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

## **STAGE 3 REVIEW REPORT**

**MONTENEGRO**

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# INTRODUCTION

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'.

1. 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.

2. At its seventh joint session in September 2021 the Steering Body and the Working Group approved the plan to perform (in 2022) an in-depth review of PM<sub>2.5</sub> emissions from residential heating and road transport, with a special focus on the topic of '*condensable particulate matter*' and a follow-up review of the implementation of recommendations given as part of the review carried out in 2021. The Parties reviewed in 2021 are Kazakhstan, Liechtenstein, Monaco and Montenegro.

3. Particulate matter can exist as solid or liquid matter (the "filterable" portion) or as gases (the "condensable" portion). Condensable particulate matter is vapour phase at stack conditions, but condenses and/or reacts upon cooling and dilution upon discharge into ambient air to form solid or liquid PM. All condensable PM is assumed to be in the PM<sub>2.5</sub> size fraction<sup>2</sup>. The inclusion of the condensable component of PM<sub>2.5</sub> emissions can have a big impact on the emission estimate for certain sources<sup>3</sup>.

4. This ad-hoc review, has assessed PM<sub>2.5</sub> emission estimates with a special focus on the topic of '*condensables*' for the years 2000 to 2020. Further, for Montenegro the implementation of all findings from the in-depth review 2021 have been assessed for all pollutants covered by LRTAP Convention and its protocols (SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> PM<sub>2.5</sub>, BC, 3 HMs and POP<sub>s</sub>) for the time series years 1990 – 2020.

5. This report covers the results of the stage 3 centralised review (ad hoc review) 2022 of the UNECE LRTAP Convention of Montenegro coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place between April and June 2022 and was performed as desk review with an in person meeting between 30 of May 2022 and 3 June 2022. The following team of nominated experts from the roster of experts performed the review.

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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  
[https://unece.org/fileadmin/DAM/env/documents/2018/Air/EB/ECE\\_EB.AIR\\_142\\_Add.1-1902937E.pdf](https://unece.org/fileadmin/DAM/env/documents/2018/Air/EB/ECE_EB.AIR_142_Add.1-1902937E.pdf)

<sup>2</sup> [Condensable Particulate Matter Definition | Law Insider](#)

<sup>3</sup> For more technical details please refer to the EMEP/EEA Guidebook (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>) or the report 'How should condensables be included in PM emission inventories reported to EMEP/CLRTAP?' [https://emep.int/publ/reports/2020/emep\\_mscw\\_technical\\_report\\_4\\_2020.pdf](https://emep.int/publ/reports/2020/emep_mscw_technical_report_4_2020.pdf)

**Follow-up review of the implementation of findings from the 2021 in-depth review and ad-hoc review**

Energy: Ivana Dukic, Laureta Dibra

Transport: Martina Toceva

Industrial Processes and Product Use: Mirela Poljanac

Agriculture: Andjelka Radosavljevic

Waste: Enkeleda Shkurta

6. Kristina Saarinen, Jeroen Kuenen and Ben Richmond were the lead reviewers. The review was coordinated by Sabine Schindlbacher (EMEP Centre on Emission Inventories and Projections - CEIP).

7. The review was performed on the basis of CLRTAP emission data officially reported by Montenegro, due by 15 February 2022 for emission inventories. The Informative Inventory Reports (IIR), reported due 15 March 2022 under the CLRTAP, informed the review.

8. The emission inventory of Montenegro was received on 15 February 2022 and thus by the deadline of 15 February. The Informative Inventory Report was received on 15 March 2022 and thus by the deadline of 15 March. Montenegro also resubmitted their emissions inventory on 15 March 2022.

## RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

### 1.A.4.b.i Residential: stationary

1. Montenegro uses a Tier 1 methodology for calculating PM<sub>2.5</sub> emissions from '1A4bi – Residential: stationary'. As 1A4bi is a key category, the ERT recommends Montenegro to use at least a Tier 2 method for calculating emissions, in line with Reporting Guidelines' paragraph 21<sup>4</sup>.
2. The activity data is taken from Statistical Office of Montenegro (MONSTAT). The ERT notes that the activity data is described transparently enough in the Informative Inventory Report. The use of solid and liquid fuels tends to decrease over time. The use of biomass covers 97.5% of the total fuel used for this category. The ERT recommends the Party to collect data on national circumstances (e.g. different types of biomass, different types of combustion appliances) and to incorporate the information in the inventory for the next submissions.
3. The activity data for Montenegro do not include collected wood, i.e. wood directly harvested from the forest outside formal market activity. The ERT encourages the Party to collect data of collected wood and to incorporate the information in the inventory for the next submissions.
4. Montenegro has not stratified the total fuel consumption for each fuel type into different appliance types e.g. boilers, stoves, age of equipment, or information on how the mix of appliances was defined in a consistent and complete manner. The ERT noted that this is not documented in the IIR, and recommends the Party to collect data on national circumstances by describing the fuel consumption for each type of appliances and to incorporate the information in the inventory for the next submissions.
5. Montenegro uses the EMEP/EEA 2019 Guidebook for the compilation of its emissions from this category.
6. The emission factors do not include the condensable component of PM<sub>2.5</sub> emissions, or it is unclear if the condensable component is included (Table 1). During the review, the Party did not provide further information on the inclusion of the condensable component of PM<sub>2.5</sub> for '1A4bi – Residential: stationary'. The ERT recommends the Party to further investigate for each biomass and coal PM emission factor whether or not condensables are included.

**Table 1: Inclusion of condensables per fuel type**

Fuel Type	Includes the condensable component of PM <sub>2.5</sub> emissions
Biomass	Unclear
Coal	No
Liquid	No
Gaseous	Unclear

7. The ERT notes that the time series is not consistent even though the same methodology is applied to the whole period. This is because the emission factors used by the Party for the calculation of PMs (PM<sub>2.5</sub>; PM<sub>10</sub>; TSP; BC) are not the relevant ones provided in the EMEP/EEA 2019 Guidebook (Table 2). The recalculations of PM<sub>2.5</sub> emissions in '1A4bi – Residential: stationary' (Table 9) based on the correct default emission factor show that the difference (in kt) between the original estimate and the revised estimate for the years 2005,

<sup>4</sup> Reporting Guidelines paragraph 21: "For sources that are determined to be key categories in accordance with the EMEP/EEA Guidebook methodologies, Parties should make every effort to use a Tier 2 or higher (detailed) methodology, including country-specific information."

2010, 2015-2020 is between +3.5 kt and +4 kt. The ERT recommends Montenegro to recalculate the time series with consistent methods for the next submission, using default EFs from the 2019 EMEP/EEA Air Pollutant Emission Inventory Guidebook.

**Table 2: Biomass Emission Factor**

	ME Biomass EF	EMEP/EEA 2019 GB EF
<b>PM<sub>2.5</sub></b>	140	740
<b>PM<sub>10</sub></b>	143	760
<b>BC</b>	28	800

8. In the IIR, it is not specified how the PM<sub>2.5</sub> emissions from small combustion are spatially distributed. The ERT recommends Montenegro to include this information in the IIR to improve transparency.

9. Montenegro lists the following planned improvements for future submissions in their 2022 IIR:

- Improvement of time series consistency and split of fuels: the energy statistics is still under development; a split of the fuel combustion for this subcategory has to be reviewed for the entire times series. Characterisation of
  - residential heating:
    - (open/partly open) fire places,
    - water heaters,
    - advanced/ conventional stoves,
    - space heating, boilers
      - Conventional boilers >50kW
      - Standard boilers >50KWth<1MWth
      - Boilers <1MWth – manual feed technology
      - Boilers <1MWth – automatic feed technology
      - Standard boilers >50KWth <1MWth
      - Standard boilers >1MWth <50MWth
      - Gas turbines
  - Cookers;
    - Split of fuels to different subcategories (1A4bi and 1A4bii)
    - Use of waste – biomass fraction/non-biomass fraction.

The ERT commends Montenegro for their improvement plans and recommends implementing them as soon as possible.

### **1.A.3.b.i-iv Road transport exhaust emissions**

10. Montenegro transport sector emissions are calculated using EMEP/EEA Guidebook emission factors. The IIR describes the calculation of transport emissions transparently.

