently enough in the IIR.
12. The description includes data sources that have been used for spatial distribution.
13. Gridded emissions reported for GNFR K\_AgriLivestock and L\_AgriOther are consistent with the corresponding NFR categories reported in Annex I.
14. Table 2 provides the findings from the ERT related to the gridded data.
15. The implementation of the recommendations will be followed up in a future CLRTAP inventory review.



**Table 2: Findings from the CLRTAP stage 3 review 2023 for gridded emissions from the sector agriculture<sup>4</sup>**

| ID                                                                                                                                                                                                                                                                                                                                                                                  | Pollutants | GNFR category | TAC <sub>1</sub> C <sub>2</sub> C <sub>3</sub> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|------------------------------------------------|
| EE-2023-GRID-GL-1                                                                                                                                                                                                                                                                                                                                                                   | All        | GNFR-K&L      | T                                              |
| <p><b>Observation</b><br/>The expert review team notes that the gridding tool used was not clearly described in the IIR. Therefore, a clarification question about the tool was asked to Estonia, which was answered.</p> <p><b>Recommendation</b><br/><b>The expert review team recommends Estonia to describe the gridding process in more detail in its next submission.</b></p> |            |               |                                                |

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<sup>4</sup> The findings have been assigned to one or more of the following criteria: TACCC T (Transparency), A (Accuracy), C<sub>1</sub> (Completeness), C<sub>2</sub> (Comparability), C<sub>3</sub> (Consistency) for definitions of these criteria see EMEP/EEA Guidebook 2019

## **REVISED ESTIMATES AND TECHNICAL CORRECTIONS CONSIDERED AND/OR CALCULATED BY ERT**

16. In the Appendix of the 'EMEP/UNECE Review Guidelines 2018'<sup>5</sup> it is stated that if the ERT considers that emissions are significantly under- or overestimated, the Party is during the review invited to submit 'Revised Estimates' that address the issue raised. Should the Party decline to do this, or should it not be possible to agree on the quantification of a Revised Estimate i.e. the ERT does not accept a Revised Estimate provided by the Party, the ERT may calculate a 'Technical Correction'. The threshold for significance for a Technical Correction for the in-depth review in 2023 was set at 2% of the national total, i.e. a finding that has been identified to result in an over- or underestimate of emissions of more than 2% of the national total. The methods for calculating Technical Corrections are set up in the 'EMEP/UNECE Review Guidelines 2018' and use the EMEP/EEA Emission 'Inventory Guidebook' as a reference for methods and emission factors.

17. The ERT did not calculate any Technical Corrections and Bulgaria did not provide any Revised Estimates.

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<sup>5</sup> [https://www.ceip.at/fileadmin/inhalte/ceip/3\\_review/advance\\_version\\_ece\\_eb.air\\_142\\_add.1.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/3_review/advance_version_ece_eb.air_142_add.1.pdf)

## **LIST OF MATERIALS PROVIDED TO ERT**

1. Estonia Annex I reporting template
2. Estonia Stage 2 S&A report
3. Estonia Stage 1 report 2023
4. Estonia IIR 2020 and 2023
5. Repdab-Report
6. Extended checks

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

1. Responses to the question raised by ERT during the review
2. Material received from the Party during the Review
  - Estonia NFR Toolbox in ArcGIS diagram.

## ABBREVIATIONS

This list includes abbreviations commonly used in the Review Reports

|                  |                                                                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AD               | Activity data                                                                                                                                                                            |
| BaP              | Benzo[a]pyrene                                                                                                                                                                           |
| BC               | Black Carbon                                                                                                                                                                             |
| C                | Confidential                                                                                                                                                                             |
| Cd               | Cadmium                                                                                                                                                                                  |
| CEIP             | Centre on Emission Inventories and Projections                                                                                                                                           |
| CLRTAP           | Convention on Long-range Transboundary Air Pollution – ‘the Air Convention’                                                                                                              |
| CO               | Carbon Monoxide                                                                                                                                                                          |
| E-PRTR           | European Pollutant Release and Transfer Register                                                                                                                                         |
| EEA              | European Environment Agency                                                                                                                                                              |
| EF               | Emission factor                                                                                                                                                                          |
| EMEP             | The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (unofficially ‘European Monitoring and Evaluation Programme’ = EMEP) |
| ERC              | Emission Reduction Commitment                                                                                                                                                            |
| ERT              | Expert Review Team                                                                                                                                                                       |
| GHG              | Greenhouse gas                                                                                                                                                                           |
| GIS              | Geo Information System                                                                                                                                                                   |
| GNFR             | NFR Aggregation for Gridding and LPS                                                                                                                                                     |
| HCB              | Hexachlorobenzene                                                                                                                                                                        |
| Hg               | Mercury                                                                                                                                                                                  |
| HM               | Heavy metals                                                                                                                                                                             |
| IEF              | Implied emission factor                                                                                                                                                                  |
| kt               | Kilotonnes                                                                                                                                                                               |
| LPS              | Large Point Sources                                                                                                                                                                      |
| NA               | Not applicable                                                                                                                                                                           |
| NE               | Not Estimated                                                                                                                                                                            |
| NECD             | National Emission reduction Commitments Directive                                                                                                                                        |
| NFR              | Nomenclature for reporting                                                                                                                                                               |
| NH <sub>3</sub>  | Ammonia                                                                                                                                                                                  |
| NMVOG            | Non-methane volatile organic compounds                                                                                                                                                   |
| NO               | Not Occuring                                                                                                                                                                             |
| NO <sub>x</sub>  | Nitrogen oxides                                                                                                                                                                          |
| NR               | Not relevant/Not Reported                                                                                                                                                                |
| PAHs             | Polycyclic aromatic hydrocarbons                                                                                                                                                         |
| Pb               | Lead                                                                                                                                                                                     |
| PCB              | Polychlorinated biphenyls                                                                                                                                                                |
| PCDD/F           | Polychlorinated dibenzo-p-dioxins and dibenzofurans                                                                                                                                      |
| PM <sub>10</sub> | Fine particulate matter: particles with an aerodynamic diameter equal to or less than 10 micrometres (µm)                                                                                |

