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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

FRANCE

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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*'⁽¹⁾ – 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 on Effects approved the plan to perform (in 2022) an in-depth review of PM_{2.5} 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_{2.5} size fraction². The inclusion of the condensable component of PM_{2.5} emissions can have a big impact on the emission estimate for certain sources³.

4. This ad-hoc review, has assessed PM_{2.5} emission estimates with a special focus on the topic of '*condensables*' for the years 2000 to 2020.

5. This report covers the results of the stage 3 centralised review (ad hoc review) 2022 of the UNECE LRTAP Convention of France 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

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
https://unece.org/fileadmin/DAM/env/documents/2018/Air/EB/ECE_EB.AIR_142_Add.1-1902937E.pdf

² [Condensable Particulate Matter Definition | Law Insider](#)

³ 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

meeting between 30 of May 2022 and 3 June 2022. The following team of nominated experts from the roster of experts performed the review.

1A3b Road Transport: Gudrun Stranner, Katrina Young, Magdalena Zimakowska-Laskowska, Martina Toceva and Rebecca Rose

1A4bi Residential: stationary: Aleksandra Nestorovska-Krsteska, André Amaro, Benjamin Cuniasse, Canan Esin Köksal, Damian Zasina, Laureta Dibra, Marion Pinteris, Sam Gorji and Wolfgang Schieder

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 France, 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 France was received on 11 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.

RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

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

9. France uses a Tier 2 methodology for calculating PM_{2.5} emissions from '1A4bi – Residential: stationary'.
10. The fuel consumption of residential installations is taken from "residential" sector of the national energy balance sheet.
11. The activity data for France do not include collected wood, i.e. wood directly harvested from the forest outside formal market activity. The ERT recommends France to develop a methodology to account for this additional amount of biomass consumption for future submissions.
12. France has stratified the total fuel consumption for each fuel type into different appliance types e.g. boilers, stoves, in a consistent and complete manner. The stock of appliances is, on the one hand, based on a national multiannual report on fuelwood use (CEREN data) which provides a distribution over appliances for certain years and, on the other hand, on equipment sales data provided by an annual market survey (Observ'ER). However the exact methodology is not sufficiently documented in the IIR, the ERT recommends France to provide a clear description of the appliance type split and how it has been derived in the IIR for the next submission.
13. France uses the EMEP/EEA Guidebook 2019 together with a country specific methodology with references given in the IIR for the compilation of its emissions from this category.
14. France informed the ERT that the country specific methods used in the calculation of emissions are based on the national studies implemented by the various institutions in France on measurements and the derivation of the EFs. The Party responded that detailed information from the studies at national level could not be retrieved within the time frame of this review. The ERT recommends France to clearly describe the source of the emission factors in the next submission.
15. France uses national measurements from studies by various French institutes but no details are provided on the sampling and measurements. The ERT recommends to include information on the measurement standards and/or equipment used in the IIR; In case different measurements/equipment are used for different types of equipment, it is also recommended to include documentation of these.
16. For the measurements, there is no information provided as to whether these include or exclude the condensable component of particulate matter (CPM). The Party responded that it is not clear if the condensable component of particulate matter (CPM) is included or not. The IIR recommends France to clarify the situation, and/or to update its methodology to ensure it is known on which basis PM emissions are reported (including or excluding the condensable component) as a minimum.

17. The measurements used to derive the emission factors do not cover the start phase (ignition) and the end (ember) phase of the combustion cycle. The emission factors used in the inventory derived from these measurements also exclude the start phase (ignition) and end (ember) phase. The ERT recommends France to include emissions during the start and end phases of the combustion cycle in the emission factors used for inventory compilation, to reflect the actual emission levels occurring during combustion.

18. The Party does not take into account user induced impacts that affect emission levels from those during “normal combustion” (the so called user impact, which covers e.g. the use of wet/unclean wood or poor management of air circulation in the appliance.) The ERT found the information included in the IIR not be transparent and sufficient. France responded during the review that it would investigate the issue further. While the user impact is not yet included in the inventory, the ERT recommends the Party to collect data on national circumstances (e.g. through studies or expert judgement/data collection by chimney sweepers) and to incorporate the information in the inventory for the next submissions.

19. It is not clear to what extent the emission factors include the condensable component of PM_{2.5} emissions (Table 1), as in most cases it is unknown if the condensable component is taken into account.

Table 1: Inclusion of condensables per fuel type

Fuel Type	Includes the condensable component of PM_{2.5} emissions
Biomass	Unknown
Coal	Unknown (EMEP/EEA Guidebook 2019)
Liquid	Unknown (EMEP/EEA Guidebook 2019)
Gaseous	Unknown (EMEP/EEA Guidebook 2019)

20. The ERT notes that the time series is consistent.

21. The PM_{2.5} emissions from small combustion are spatially distributed however the ERT did not find any information on the proxies of this section. The ERT recommends France to include this information in the next submission of gridded data.

22. France lists the following planned improvements for future submissions in their 2022 IIR:

- reduce the points not taken into account or deemed unsatisfactory (speciation of PAHs from certain sources, particle emissions, heavy metals, etc.). In particular, it is planned to continue to improve the estimate of the fleet of boilers in the residential sector, which could further impact NO_x emissions;
- update the methodologies for estimating emissions related to wood combustion in the various sectors (outside industry);

- Update of the methodologies for wood combustion emissions in the residential sector, in particular pellets, update of the fleet of equipment, and including condensables.

The ERT commends France for their improvement plans and recommends implementing them as scheduled. The ERT considers especially the last point to be important following the recommendations in this report.

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

23. French PM transport sector emissions are calculated using COPERT version 5.4. All emission factors in COPERT are based on the Tier 3 methodology in the 2019 EMEP/EEA Guidebook. The IIR provides details of the main features of the model. The IIR describes the calculation of transport emissions transparently.

24. Vehicle fleets in France are calculated using the OPALE model developed by Citepa to establish a detailed static fleet of vehicles registered in France from statistical data available from Comité des Constructeurs Français d'Automobiles (CCFA), Ministère de l'Équipement, des Transports et du Logement, Chambre Syndicale Nationale du Motocycle (CSNM) and Institut National de REcherche sur les Transports et leur Sécurité (INRETS). Vehicle activity (kilometers travelled) is taken from CCTN, balanced to national energy data. Activity is distributed between urban, rural and highway roads based on estimates from IFSTTAR (French Institute of Science and Technology for Transport, Planning and Networks).

25. The inventory includes the condensable component of PM_{2.5} emissions.

26. The ERT notes that the method is documented transparently in the IIR.

27. The time series is consistent.

28. France lists the following planned improvements for future submissions in their 2022 IIR

- Consideration of updates to the EMEP/EEA 2019 Guidebook and COPERT
- The calculation of uncertainties by the Monte-Carlo method

The ERT commends France for their improvement plans and recommends implementing them as scheduled. The ERT notes that the improvement program does not specify what updates to the 2019 EMEP/EEA Guidebook and COPERT are being considered. The ERT recommends that greater clarity be provided about planned improvements.

29. In addition the ERT recommends implementing the following:

- In response to a question raised during the review France provided the version of COPERT used for transport emissions modelling. The ERT recommends France to report the version of COPERT in the IIR.

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

30. In the Appendix of the ‘EMEP/UNECE Review Guidelines 2018⁴’ 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.

31. France did not provide any revised estimates and the ERT did not calculate technical corrections for France.

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. France IIR 2022
2. NFR19 France 1990-2020, Table NFR v2014 - an YYYY.xlsx
(YYYY = 1980-2020)

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

3. Responses to questions raised by the ERT during this review