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

2023

MONTENEGRO

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 Montenegro'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 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 Montenegro, 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 Montenegro was received on 15 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. Montenegro provided two resubmissions of the emission inventory, on 15 March 2023 and 15 April 2023, and a resubmission of the IIR on 15 April 2023. These resubmissions have been considered for the review.

² 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 Montenegro 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 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 Montenegro to:

- provide a detailed description of applied methodologies, data sources, choice of emission factors and activity data for all categories including the description of the trends, in particular dips and jumps in the time series in the IIR.
- apply a Tier 2 or higher method to all key categories.
- ensure that the agriculture emission inventory is complete.
- ensure that also emissions of the following pollutants are included in the inventory.
- provide gridded data.
- provide transparent information on recalculations.
- ensure that activity data is included in the NFR tables and is consistent with the IIR.

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 level	Type	TAC ₁ C ₂ C ₃
ME-2023-3B-1	NH ₃ , NO _x	3B	Yes	Indeterminate	R	AC ₃
<p>Observation The ERT noted with reference to the 2021 inventory review report for Montenegro that the recommendation concerning the use of higher Tier method for estimation of NH₃ and NO_x from NFR 3B Manure management has not been implemented in submission 2023. The ERT raised a question regarding this issue during the review, the Party responded that the Manure Management N-flow tool, provided along with the EMEP EEA GB 2019 was intended to be used but it was not possible to get relevant activity data such as share of slurry/liquid or solid for timeseries. Therefore, it was decided to stay with Tier 1 in this inventory cycle. For next submission Montenegro expects to have relevant data for the time series 1990-2022.</p> <p>Recommendation The ERT recommends Montenegro to apply a higher Tier method to calculate emissions for all 3B Manure Management categories.</p>						

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 level	Type	TAC ₁ C ₂ C
ME-2023-3D-1	HCb	3Df	Yes	Indeterminate	R	AC ₃

Observation

The ERT noted with reference to the 2021 inventory review report for Montenegro that the recommendation concerning the inclusion of HCB emissions from the use of pesticides in the inventory has been not implemented in submission 2023. The ERT noted that activity data of sales of pesticides is available at the Statistical Office of Montenegro. The EMEP/EEA Guidebook 2019 provides a Tier 1 methodology to calculate the emissions of HCB from the application of pesticides. Table 4 in chapter "Agriculture other including use of pesticides" shows a list of proposed maximum HCB-concentration (impurity factor) in active substances used in Europe from 1990 onwards taking into account the implemented EU regulation. The ERT raised a question regarding this issue during the review, the Party responded that sales of pesticides available on Monstat and FAO are too general. The Ministry of Agriculture and Rural Development, Administration for Food Safety and Veterinary and Phytosanitary Affairs are data provider. However, it was not possible to get relevant activity data in this inventory cycle. In the next cycle with an official request the inventory of HCB emission from pesticide use will be implemented.

Recommendation

The ERT recommends Montenegro to collect the necessary information and include HCB emissions from the use of pesticides in the inventory.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC ₁ C ₂ C ₃
ME-2023-3-1	All	3	Yes	Indeterminate	R	AC ₃

Observation

The ERT noted with reference to the 2021 inventory review report for Montenegro that the recommendation concerning the provision of the necessary information on the different statistical methods such trends, dips or jumps in the activity data or emissions to promote the transparency was not implemented in submission 2023. The ERT raised a question regarding this issue during the review, the Party responded that such information will be included in the next submission.

Recommendation

The ERT recommends Montenegro to implement the recommendation concerning the provision of the necessary information on the different statistical methods such trends, dips or jumps in the activity data or emissions to promote the quality of inventory in the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC ₁ C ₂ C ₃
ME-2023-3D-2	All	3Da2b	No	Indeterminate	R	AC ₃

Observation

The ERT noted with reference to the 2021 inventory review report for Montenegro that the recommendation concerning the estimation of NH₃ emissions from Sewage sludge applied to soils was not implemented in submission 2023. The ERT raised a question regarding this issue during the review, the Party responded that application of sludge is not common in Montenegro and the subject will be taken into consideration in next cycle with an official answer from relevant stakeholder.

Recommendation

The ERT commends Montenegro for this approach. The ERT recommends Montenegro to implement the recommendation concerning the estimation of NH₃ emissions from swage sludge applied to soils.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC ₁ C ₂ C ₃
ME-2023-3D-3	All	3Da1	Yes	Indeterminate	R	AC ₃

Observation

The ERT noted that the activity related to category 3DA1 Inorganic N-fertilizers is identical for 2015-2021 (751700 kg N). The ERT raised a question during the review process to clarify why the emissions of NH₃ and NO_x differ between these years although the same AD is used. The Party responded that an error was made concerning the activity data. The Party provided a calculation sheet for NO_x and NH₃ "3.D.a.1_Review.xlsx". The Party added that the correct activity data will be presented in the next submission.

Recommendation

The ERT commends Montenegro for providing information on this issue. The ERT recommends Montenegro to correct the activity data from 3Da1 Inorganic N-fertilizers in its next submission.

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

Observation

The ERT identified inconsistency in the reported totals of NH₃ and NO_x emissions between NFR Tables and the IIR submission 2023 (Table 5.3, Table 5.4, and Table 5.6). For example, the total emission of NH₃ for 3B in the NFR Tables (submission 2023) is 1.5 kt, while the reported emission in the IIR for the same year is 2.811 kt. Inconsistency was also observed in the reported totals of NH₃ and NO_x emissions

between NFR Tables and the IIR submission 2023 (Table 5.20 and Table 5.21). The ERT raised a question regarding this issue during the review, the Party responded that there was a technical error and Montenegro would implement additional QA/QC procedures for next inventory cycle in order to avoid inconsistencies between NFR and IIR but also between categories and sum of sub-categories.

Recommendation

The ERT recommends Montenegro to harmonize the reported emissions and AD between NFR Tables and the IIR to enhance the consistency of the inventory in the next submission.

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

No gridded emission data was reported.

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

11. In the Appendix of the 'EMEP/UNECE Review Guidelines 2018'⁴ 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 under-estimate 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.

12. The ERT did not calculate any Technical Corrections and Montenegro did not provide any Revised Estimates.

⁴ 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. ME_Annex I reporting template_submission 2023
2. ME_Stage 2 S&A report
3. ME_Stage 1 report 2023
4. ME_IIR submission 2023
5. Repdab-Report

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Responses to the questions raised by ERT during the review.
2. Material received from the Party during the Review
 - Excel file 3.D.a.1_Review.xlsx3.D.a.1_N2O emissions from Inorganic N fertilizer application.

ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES

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

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 Occuring
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_DECISION_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)
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