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

2023

Serbia

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'⁽¹⁾ – 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_x emissions including gridded data. While the focus was set on NH₃, NMVOC and NO_x emissions, also all other pollutants covered by LRTAP Convention and its protocols (i.e. SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ PM_{2.5}, BC, priority HMs and POP_S) 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 Serbia'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)

¹ 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

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 (United Kingdom)

Mr. Christian MIELKE (Germany)

5. Mr. Ben RICHMOND (United Kingdom), Ms. Rikke ALBREKTSSEN (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 basis of CLRTAP emission data officially reported by Serbia, 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 2019² was used as a base for the review.

8. The emission inventory of Serbia was received on 14 February 2023 and thus by the deadline of 15 February. The Informative Inventory Report was received on 15 March 2023 and thus by the deadline of 15 March. Serbia provided a resubmission of the emission inventory on 5 April 2023. The resubmission has been considered for the review.

² EMEP/EEA: EMEP/EEA 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 Serbia in providing an inventory including a significant level of detail.

The IIR does not describe the methods used for the sector agriculture transparently enough. The ERT considers the agriculture part of the inventory submission to be of adequate quality in terms of completeness and to need further development in terms of accuracy, comparability and consistency.

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

- provide a detailed description of applied methodologies, data sources, choice of emission factors and activity data for all categories in the IIR.
- apply a Tier 2 or higher method to all key categories.

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 NH₃, NMVOC and NO_x emissions, also all other pollutants covered by the LRTAP Convention and its protocols (i.e. SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ PM_{2.5}, BC, priority HMs and POP_s) 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 Agriculture³

ID	Pollutants	NFR category	Key Category	Tier 1 used for KC	Type	TAC ₁ C ₂ C ₃
Serbia-2023-1	NMVOG	3B	Yes	Yes	R	TA

Observation

The ERT noticed that the IIR does not provide the methodology used to calculate NMVOG emissions. The Party explained that a Tier 1 method is used to calculate all 3B emissions and that the methodology will be documented in the next IIR.

Recommendation

The ERT recommends the Party to provide a more detailed documentation of the calculations in the IIR by providing the activity data and emission factors used in the calculations, explaining developments in the activity data and emission factors and to provide graphs with the emissions from the different subsectors with an explanation for trends and years that show a deviation.

³ 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), C₁ (Completeness), C₂ (Comparability), C₃ (Consistency) for definitions of these criteria see EMEP/EEA Guidebook 2019

ID	Pollutants	NFR category	Key Category	Tier 1 used for KC	Type	TAC ₁ C ₂ C ₃
Serbia-2023-2	All	3B and 3D	Yes	Yes	R	AC ₃

Observation

The ERT noticed that all key sources from the agricultural sector are calculated using a Tier 1 method. The Party explained that it is setting up two projects aiming to increase data accuracy and move to a higher Tier. One project will be focussed on livestock and the other project will focus on nitrogen fertiliser.

Recommendation

The ERT recommends the Party to provide information on the projects in the agriculture chapter and under the “Planned improvements” chapter and to include clear steps and a schedule for the implementation of Tier 2 methodologies in the “Planned improvements” chapter.

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

11. For the 2023 Review of the gridded emission data the focus was set on NH₃, NMVOC, NO_x and PM_{2.5} emissions.
12. The methods used by Serbia to spatially resolve sectoral emissions are not described in the IIR.
13. The description does not include data sources that have been used for spatial distribution
14. Gridded emissions reported for GNFR K_AgriLivestock and L_AgriOther are not consistent with the corresponding NFR categories reported in Annex I.
15. Table 2 provides the findings from the ERT related to the gridded data.
16. 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 agriculture⁴

ID	Pollutants	GNFR category	TAC ₁ C ₂ C ₃
Party-2023-GRID-GL-1	NH ₃ , NMVOC	GNFR-L	
<p>Observation The expert review team notes that there is no description regarding the methodologies and assumptions used to generate the gridded data and the IIR does not contain a dedicated chapter as outlined in Annex II of the Reporting Guidelines.</p> <p>Recommendation The ERT recommends Serbia to add the missing chapter on methodologies and assumptions used for the gridding and LPS data in the IIR of the next submission.</p>			

⁴ The findings have been assigned to one or more of the following criteria: TACCC T (Transparency), A (Accuracy), C₁ (Completeness), C₂ (Comparability), C₃ (Consistency) for definitions of these criteria see EMEP/EEA Guidebook 2019

ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES

1. Serbia did not send Revised Estimates and the ERT did not calculate Technical Corrections.

LIST OF MATERIALS PROVIDED TO ERT

1. CLRTAP Serbia IIR 2021
2. NFR_2021_RS
3. RS_2021_NFR_Ver2

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Responses to the question raised by ERT during the review

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 ₃	Ammonia
NMVOG	Non-methane volatile organic compounds
NO	Not Occurring
NO _x	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 ₁₀	Fine particulate matter: particles with an aerodynamic diameter equal to or less than 10 micrometres (µm)

PM _{2.5}	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 ₂	Sulphur dioxide
SO _x	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
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
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
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
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
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)
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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