11. The activity data is taken from National Transport Statistics.

12. The PM<sub>2.5</sub> emissions from road transport exhaust do not include the condensable component of PM<sub>2.5</sub> emissions.

13. The ERT notes that the method is partially documented in the IIR. The ERT recommends Montenegro to include further information on the description of the methodology

of the aggregation of the available vehicle categories into NFR Categories in the next IIR submissions.

14. The time series is not consistent. The ERT recommends Montenegro to calculate the time series for 2020 with consistent methods in the next submission.

15. Montenegro lists the following planned improvements for future submission in their 2022 IIR:

- Application of EMEP/EEA air pollutant emission inventory guidebook 2019, Tier 2/3 methods within the calculations.
- Use of COPERT model to aid calculation of emissions.
- Investigation regarding vehicle movements (e.g. mileage, age technology of vehicles).
- Investigation on the vehicle fleet within Montenegro.

The ERT commends Montenegro for their improvement plans and recommends implementing them as scheduled.

16. In addition the ERT recommends implementing the following:

- The ERT recommends the Party to implement the planned use of COPERT model for road transport emission calculations and improve the methodological approach of activity data collection and aggregation.

And the ERT encourages to implement the following:

- The ERT encourages the Party to include the calculation of the condensable part of PM from road transport in the next reporting cycle

## FOLLOW-UP REVIEW OF THE IMPLEMENTATION OF THE FINDINGS FROM PREVIOUS REVIEWS

17. Montenegro was reviewed in-depth in 2021. The review resulted in a number of recommendations. The ERT commends Montenegro for implementing several of the recommendations from the last review and also noted with appreciation that several of the items that were not implemented are on the improvement plan. The ERT notes that the following findings are not fully implemented (see Table 3) and recommends Montenegro to implement these findings in the next submission.

**Table 3: Findings from the 2021 review that have not or only been partially implemented**

Sector <b>Aviation</b>	NFR Category <b>1A3aii</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Consistency</b>	TC or RE <b>No</b>
<p><b>Recommendation text from 2021:</b> The ERT noticed in the NFR tables that the notation key 'NO' is used for the LTO part of domestic aviation (1A3aii(i)), while NA is used for cruise (1A3aii(ii)). On the other hand, according to Tables 3.98 and 3.99 (p.239-240) of the IIR, emissions from domestic aviation (1A3aii) have been estimated. Hence, there is an inconsistency related to whether emissions from domestic aviation are reported or not. Also the notation key is used inconsistently, i.e. NO or NA. In response to a question raised during the review, Montenegro answered that NO should be used throughout.</p>				
<p><b>Recommendation text for 2022:</b> As it was noted in the previous Review Report, in the 2022 IIR the Party reports emissions for basic pollutants related to the category 1A3aii, however in the NFR table the emissions are Not Occurring (NO). The Party provided an explanation that the emissions of this sector will be updated in submission 2023. The ERT welcomes the Party's plan to provide a correction in the IIR in the next submission cycle.</p>				
Sector <b>Road Transport</b>	NFR <b>1A3b</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
<p><b>Recommendation text from 2021:</b> The ERT noticed in the IIR (p. 247, Step 1 of activity data production) that the Light duty vehicles NFR category (1A3bii) is empty and that the Heavy duty vehicles category (1A3biii) includes Buses + Goods vehicles + Road tractors from the National Transport Statistics of Montenegro. However, Light duty vehicles (LDV) are provided in the vehicle categories of Step 2, p. 248, including Vans and Special Passenger vehicles. Hence, there seems to be an inconsistency in the description of the various steps of activity data production. Furthermore, there are concerns related to the accuracy of the calculated emission values, since the emission factors have significant differences among the various vehicle categories and it is not clear from the IIR whether the appropriate emission factors are used for each vehicle category. In response to a question raised during the review, Montenegro answered that Tier 1 emission factors of the 2019 Guidebook have been used for each one of the road transport sub-sectors (i.e. 1A3bi, 1A3bii, 1A3biii, 1A3biv) and that there is a plan with an ongoing project to update to Tier 3.</p>				
<p><b>Recommendation text for 2022:</b> The ERT noted that in the 2022 IIR there is a description of the methodology of aggregation of the available vehicle categories into NFR Categories, however the methodology is not sufficiently clear. The Party answered that they have applied</p>				



the COPERT 5 model, but that they need more time to properly evaluate the results and that the Party plans to recalculate the emissions and re-submit as soon as possible. The ERT welcomes the Party's effort to upgrade to a Tier 3 methodology of calculation which will improve the accuracy and comparability of the inventory.

Sector <b>Road Transport</b>	NFR <b>1A3bii-iv</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:** The ERT noticed in the NFR tables that the activity data (i.e. liquid and gaseous fuels, TJ) for road transport Light duty vehicles (1A3bii), Heavy duty vehicles and buses (1A3biii), and Mopeds and motorcycles (1A3biv), are identical, i.e. the same values are reported for each one of these sub-categories. The ERT found no explanation for this in the IIR. In response to a question on the issue, Montenegro answered that this is due to a broken link in the excel file with activity data, which was not identified by the QA/QC activities.

**Recommendation text for 2022:** The ERT noted the same issue that is not resolved in the 2022 IIR and recommends the Party to implement the previous Review recommendations and include QA/QC checks on the broken links in the calculation files.

Sector <b>Road Transport</b>	NFR <b>1A3bi-iv</b>	Pollutant(s) <b>SOx, BC, Cd, Hg, additional HMs, dioxins/furans, HCB, PCBs</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:** The ERT noticed in the IIR (Table 1.26, p. 68) and in the NFR Tables that SOx, BC, Cd, Hg, all additional HMs, dioxins/furans, HCB, PCBs emissions from road transport (1A3bi-iv) are reported as 'NE'. The ERT understands that this is possibly related to the Tier 1 method used and lack of detailed information of the vehicle fleet. However, this issue affects the completeness of the inventory, since the emissions of these pollutants are not provided. In response to a question raised during the review, Montenegro answered that this is due to lack of capacity and that there is a plan with an ongoing project to update to Tier 3 for 1A3b and provide emission estimates which are currently missing.

**Recommendation text for 2022:** The ERT noted the same issue for this year's submission cycle. Upon a question posed during the review process the Party responded that the calculations will be completely revised. The ERT welcomes the Party's plan to implement the COPERT calculation of the emission estimated that are missing in the resubmission.

Sector <b>Road Transport</b>	NFR <b>1A3bv-vii</b>	Pollutant(s) <b>NMVOC and PM</b>	Category (TCCCA) <b>Consistency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:** The ERT noticed in the IIR (Table 1.26, p. 68) that the pollutants related to Road transport: Gasoline evaporation (1A3bv), i.e. NMVOC, and Road transport: Automobile tyre and brake wear and road abrasion (1A3bvi-vii), i.e. all PM, are NE. However, this is inconsistent with NFR tables, where values are provided for years 1998-2019. For years prior to 1997, NE is also used in the NFR. The NFR values are also summarised in the IIR chapter 11 Annex – NFR Tables (p. 400-411) for years 2019, 2005, 1990. This inconsistency among various tables within the IIR and between IIR and NFR

confuses the reader, while there is also an issue of completeness, since NFR values are not provided for years prior to 1997. In response to a question on the issue, Montenegro answered that there is an ongoing process to improve activity data collection and, hence, provide emission estimates for missing years.

**Recommendation text for 2022:** The ERT has noted that the same issue remains unresolved. Upon a question posed during the review process the Party responded that the calculations will be completely revised. The ERT welcomes the Party's plan to improve the completeness and implement the recommendations in the next submission.

Sector <b>Rail</b>	NFR <b>1A3c</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency, Completeness</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:** The ERT noticed in the IIR (Table 1.26, p. 68) that NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, all PM (except BC), CO, Cd, all additional HMs (except As), and PAHs, are calculated for the railways sub-sector (1A3c). BC, Pb, Hg, As, and dioxins/furans are reported as NE, SO<sub>x</sub> is reported as IE, and HCB, PCBs are reported as NA. Nevertheless, there is no methodological description, or any other information related to 1A3c. The only additional item related to railways is in chapter 11 Annex – NFR Tables (p. 400-411), where emission values are provided for years 1990, 2005, while for 2019 the notation key NO is used. In addition, the ERT noticed that in Annex I values, all emissions and activity data in the period 2011-2019 are reported as NO. Due to lack of relevant information in the IIR, no further assessment can be made. In response to a question raised during the review, Montenegro answered that Tier 1 emission factors from the Guidebook have been used and that the network has been electrified since 2011, hence, no emissions occur since then.