|                   |                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------|
| PM <sub>2.5</sub> | Fine particulate matter: particles with an aerodynamic diameter equal to or less than 2.5 micrometres (µm) |
| POPs              | Persistent organic pollutants                                                                              |
| PTC               | Potential technical correction                                                                             |
| RE                | Revised estimate                                                                                           |
| SO <sub>2</sub>   | Sulphur dioxide                                                                                            |
| SO <sub>x</sub>   | Sulphur oxides                                                                                             |
| TC                | Technical correction                                                                                       |
| TSP               | Total suspended particulates                                                                               |

## LIST OF REFERENCES AND SUPPORTING DOCUMENTS

1. Annex I emission reporting template. Available at <https://www.ceip.at/reporting-instructions>
2. ECE/EB.AIR/111/Add.1: Decision 2012/3: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them  
[https://unece.org/DAM/env/documents/2013/air/ECE\\_EB.AIR\\_111\\_Add.1\\_ENG\\_DE\\_CISION\\_3.pdf](https://unece.org/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DE_CISION_3.pdf)
3. ECE/EB.AIR/113/Add.1: Decision 2012/12: Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them  
[https://unece.org/DAM/env/documents/2012/EB/Decision\\_2012\\_12.pdf](https://unece.org/DAM/env/documents/2012/EB/Decision_2012_12.pdf)
4. ECE/EB.AIR/125: 2014 Reporting Guidelines for Estimating and Reporting Emission Data under CLRTAP  
[https://unece.org/fileadmin/DAM/env/documents/2013/air/eb/ece.eb.air.125\\_E\\_ODS.pdf](https://unece.org/fileadmin/DAM/env/documents/2013/air/eb/ece.eb.air.125_E_ODS.pdf)
5. ECE/EB.AIR/127/Add.1: Decision 2014/1: Improving the guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them  
[https://unece.org/DAM/env/documents/2014/AIR/EB/Decision\\_2014\\_1.pdf](https://unece.org/DAM/env/documents/2014/AIR/EB/Decision_2014_1.pdf)
6. ECE/EB.AIR/130: Technical Guidance for Parties Making Adjustment Applications and for the Expert Review of Adjustment Applications, 14 April 2015  
[https://unece.org/DAM/env/documents/2014/AIR/EB/ECE\\_EB\\_AIR\\_130\\_ENG.pdf](https://unece.org/DAM/env/documents/2014/AIR/EB/ECE_EB_AIR_130_ENG.pdf)
7. [ECE/EB.AIR/142/Add.1: Decision 2018/1: Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2019/decision_2018_1_advance_version_ece_eb.air_142_add.1.pdf)  
[https://www.ceip.at/fileadmin/inhalte/ceip/00\\_pdf\\_other/2019/decision\\_2018\\_1\\_advance\\_version\\_ece\\_eb.air\\_142\\_add.1.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2019/decision_2018_1_advance_version_ece_eb.air_142_add.1.pdf)
8. EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2016, EEA Report No. 21/2016 European Environment Agency, Copenhagen. Available at: <http://www.eea.europa.eu/publications/emep-eea-guidebook-2016>
9. EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2019, EEA Report No. 13/2019 European Environment Agency, Copenhagen. Available at: <https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>
10. TFEIP (2022): "Inventory adjustments in the context of emission reduction commitments (ERC)" available at: [https://www.ceip.at/fileadmin/inhalte/ceip/00\\_pdf\\_other/2022/technical\\_guidance\\_for\\_erc\\_adjustments\\_issue1.1.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2022/technical_guidance_for_erc_adjustments_issue1.1.pdf)