**Recommendation text for 2022:** The ERT noted that the Party has not provided an explanation in the 2022 IIR relating to the change/electrification of the railways. Following a question raised during the review process, the Party responded that the electrification of the railways occurred in 2009. The ERT recommends that the Party should include this information in the next IIR and use the appropriate notation keys in the NFR Tables, documenting this also in the IIR.

Sector <b>Shipping</b>	NFR <b>1A3di(ii), 1A3dii</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency, Completeness</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:** The ERT noticed in the IIR (Table 1.26, p. 68) that NO<sub>x</sub>, NMVOC, SO<sub>x</sub>, NH<sub>3</sub>, all PM (except BC), and CO, are reported as IE for international inland waterways (1A3di(ii)), while all remaining pollutant emissions are reported as NE, apart from HCB and PCBs which are reported as NA. In the same table, for national navigation (shipping) (1A3dii), NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, all PM (except BC), and CO, are marked as calculated, SO<sub>x</sub> is reported as IE, while all remaining pollutants are reported as NE, apart from HCB and PCBs which are reported as NA. Nevertheless, there is no methodological description, or any other information related to 1A3d. The only additional item related to 1A3di(ii) and 1A3dii is in chapter 11 Annex – NFR Tables (p.400-411) for years 2019, 2005, 1990, which present inconsistencies with Table 1.26. Looking at the NFR tables for the whole time series 1990-2019, NO<sub>x</sub> emissions are provided for 1A3di(ii) for years 2001-2007, 2009-2010, and remaining years are reported as IE. For 1A3dii, NO<sub>x</sub> emissions are provided for the period 1990-2016, while IE is reported for years 2017-2019. Various inconsistencies among Table 1.26 and NFR Tables also exist for other pollutants. However, due to lack of relevant information in the IIR, no further assessment can be made. In response to a question raised during the review, Montenegro answered that Tier 1 emission factors from

the Guidebook have been used for 1A3d and that inconsistencies in emissions are due to inconsistencies of the national energy balance (i.e. activity data). In addition, the Party answered that the emissions from 1A3d will be completely revised and relevant description will be included in the IIR.

**Recommendation text for 2022:** The ERT noted that the issue identified in the previous review relating to sectors 1A3di(ii) and 1A3dii remains. The description explaining the methodological approach related to 1A3d is still not included in the 2022 IIR. Also, the ERT noted that the inconsistencies relating to the reported emissions from this category remain the same. Upon a question posed during the review process, the Party responded that Montenegro does not have sizeable ports, and that ship owners or ships visiting Montenegro ports do not always use the fuel from port stations, but also use fuel from the gas stations (Skadar Lake). As a result, the Party uses a Tier 1 method for the calculation of emissions, based on the activity data included in the MONSTAT Energy balance. The ERT recommends the Party to improve the completeness and the accuracy of the IIR and NFR reporting tables. The ERT welcomes the Party's plan to strengthen the collaboration with the statistical data provider MONSTAT.

Sector <b>Industrial Processes</b>	NFR Category <b>2A2</b>	Pollutant(s) <b>PM<sub>10</sub>, PM<sub>2.5</sub>, TSP, BC</b>	Category (TCCCA) <b>Accuracy, Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

During the review, the ERT noted that the reported amount for lime production in 2010 differs in the 2021 IIR (p.300ff, Table 4.2) where this is 839 t (i.e. 0.839 kt), and in the NFR table, where this is 33.0 kt, and that consequently, the resulting PM<sub>10</sub>, PM<sub>2.5</sub>, TSP and BC emissions also differ. To a question on the issue, Montenegro responded that they noticed a fixed link; thus for all years the activity data of 1990 were used in the NFR Tables and sent to the ERT. The revised estimations (in the file: 2.A.2. Lime) were the data used in the IIR are provided. The ERT recommends correcting this in the next submission.

During the review, the ERT noted that in the IIR in the Chapter 4.2.1 the explanation of the trend for lime production in Montenegro is missing. Montenegro was asked to explain the trend inconsistency in lime production and consequently in PM<sub>10</sub>, PM<sub>2.5</sub>, TSP and BC emissions (a dip in 1994 for 69%, a dip/peak in 2010). To the question on the issue Montenegro responded with the following explanations: 1994 - Economic Collapse during Yugoslav Wars, 2009/2010 - Economic crisis (worldwide). The ERT recommends including this information in the next submission.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendations for category 2.A.2 and years 2010 and 1994, and thus strongly recommends Montenegro to implement all recommendations regarding this NFR category in the next submission in 2023.

Sector <b>Industrial Processes</b>	NFR Category <b>2A5a</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Accuracy, Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT noted in the IIR2021 that the first tables on p. 299 and p. 303 are the same, of which the table on p. 303 seems to be a copy/paste error and asked Montenegro to correct this error and present category 2A5a with new, correct table in the next submission of IIR.

To the question on the issue Montenegro responded that this will be corrected by adding a caption as in other chapters. The ERT recommends correction in the next IIR.

According to the Montenegro's IIR2021 (p. 303) the data on crushed stones, gravel, sands and etc for the period 1990 - 2009 is missing and will be included, when the examination of the years before 2010 is finished. This category is included in the improvement plan (p.389, Table 8.1) and is characterized as high priority, but with no clear time frame. The ERT commended Montenegro for including the improvement plan in the IIR and asked Montenegro to present the schedule for the implementation in the next IIR submission. To the question on the issue Montenegro responded that there is currently a twinning light project in Montenegro starting, which focusses on the improvement and completeness of inventory in order to fulfil the TACC criteria, that issues like the higher Tier for key categories or the estimates for missing sources will be addressed within this project. And that the results will be implemented mainly in submission 2022 and at latest in submission 2023 (<http://www.twinplace.eu/MyTwinPlace/Members/InterestDetails.aspx?3926>). The ERT recommends Montenegro doing as they said and including all results and new information in the next IIR.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendations for category 2A5a: did not include the recommended corrections in the 2022 IIR and did not include all results and updated information regarding the twinning light project (which focusses on improvements to the accuracy and completeness of inventory, including moving to a higher Tier for key categories and the estimation of emissions for missing sources) in the 2022 IIR. Hence, the ERT strongly recommends Montenegro to implement all recommendations regarding this NFR category in the next submission in 2023.

Sector <b>Industrial Processes</b>	NFR Category <b>2C1</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT noted that in the IIR2021 in the Chapter 4.3.1 the explanation of the trend for steel production in Montenegro is missing. The Montenegro was asked to explain the trend inconsistency in steel production. To the question on the issue Montenegro responded with the following explanations: 1994 - Economic Collapse during Yugoslav Wars, degradation of Montenegro's infrastructure (ways, communications, electric power stations, etc.), however, delayed deliveries of raw materials and electricity, which, in turn, delayed or prevented needed deliveries, 2009/2010 - Economic crisis (worldwide), 2009 - lack of raw materials as the reason for the shutdown, 2014 - termination of Electrodes Factory Piva, which was a manufacturer of electrodes and welding wires, increase after 2012 - improvements/ modernisation of Toscelik Alloyed Engineering Steel Niksic (Steel Mill Niksic) and the statement that these descriptions will be provided in the next IIR. The ERT commends Montenegro on providing detail trend description and recommends including this information in the next submission.

**Recommendation text for 2022:**

During the 2022 review, the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2C1, in that they did not include new detailed trend descriptions in the 2022 IIR. Hence, the ERT strongly recommends Montenegro to implement the previous recommendation regarding this NFR category in the next submission in 2023.

Sector <b>Industrial Processes</b>	NFR Category <b>2C3</b>	Pollutant(s) <b>SO<sub>2</sub>, CO</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT noted that in the IIR in the Chapter 4.3.2 the explanation of the trend for aluminium production in Montenegro is missing and asked for an explanation of the trend inconsistency in aluminium production, specifically dips in SO<sub>2</sub> and CO emissions in 1994. To the question on the issue Montenegro responded the following explanations: 1994 - Economic Collapse during Yugoslav Wars, degradation of Montenegro's infrastructure (ways, communications, electric power stations, etc.), however, delayed deliveries of raw materials and electricity, which, in turn, delayed or prevented needed deliveries, 2009 - closing alumina plant, 2014 - bankruptcy & takeover 2015 - Shut down of Elektroliza, and the statement that these descriptions will be provided in the next IIR. The ERT commends Montenegro on providing detail trend description and recommends including this information in the next submission.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2C1 in that they did not include detailed trend description in the 2022 IIR. Hence, the ERT strongly recommends Montenegro to implement the previous recommendation regarding this NFR category in the next submission in 2023.

Sector <b>Solvents</b>	NFR Category <b>2D3a</b>	Pollutant(s) <b>NMVOG</b>	Category (TCCCA) <b>Transparency, Accuracy, Consistency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

According to the IIR (p. 327 Table 4.31) Montenegro is planning source-specific improvements for the key category NFR 2.D.3.a (move to T2), on which the ERT commends the Party. However, there is no clear timetable for the implementation of this improvement, and the ERT asked for clarification. To the question on the issue Montenegro responded that there is currently a twinning light project in Montenegro starting, which focusses on the improvement and completeness of inventory in order to fulfil the TACC criteria, and that the issues like the higher Tier for key categories or the estimates for missing sources will be addressed within this project. Montenegro also stated in their response that the results of this project will be implemented mainly in the submission 2022 and at latest in the submission 2023 (link to the project: <http://www.twinplace.eu/MyTwinPlace/Members/InterestDetails.aspx?3926>).

The ERT notes that according to the Reporting Guidelines paragraph 21 Parties should make every effort to use a Tier 2 or higher (detailed) methodology, including country-specific information for key categories, and recommends including all new information provided during the review, the schedule into the improvement plan and to report on progress of the work in the next IIR submissions.

The ERT noted in the NFR tables, the drop of NMVOC emissions in 2010 for around 6.2%. The ERT also noted that NMVOC emission in 2010 is the same as in 1990 and wanted to know if the error has occurred during the manipulation with the activity data (population number). According to Montenegro's IIR (p. 324, Table 4.28) the NMVOC emission in 2010 is 743.31 t, and in the NFR table for 2010 is 0.6958704 kt (i.e. 695.87 t), and asked Montenegro for an answer which of reported amounts for NMVOC emissions in 2010, is the correct one.

To the question on the issue Montenegro responded that this is a technical mistake: the link between calculation file and NFR tables is broken, and send the revised calculation file with activity data, emission factor and NMVOC emissions. The ERT recommends correcting and documenting this correction in the next submission.

**Recommendation text for 2022:**

During the 2022 CLRTAP review, the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2D3a in that they did not include all new information in the 2022 submission, which was provided during the 2021 review. This includes the schedule of the work into the improvement plan, the report on progress of the work in the next IIR submissions, and the inclusions of all corrections noticed during 2021 review and documentation of them in the IIR submitted in 2022. Hence, the ERT strongly recommends Montenegro to implement all recommendations considering this NFR category in the next submission in 2023.

Sector <b>Solvents</b>	NFR Category <b>2D3b, 2D3c</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Completeness, Transparency</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT noted that in the NFR tables 1990-2019 Montenegro uses a notation key "NE" for reporting the NMVOC, and for the emissions of other relevant pollutants, "NO". The ERT noted that according to Guidebook 2019, road paving with asphalt and asphalt roofing activities resulting with emission of many other pollutants, except NMVOC and asked the rationale for using the notation key "NO" for reporting the other relevant emitting pollutants. To the question on the issue Montenegro responded that this emissions NMVOC, TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, and BC from Road paving with asphalt are now estimated and that further investigation on the use of asphalt will be done in the framework of Twinning Light Project. The ERT recommends including this information in the next submission.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendations for categories 2.D.3.b and 2.D.3.c in that they did not include all new information regarding a twinning light project in the 2022 IIR. Emissions from the process of road paving with asphalt, remain not calculated also. Hence, the ERT strongly recommends Montenegro to implement all recommendations regarding these NFR categories in the next submission in 2023.

Sector <b>Solvents</b>	NFR Category <b>2D3b</b>	Pollutant(s) <b>NMVOC, TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, BC</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>Yes</b>
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**Recommendation text from 2021:**

The ERT noted that the category 2D3b is included in the improvement plan on (p.389, Table 8.1) and is characterized as high priority, but with no clear time frame and asked Montenegro to present the schedule for the implementation in the next IIR submission. Moreover, the ERT did a research and find in the Statistical Yearbook of Montenegro 2020 (Source: MONSTAT), Chapter 15: Construction, a data on annual amount of asphalt for the period 2015 – 2019 and asked Montenegro to calculate NMVOC, TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and BC emissions now by using Guidebook 2019 Tier 1 methodology for period 2015 – 2019. To the question on the issue Montenegro sent the revised estimations for the period 2001 - 2019 (attached file 2.D.3.b\_RoadPaving.xlsx), and that the time series 1990 - 2006 will be calculated for next submissions with the further investigation on the asphalt use, with providing the statement that they will include estimations and description in next IIR. The

ERT commends Montenegro on revised estimations and recommends including them and all new information in the next submission.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2.D.3.b: implementing the revised estimations for the period 2001 - 2019 which they sent during the 2021 review (attached file 2.D.3.b\_RoadPaving.xlsx), and they did not calculate the time series 1990 - 2006 for the submission in 2022. Information was not provided in the 2022 IIR on the planned further investigation on regarding asphalt use, and all related information in the 2022 IIR. Hence, the ERT strongly recommends Montenegro to implement all recommendations concerning NFR category 2D3b in the next submission in 2023.

Sector <b>Solvents</b>	NFR Category <b>2D3f</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Transparency, Completeness</b>	TC or RE <b>Yes</b>
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**Recommendation text from 2021:**

The ERT noted that Montenegro is using a different notation key for presenting the NMVOC emissions from this source category across the IIR and NFR tables (1990-2019): "NO" is used in NFR tables, and "NE" in the IIR (p. 297ff, Table 4.1). The ERT also noted that Montenegro included this activity in the improvement plan with high priority, but with no clear implementation schedule. The ERT commended Montenegro for including it in the improvement plan and asked for an explanation of the rationale for using the notation key "NO" in the NFR tables. Moreover, the ERT asked Montenegro, while waiting the realization of the improvement plan when the annual quantity of material cleaned need to be collected, to calculate NMVOC emissions for the period 1990-2019 now, by using the annual population number and EF(NMVOC) = 0.3 kg/inhabitant given in Guidebook 2019.

To the question on the issue Montenegro responded that the use of the notation key "NO" in the IIR is not correct as in Montenegro dry cleaning facilities are available, that emissions are not yet estimated but in the framework of the Twinning light, the subcategory solvent use will be estimated according to EMEP/EEA Guidebook 2019 and according to the key category analysis. Montenegro also responded that there is currently a twinning light project in Montenegro starting, which focusses on the improvement and completeness of inventory in order to fulfil the TACC criteria, and that the issues like the higher Tier for key categories or the estimates for missing sources will be addressed within this project. Montenegro also stated in their response that the results of this project will be implemented mainly in the submission 2022 and at latest in the submission 2023 (<http://www.twinplace.eu/MyTwinPlace/Members/InterestDetails.aspx?3926>). As the ERT did not get revised estimation from Montenegro the technical corrections were prepared.

The ERT recommends including revised technical corrections in the inventory in the next submission with all new information provided during the review, the schedule into the improvement plan and to report on progress of the work in the next IIR submissions.

**Recommendation text for 2022:**

During the 2022 review, the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2.D.3.f: to implement the revised technical corrections in the inventory in the 2022 submission, along with all new information provided during the 2021 review. Additionally, the work should be scheduled into the improvement plan and the progress of the work should be reported in the IIR submission. Hence, the ERT strongly

recommends Montenegro to implement the previously agreed revised technical corrections and all recommendations considering this NFR category in the next submission in 2023.

Sector <b>Solvents</b>	NFR Category <b>2D3i</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Transparency, Completeness</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT notes that Montenegro is using a different notation key for presenting pollutants emissions from this source category: across the IIR and NFR tables (1990-2019): in the NFR tables "NE" is used for presenting the NMVOC emissions and "NO" or "NA" for all other pollutant's emissions, while in the IIR p.297ff, Table 4.1 "NO" is used, and on p. 68 Table 1.26 "NE" for NMVOC, and "NA" for other pollutants are used. The ERT also noted that Montenegro did not include the source category NFR 2.D.3.i Other solvent use in the improvement plan in the IIR (page 386, Table 8.1). The ERT noted that this category includes many activities such as: Glass wool and Mineral wool enduction, Fat, edible and non-edible oil extraction, Application of glues and adhesives, Underseal treatment and conservation of vehicles, Vehicles dewaxing, Other (Concrete additive, Cooling lubricant, Lubricant, Pesticide, Aeroplane de-icing Agent) of which some maybe exist or existed in Montenegro during the period 1990-2019.

Montenegro was asked for an explanation for the use of different notation keys and to provide evidence that activities in the scope of NFR 2.D.3.i don't exist in the Montenegro for the years 1990 to 2019. To the question on the issue Montenegro responded that the use of the notation key "NO" in the IIR is not correct, and that emissions are not yet estimated but in the framework of the Twinning light, the subcategory solvent use will be estimated according to EMEP/EEA Guidebook 2019 and according to the key category analysis. Montenegro also provided information on a twinning light project starting in Montenegro, which focusses on the improvement and completeness of inventory in order to fulfil the TACC criteria and that issues like the higher tier for key categories or the estimates for missing sources will be addressed within this project. The results will be implemented, mainly in the 2022 submission and at latest in the 2023 submission (link to the project: <http://www.twinplace.eu/MyTwinPlace/Members/InterestDetails.aspx?3926>).

The ERT recommends Montenegro correcting and documenting this correction, including all new information provided during the review, including the schedule into the improvement plan and to report on progress and the results of the work in the next IIR submissions.

**Recommendation text for 2022:**

During the 2022 review, the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2D3i: to correct and document corrections noted by previous ERT, include all new information provided during the review 2021, include the schedule into the improvement plan and to report on progress and the results of the work in the IIR submission in 2022, and thus strongly recommends Montenegro to implement all recommendations considering NFR category 2D3i in the next submission in 2023.

Sector <b>Industrial Processes</b>	NFR Category <b>2H2</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Recommendation text from 2021:**

The ERT noted that Montenegro estimates emissions of the food and beverages industry with the production data of bread, beer, wine, and spirits (p. 328, table 4.32). According to Guidebook 2019 the relevant activity statistics include also total production of home-killed



meat, total fish and seafood landed, total production of poultry meat, total production of cakes, biscuits and breakfast cereals, total sugar production, total production of fats excluding butter, total weight of coffee beans roasted, and total production of animal feed. The ERT researched and found in the Statistical Yearbook of Montenegro 2020 (Source: MONSTAT), Chapter 14: Industry, data on the annual amount of Roasted coffee, Cake and pastry products, Fresh or chilled carcasses, half-carcasses and cuts, of beef, veal, pig, lamb, sheep and chicken meat, and asked Montenegro to include this new data and complete the NMVOC emission inventory for the NFR 2H2 Food and beverages industry for the next submission in 2022. To the question on the issue Montenegro responded that they will estimate emissions from the activity 2H2 for next submission. The ERT recommends Montenegro doing as they said and including all new information in the next submission.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2H2: to estimate emissions from the sector 2H2 for the submission in 2022. The Party also did not include all new related information and descriptions in the 2022 IIR, and thus the ERT strongly recommends Montenegro to implement all recommendations considering this NFR category in the next submission in 2023.

Sector <b>Industrial Processes</b>	NFR Category <b>2K</b>	Pollutant(s) <b>Hg, PCBs</b>	Category (TCCCA) <b>Completeness, Transparency</b>	TC or RE <b>Yes</b>
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**Recommendation text from 2021:**

The ERT noted that Montenegro uses the notation key "NA" instead of actual emission estimates for Hg and PCB for category 2K and thus there may be an [over/under]-estimate of emissions. This [over/under]-estimate may have an impact on total emissions that is above the threshold of significance (i.e. a change in the National Total of more than 2%). The ERT also noted that "NA" is not the correct notation key to use because the 2019 Guidebook provides a methodology for Hg and PCB emission calculation based on population. The ERT asked Montenegro for an explanation on why Hg and PCB emissions are not calculated, although the historic data on country's total population is known, and to provide further justification for not reporting emissions or a revised estimate that resolves the potential [over/under]-estimate or evidence in case they consider that the impact of the [over/under]-estimate is below the threshold of significance. To the question on the issue Montenegro responded with the revised emission estimations for HCB and Hg for the period 1990 – 2019, based on Tier 1 methodology according to Guidebook 2019. Montenegro also noted that they need to review the reports prepared for submission under the Stockholm Convention (Fourth reporting cycle), and that the final discussion incorporating the emissions in the national Air pollutant emission inventory will be decided together with the colleagues from the Ministry and together with the Twinning Light project team. The revised estimations for PCB and Hg emissions were not accepted by the ERT due to the errors in the estimations (population number, forgot the conversion factor). The ERT asked Montenegro revising their own estimations and resending corrected estimations. As the ERT did not get any repossesses back from Montenegro the technical corrections were prepared.

**Recommendation text for 2022:**

During the review 2022 the ERT noted that Montenegro did not follow the previous ERT recommendation for category 2K: to implement technical corrections in the inventory submitted in 2022, and thus the ERT strongly recommends Montenegro to implement the recommendation considering NFR category 2K in the next submission in 2023.

18. During the follow up review, the ERT noted that there were the following notable issues (see Table 4). The ERT recommends Montenegro to implement these findings in the next submission.

**Table 4: New findings from the 2022 review**

Sector <b>Energy</b>	NFR Category <b>1A1a</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
<p><b><u>Issue:</u></b> The ERT noted that for the year 2020, emissions in sector 1A1a for all pollutants are not presented in the IIR, even though they are presented in Montenegro's NFR tables.</p>				
<p><b><u>Recommendation text for 2022:</u></b> The ERT asked the Party to include emissions occurring in 2020 for NFR sector 1A1a in the IIR. The Party responded that the Chapter on 1A1a has been revised and 2020 emissions are now presented in an updated IIR. Unfortunately this was not made available to the ERT during the 2022 review, and as a result, it is recommended to include this information, along with emissions data for the latest year, in the 2023 submission of the IIR.</p>				
Sector <b>Energy</b>	NFR Category <b>1A1a</b>	Pollutant(s) <b>PCDD/ PCDF (dioxins/ furans)</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
<p><b><u>Issue:</u></b> The ERT noted that emissions of dioxins in sector 1A1a are higher than expected in Montenegro's NFR 2022 tables due to an incorrect unit conversion being applied to the EF in the EMEP/EEA Guidebook 2019 when calculating emissions to include in the NFR tables.</p>				
<p><b><u>Recommendation text for 2022:</u></b> The ERT asked the Party to pay specific attention to the unit for dioxins in the NFR tables (g I-TEQ) and the unit of the EF in EMEP/EEA Guidebook 2019 (ng I-TEQ/GJ), and estimate emissions again. The Party responded that this will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends the Party to follow up on their intent to use the correct unit conversions.</p>				
Sector <b>Energy</b>	NFR Category <b>1A1a</b>	Pollutant(s) <b>Benzo(k) fluoranthene</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
<p><b><u>Issue:</u></b> The ERT noted that in the Party's IIR (page 129, table 3.5), Montenegro reports the notation key "NO" for the emissions of benzo(k)fluoranthene for the period 1990-2019. However, the ERT noted that emissions were reported in the NFR tables for all years.</p>				

**Recommendation text for 2022:**

The ERT asked the Party to explain why emissions of benzo(k)fluoranthene were not included in the IIR for 1A1a; the Party responded that the Chapter on 1A1a will be revised and emissions of benzo(k) fluoranthene for 1990-2020 shall be presented in the updated IIR. The ERT recommends Montenegro to follow up on their intent and to report emissions of benzo(k)fluoranthene for 1A1a in the 2023 submission of the IIR.

<b>Sector</b> <b>Energy</b>	<b>NFR Category</b> <b>1A2a</b>	<b>Pollutant(s)</b> <b>All</b>	<b>Category (TCCCA)</b> <b>Accuracy</b>	<b>TC or RE</b> <b>No</b>
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**Issue:**

The ERT noted that the reported values in sector 1A2a do not correspond to the reported AD and the Tier 1 default EFs from the EMEP/EEA 2019 Guidebook. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs that are used for the estimation of emissions in sector 1A2a.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

<b>Sector</b> <b>Energy</b>	<b>NFR Category</b> <b>1A2c</b>	<b>Pollutant(s)</b> <b>NO<sub>x</sub>, Cd, PCDD/PCDF</b>	<b>Category (TCCCA)</b> <b>Accuracy</b>	<b>TC or RE</b> <b>No</b>
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**Issue:**

The ERT noted that the reported emission values for NO<sub>x</sub>, Cd, PCDD/PCDF in sector 1A2c do not correspond to the reported AD and the Tier 1 default EFs from EMEP/EEA 2019 Guidebook. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs that are used for the estimation of emissions in sector 1A2c.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

<b>Sector</b> <b>Energy</b>	<b>NFR Category</b> <b>1A2e</b>	<b>Pollutant(s)</b> <b>All, except NH<sub>3</sub></b>	<b>Category (TCCCA)</b> <b>Accuracy</b>	<b>TC or RE</b> <b>No</b>
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**Issue:**

The ERT noted that the reported emission values for all pollutants except NH<sub>3</sub> in sector 1A2e do not correspond to the reported AD and the Tier 1 default EFs from EMEP/EEA 2019 Guidebook. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs that are used for the estimation of emissions in sector 1A2e.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

Sector <b>Energy</b>	NFR Category <b>1A2c, 1A2d, 1A2f</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the IIR (page 69, Table 1.26), the Party reports the notation key “IE” for NFR sectors 1A2c, 1A2d, 1A2f. However, the ERT noted that emissions were reported for these sectors in the NFR tables and also in IIR.

**Recommendation text for 2022:**

The Party responded that the information regarding sectors 1A2c, 1A2d and 1A2f in Table 1.26 has been updated in the IIR. The updated IIR has not been seen by the ERT, hence it is recommended for Montenegro to ensure that these changes are represented in the 2023 submission of the IIR.

Sector <b>Energy</b>	NFR Category <b>1A2d</b>	Pollutant(s) <b>Cd</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that the reported values for Cd in sector 1A2d do not correspond to the reported AD and the Tier 1 default EFs from GB 2019. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs that were used for the estimation of emissions in 1A2d.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

Sector <b>Energy</b>	NFR Category <b>1A2gvii</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the NFR tables, the Party reports the notation key “IE” for 1A2gvii, but does not state in the IIR under which NFR categories this is included.

**Recommendation text for 2022:**

The Party responded that the emissions from Mobile combustion in manufacturing industries and construction are reported in NFR categories 1A2a - 1A2f and 1A2gviii. The ERT thanks Montenegro for their response and recommends to include this information in the 2023 submission of the IIR.

Sector <b>Energy</b>	NFR Category <b>1A2gviii</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

In the IIR (page 218) the Party stated that sector 1A2gviii includes the emissions from following categories: 1A2i, 1A2j, 1A2k, 1A2l, 1A2m. However, the ERT noted that the reported emission values in the NFR table for sector 1A2gviii do not correspond to the reported AD and emissions from the categories: 1A2i, 1A2j, 1A2k, 1A2l, 1A2m as stated in the IIR.

**Recommendation text for 2022:**

The ERT strongly recommends the Party to include all AD in their IIR in order to be fully transparent and in compliance with reported emissions in sector 1A2gviii. The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends the Party to follow-up on their intent.

Sector <b>Transport</b>	NFR Category <b>1A3b, 1A3c, 1A3d and all transport related categories</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Issue:** The ERT noted that the Party reported NFR Annex 1 reporting Tables that do not include any data on transport emissions for the whole period 1990-2020. The ERT were unable to carry out any assessment on the most up-to-date data, and so had to rely on the data provided in the 2021 submission, where the latest reported emission year was 2019. Further, the Party did not include any activity data nor emission calculations in the 2022 IIR.

Upon a question posed to the Party related to this issue, the Party responded that for the calculation of emissions from the transport sector, the COPERT model will be used and that the results will be presented in next submission cycle.

**Recommendation text for 2022:** The ERT welcomes the Party's plan to improve the reporting of the transport related emission estimates and strongly recommends the inclusion of emissions in the reported NFR Tables.

Sector <b>Energy</b>	NFR Category <b>1A4ai</b>	Pollutant(s) <b>PMs</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the NFR tables for 2020, in the sector 1A4ai, emissions of PM are reported, but these emissions are not included in the IIR (page 274, Table 3.112).

**Recommendation text for 2022:**

The Party responded that PM emissions for 1A4ai have been added into Montenegro's updated IIR. The updated IIR has not been seen by the ERT, hence it is recommended for Montenegro to ensure that these changes are represented in the 2023 submission of the IIR.

Sector <b>Energy</b>	NFR Category <b>1A4a</b>	Pollutant(s) <b>All, except NH<sub>3</sub>, HCB</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that the reported emission values for all pollutants except NH<sub>3</sub> and HCB in sector 1A4a do not correspond to the reported AD and the Tier 1 default EFs from EMEP/EEA 2019 Guidebook. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs that are used for the estimation of emissions in sector 1A4a.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

Sector <b>Energy</b>	NFR Category <b>1A4bi</b>	Pollutant(s) <b>NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, PM<sub>2.5</sub></b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>Yes</b>
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**Issue:**

The ERT noted that the reported emission values for NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, PM<sub>2.5</sub> in sector 1A4bi do not correspond to the reported AD and the Tier 1 default EFs from the EMEP/EEA 2019 Guidebook.

**Recommendation text for 2022:**

The ERT recommends the Party to refer to Tables 7a, 7b, 7c and 7d in this report and also to the file 'TC\_ME\_1A4bi.xlsx' for the ERT's calculated technical corrections for each of the pollutants. The ERT strongly recommends the Party to use these re-calculated figures in the 2023 submission.

Sector <b>Energy</b>	NFR Category <b>1A4ci</b>	Pollutant(s) <b>NO<sub>x</sub>, NMVOC, SO<sub>x</sub>, CO, Pb, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that the reported emission values of NO<sub>x</sub>, NMVOC, SO<sub>x</sub>, CO, Pb, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF in the sector 1A4ci do not correspond to the reported AD and the Tier 1 default EFs from the EMEP/EEA 2019 Guidebook. The Party was asked to refer to the file 'Energy\_Calculations\_NFR\_ME.xlsx' for the ERT's calculations and to provide information on the AD and EFs used for the estimation of emissions in sector 1A4ci.

**Recommendation text for 2022:**

The Party responded that its emissions will be revised in the 2023 submission. The ERT thanks Montenegro for their response and recommends to follow-up on their intent.

Sector <b>Energy</b>	NFR Category <b>1A5a, 1A5b</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the Party's IIR (page 308), Montenegro reports the notation key "NE" for emissions in sectors 1A5a and 1A5b. However, the ERT noted that in the NFR tables, zero is reported for all pollutants.

**Recommendation text for 2022:**

The ERT asked the Party to use the notification key "NE" for 1A5a and 1A5b in its NFR tables, since the emissions are not estimated. The Party responded that it has been changed in the revised NFR. The updated NFR Tables have not been seen by the ERT, hence it is recommended for Montenegro to ensure that these changes are represented in the 2023 submission of the NFR Tables.

Sector <b>Energy</b>	NFR Category <b>1B1a</b>	Pollutant(s) <b>NMVOC, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the IIR (page 309, table 3.142) in the sector 1B1a, AD and emissions are reported for period 1990-2019, but these emissions are not included in NFR tables.

**Recommendation text for 2022:**

The ERT asked the Party to include emissions from sector 1B1a in its NFR table. The Party answered that this has been changed in the revised NFR. The updated NFR Tables have not been seen by the ERT, hence it is recommended for Montenegro to ensure that these changes are represented in the 2023 submission of the NFR Tables.

Sector <b>Industrial Processes</b>	NFR Category <b>2A5a, 2C1, 2C3, 2H2</b>	Pollutant(s) <b>All relevant</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that in the NFR tables submitted in 2022, all pollutant emissions regarding observed categories for 2020 are equal to those in 2019, while all activity data are reported with zero value for the whole historic trend 1990 - 2020. The ERT noted that in the 2021 submission, activity data was not reported as zero. Montenegro was asked for an explanation. During the review week, Montenegro responded that activity data has been reported in an updated NFR, but the ERT did not receive the updated NFR tables.

**Recommendation text for 2022:**

The ERT recommends Montenegro to secure data for annual reporting according to paragraph 42 of 2014 Reporting guidelines (ECE/EB.AIR/125) for the NFR categories that occur in Montenegro in the scope of Industrial processes sector, report all relevant emissions and related activity data and document all new information in the IIR for the next submission in 2023, and for all following submissions.

Sector <b>Industrial Processes</b>	NFR Category <b>2A5a, 2C1, 2C3, 2H2</b>	Pollutant(s) <b>All relevant</b>	Category (TCCCA) <b>Completeness, Transparency</b>	TC or RE <b>No</b>
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**Issue:**

The ERT notes that the chapter on Industrial processes and product use (for categories that fall under Industrial Processes) in the IIR of Montenegro submitted in 2022 is identical to the chapter in the IIR submitted in 2021, and that data on emissions and activity statistics for 2020 are not present and are not reported. Montenegro was asked for an explanation. During the review week, Montenegro responded that the Industry chapter has been revised in an updated IIR, but the ERT did not receive the updated IIR.

**Recommendation text for 2022:**

The ERT recommends Montenegro to secure data for annual reporting according to paragraph 42 of 2014 Reporting guidelines (ECE/EB.AIR/125) for the NFR categories that occur in Montenegro in the scope of Industrial processes sector, report all relevant emissions and related activity data and document all new information in the IIR for the

next submission in 2023, and for all following submissions.

Sector <b>Solvents</b>	NFR Category <b>2D3a</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Accuracy</b>	TC or RE <b>No</b>
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**Issue:**

The ERT notes that in the NFR tables submitted in 2022, NMVOC emissions for 2020 are equal to those in 2019, while activity data are reported with zero value for the whole historic trend 1990 - 2020 instead of with a value or adequate notation key. Montenegro was asked for an explanation. During the review week, Montenegro responded that activity data have been reported in an updated NFR, but the ERT did not receive the updated NFR tables.

**Recommendation text for 2022:**

The ERT recommends Montenegro to secure data for yearly reporting according to paragraph 42 of 2014 Reporting guidelines (ECE/EB.AIR/125) for the NFR categories that occur in Montenegro in the Solvent sector, report NMVOC emissions and activity data and document all new information in the IIR for the next submission in 2023, and for all following submissions.

Sector <b>Solvents</b>	NFR Category <b>2D3a</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Issue:**

The ERT notes that the chapter on Industrial processes and product use (for categories that fall under Solvents) in the IIR of Montenegro submitted in 2022 is identical to the chapter in the IIR submitted in 2021, and that data on emissions and activity statistics for 2020 are not present and are not reported. Montenegro was asked for an explanation. During the review week, Montenegro responded that the IPPU chapter has been revised in updated IIR, but the ERT did not receive the updated IIR.

**Recommendation text for 2022:**

The ERT recommends Montenegro to secure data for annual reporting according to paragraph 42 of 2014 Reporting guidelines (ECE/EB.AIR/125) for the NFR categories that occur in Montenegro in the Solvent sector, report NMVOC emissions and activity data and document all new information in the IIR for the next submission in 2023, and for all following submissions.

Sector <b>Agriculture</b>	NFR Category <b>3B4f</b>	Pollutant(s) <b>NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP</b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Issue:**

In the category 3B4f – 'Manure management - Mules and asses', for pollutants NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP the notification key 'IE' is used for the entire time series in the NFR tables. It is not clear from the Party's IIR where these emissions are included.



**Recommendation text for 2022:**

The ERT encourages the Party to include information in the IIR to indicate in which categories emissions in sector 3B4f are included.

Sector <b>Agriculture</b>	NFR Category <b>3F</b>	Pollutant(s) <b>All</b>	Category (TCCCA) <b>Completeness</b>	TC or RE <b>No</b>
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**Issue:** The notation key 'NE' is used for category 3F - Field Burning of Agricultural Residues due to lack of data according to the Party.

**Recommendation text for 2022:**

The ERT recommends that the Party attempt to find activity information about category 3F – 'Field Burning of Agricultural Residues' on the FAOSTAT website - <https://www.fao.org/faostat/en/#data/GB> and include an estimate in the 2023 submission. If no suitable information is available, the ERT encourages the Party to state in the IIR that FAOSTAT does not hold any suitable statistics.

Sector <b>Waste</b>	NFR Category <b>5A1</b>	Pollutant(s) <b>TSP, PM<sub>10</sub>, PM<sub>2.5</sub></b>	Category (TCCCA) <b>Transparency</b>	TC or RE <b>No</b>
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**Issue:**

In its IIR table 6.4 (page 404), the Party provides the EFs used for estimation of NMVOC and Particle emissions from NFR 5A (Biological treatment of waste - Solid waste disposal on land), referring to the EMEP/EEA Guidebook 2019 Tier 1 factors. However, the ERT noted that the unit used for the particle fractions in table 6.4 are incorrect: kg/Mg waste instead of the Tier 1 factor units of g/Mg waste. The ERT noted that the emission estimations in NFR 5A seem to be correct. During the review, Montenegro agreed that the information in the IIR is incorrect and explained that the Party will improve its QA/QC procedures and correct the error in the next submission.

**Recommendation text for 2022:**

The ERT recommends that Montenegro update Table 6.4 in the IIR with the correct information regarding PM emissions in the 2023 submission.

Sector <b>Waste</b>	NFR Category <b>5D1</b>	Pollutant(s) <b>NMVOC</b>	Category (TCCCA) <b>Consistency</b>	TC or RE <b>No</b>
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**Issue:**

The ERT noted that the Party reported emissions of NMVOC from Domestic wastewater handling (NFR 5D1) but no AD in its NFR tables. However, in its IIR (page 380) the Party states that currently no emissions were estimated due to lack of resources and data. During the review, Montenegro provided the information on the applied methodology together with underlying calculations, including AD, data sources, and EFs. Further, the Party explained that the information in the IIR will be updated in the next submission. However, the ERT noted that there is an error in the underlying revised calculations sheets: a unit conversion of  $10^6$  is used instead of  $10^9$ .

**Recommendation text for 2022:**

The ERT recommends Montenegro to check its NMVOC emission estimates for category 5D1, to ensure that the calculations are accurate, to provide AD in the NFR tables, and to revise the information provided in the IIR in the 2023 submission.

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

19. In the Appendix of the 'EMEP/UNECE Review Guidelines 2018'<sup>5</sup> it is stated that if the ERT considers that when emissions are significantly under- or overestimated, then during the review, the Party is 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 the Revised Estimates, then the ERT may calculate a "Technical Correction" in the absence of an updated emission estimate being provided by the Party itself. The threshold for significance for a technical correction for the in-depth review in 2022 was set at 2% of the national total, i.e. findings identified which result in an over- or under-estimate of emissions of more than 2% of the national total can result in a Technical Correction. The methods for calculating the Technical Corrections are set up in the "Review Guidelines 2018" and use the EMEP/EEA Emission "Inventory Guidebook" as a reference for methods and emission factors.

20. The ERT calculated four technical corrections, these were sent to Montenegro, who did not provide comments on whether they agree or disagree with the technical corrections. Montenegro sent no revised estimates that were accepted by the ERT. The ERT recommends Montenegro to consider the Technical Corrections and Revised Estimates in their next inventory submission. Details of the Technical Corrections and Revised Estimates presented in Table 5 are included in ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES.

**Table 5: Summary of revised estimates and technical corrections identified by ERT for country**

Number	NFR category (s)	Pollutants	Year(s)	RE/TC quantified (yes/no)	Contribution to national total (%)
TC1-ME-2022-1A4bi	1A4bi	NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>2.5</sub>	2005-2020	Yes	All for the year 2005 NO <sub>x</sub> : +3.5% NMVOC: +42.5% NH <sub>3</sub> : +4.7% PM <sub>2.5</sub> : +264.6%

<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. Montenegro Stage 2 S&A report
2. Montenegro Stage 1 report 2022
3. Montenegro IIR 2022
4. MNE\_NFR\_annexI\_2022v2.xlsx
5. Stage 3 RR from year 2021

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

None

# ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES

21. The ERT calculated four technical corrections. Montenegro has sent zero revised estimates that have been accepted by the ERT. Detailed related information is provided separately in the one Excel file:

- TC1-ME-2022-1A4bi.xlsx

**Table 6: Technical corrections calculated by the ERT for NO<sub>x</sub> emissions in NFR sector 1A4bi**

TC1-ME-2022-1A4bi: Technical Correction for NO <sub>x</sub> emissions in 1A4bi Residential: Stationary			
Year	Original estimate (kt)	Revised Estimate received from MS (kt)	Difference between original estimate and Revised Estimate (kt)
2005	0.053	0.320	+0.267
2010	0.040	0.358	+0.319
2015	0.027	0.355	+0.327
2016	0.036	0.359	+0.323
2017	0.021	0.371	+0.350
2018	0.020	0.351	+0.331
2019	0.021	0.359	+0.338
2020	0.021	0.364	+0.343

**Table 7: Technical corrections calculated by the ERT for NMVOC emissions in NFR sector 1A4bi**

TC1-ME-2022-1A4bi: Technical Correction for NMVOC emissions in 1A4bi Residential: Stationary			
Year	Original estimate (kt)	Revised Estimate received from MS (kt)	Difference between original estimate and Revised Estimate (kt)
2005	1.803	3.653	+1.850
2010	2.019	4.109	+2.090
2015	2.035	4.110	+2.075
2016	2.035	4.127	+2.091
2017	2.156	4.340	+2.184
2018	2.039	4.101	+2.062
2019	2.081	4.186	+2.105
2020	2.113	4.249	+2.136

**Table 8: Technical corrections calculated by the ERT for NH<sub>3</sub> emissions in NFR sector 1A4bi**

TC1-ME-2022-1A4bi: Technical Correction for NH <sub>3</sub> emissions in 1A4bi Residential: Stationary			
Year	Original estimate (kt)	Revised Estimate received from MS (kt)	Difference between original estimate and Revised Estimate (kt)
2005	0.220	0.417	+0.197
2010	0.246	0.466	+0.220
2015	0.249	0.472	+0.222
2016	0.249	0.471	+0.222
2017	0.265	0.501	+0.236
2018	0.250	0.474	+0.223
2019	0.255	0.483	+0.228
2020	0.259	0.491	+0.231

**Table 9: Technical corrections calculated by the ERT for PM<sub>2.5</sub> emissions in NFR sector 1A4bi**

<b>TC1-ME-2022-1A4bi: Technical Correction for PM2.5 emissions in 1A4bi Residential: Stationary</b>			
Year	Original estimate (kt)	Revised Estimate received from MS (kt)	Difference between original estimate and Revised Estimate (kt)
2005	0.972	4.472	+3.500
2010	1.091	5.022	+3.931
2015	1.093	5.042	+3.948
2016	1.096	5.052	+3.955
2017	1.155	5.334	+4.178
2018	1.092	5.041	+3.949
2019	1.114	5.144	+4.030
2020	1.131	5.223	+4.092

**Table 10: Effect of the Technical Corrections and Revised Estimates on the National Total and National Total for compliance for NO<sub>x</sub>**

Year	National Total (kt) <sup>6</sup>	National Total for Compliance (kt) <sup>7</sup>	Sum of Revised and Technical Corrections (kt)	National Total including Revised Estimates and Technical Corrections (kt)	National Total for Compliance including Revised Estimates and Technical Corrections (kt)
2005	7.552	7.552	+0.267	7.819	7.819
2010	7.113	7.113	+0.319	7.432	7.432
2015	8.876	8.876	+0.327	9.203	9.203
2016	7.787	7.787	+0.323	8.110	8.110
2017	7.185	7.185	+0.350	7.535	7.535
2018	8.069	8.069	+0.331	8.400	8.400
2019	7.786	7.786	+0.338	8.124	8.124
2020	9.417	9.417	+0.343	9.760	9.760

**Table 11: Effect of the Technical Corrections and Revised Estimates on the National Total and National Total for compliance for NMVOC**

Year	National Total (kt) <sup>8</sup>	National Total for Compliance (kt) <sup>9</sup>	Sum of Revised and Technical Corrections (kt)	National Total including Revised Estimates and Technical Corrections (kt)	National Total for Compliance including Revised Estimates and Technical Corrections (kt)
2005	4.354	4.354	+1.850	6.204	6.204
2010	4.322	4.322	+2.090	6.412	6.412
2015	4.507	4.507	+2.075	6.582	6.582
2016	4.529	4.529	+2.091	6.620	6.620
2017	4.583	4.583	+2.184	6.767	6.767
2018	4.407	4.407	+2.062	6.469	6.469
2019	4.469	4.469	+2.105	6.574	6.574
2020	4.451	4.451	+2.136	6.587	6.587

<sup>6</sup> Line 141 in Annex I to the reporting guidelines (NFR table)

<sup>7</sup> Line 152 in Annex I to the reporting guidelines (NFR table)

<sup>8</sup> Line 141 in Annex I to the reporting guidelines (NFR table)

<sup>9</sup> Line 152 in Annex I to the reporting guidelines (NFR table)

**Table 12: Effect of the Technical Corrections and Revised Estimates on the National Total and National Total for compliance for NH<sub>3</sub>**

Year	National Total (kt) <sup>10</sup>	National Total for Compliance (kt) <sup>11</sup>	Sum of Revised and Estimates Technical Corrections (kt)	National Total including Revised Estimates and Technical Corrections (kt)	National Total for Compliance including Revised Estimates and Technical Corrections (kt)
2005	4.209	4.209	+0.197	4.406	4.406
2010	3.534	3.534	+0.220	3.754	3.754
2015	3.625	3.625	+0.222	3.847	3.847
2016	3.646	3.646	+0.222	3.868	3.868
2017	3.558	3.558	+0.236	3.794	3.794
2018	3.435	3.435	+0.223	3.658	3.658
2019	3.347	3.347	+0.228	3.575	3.575
2020	3.278	3.278	+0.231	3.509	3.509

**Table 13: Effect of the Technical Corrections and Revised Estimates on the National Total and National Total for compliance for PM<sub>2.5</sub>**

Year	National Total (kt) <sup>12</sup>	National Total for Compliance (kt) <sup>13</sup>	Sum of Revised and Estimates Technical Corrections (kt)	National Total including Revised Estimates and Technical Corrections (kt)	National Total for Compliance including Revised Estimates and Technical Corrections (kt)
2005	1.323	1.323	+3.500	4.823	4.823
2010	1.435	1.435	+3.931	5.366	5.366
2015	1.528	1.528	+3.948	5.476	5.476
2016	1.513	1.513	+3.955	5.468	5.468
2017	1.540	1.540	+4.178	5.718	5.718
2018	1.494	1.494	+3.949	5.443	5.443
2019	1.519	1.519	+4.030	5.549	5.549
2020	1.574	1.574	+4.092	5.666	5.666

<sup>10</sup> Line 141 in Annex I to the reporting guidelines (NFR table)

<sup>11</sup> Line 152 in Annex I to the reporting guidelines (NFR table)

<sup>12</sup> Line 141 in Annex I to the reporting guidelines (NFR table)

<sup>13</sup> Line 152 in Annex I to the reporting guidelines (NFR table)