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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**

**SPAIN**

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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 on Effects 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.

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

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

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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)

1A4bi Residential: stationary: Aleksandra Nestorovska-Krsteska, André Amaro, Benjamin Cuniasse, Canan Esin Köksal, Damian Zasina, Laureta Dibra, Marion Pinterits, 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 Spain, 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 Spain was received on 15 February 2022 and thus by the deadline of 15 February. The Informative Inventory Report was received on 14 March 2022 and thus by the deadline of 15 March. Spain provided a resubmission of the emission inventory on 14 March 2022.

## RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

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

9. Spain uses a Tier 1 methodology for calculating PM emissions from some of the activities within '1A4bi – Residential: stationary'. This includes emissions from burning petroleum coke, charcoal, fuel oil, LPG and gas work gas. Emissions from combustion of other fuels such as wood and wood pellets are calculated based on Tier 2 emission factors. In the absence of detailed information on the breakdown of the activities over different technologies or appliances, Spain has assumed that all wood and similar wood waste consumption takes place in “boilers” and that all wood pellet consumption takes place in “pellet stoves and boilers”, and applied corresponding emission factors from the EMEP/EEA Guidebook. The ERT notes that the current method is not a proper Tier 2 methodology. Since '1A4bi – Residential: stationary' is a key category, the ERT recommends Spain to use at least a Tier 2 method for calculating emissions from '1A4bi – Residential: stationary' in line with Reporting Guidelines' paragraph <sup>214</sup>.

10. The activity data is obtained from official statistics and questionnaires from Ministry for the Ecological Transition and the Demographic Challenge (MITECO), Institute for the Diversification and Saving of Energy (IDAE) and Spanish Association for Energy Recovery of Biomass (AVEBOIM). The ERT notes that the activity data is described transparently in the Informative Inventory Report. The primary form of energy consumption has been natural gas followed by liquid fuels such as gas oil and LPG. Consumption of biomass formed more than 23% of the total energy consumption for 1A4b in 2020.

11. The activity data for Spain do not include collected wood, i.e. wood directly harvested from the forest outside formal market activity. The ERT recommends Spain to account for the emissions associated with the combustion of collected wood in 1A4bi in future submissions.

12. Spain has not stratified the total fuel consumption for each fuel type into different appliance types e.g. boilers, stoves, in a consistent and complete manner. The ERT recommends Spain to stratify the total fuel consumption into different appliance types for the next submission, if no data is available the default information from the EMEP/EEA Guidebook 2019 version can be used. In addition, the ERT recommends Spain to improve the description in the IIR, for instance by providing a table clearly documenting for each fuel how the fuel consumption is allocated to different appliances, preferably including the amount of fuel used in each appliance type.

13. Spain uses the EMEP/EEA Guidebook 2019 for the compilation of its emissions from this category.

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<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.”

14. The emission factors partially include the condensable component of PM<sub>2.5</sub> emissions (Table 1).

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

<b>Fuel Type</b>	<b>Includes the condensable component of PM emissions</b>
Gas oil	Unclear
LPG	Unclear
Petroleum coke	Yes
Residual oil	Unclear
Gas works gas	Unclear
Patent fuels	No
Steam coal	No
Sub-Bituminous coal	No
Natural gas	Unclear
Charcoal	Yes
Pellets	Yes
Wood wastes	Yes

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

16. The PM<sub>2.5</sub> emissions from small combustion are spatially distributed, for community level fuel consumption, such as coal storers, consumption of diesel, fuel oil, LPG and natural gas in the residential sector, and biomass consumption in Spain, by using population statistics as the proxy data.

17. Spain lists the following planned improvements for future submissions in their 2022 IIR:

- Study of biomass heating technologies and their breakdown for estimation of emissions from the residential sector. Spain has planned to make improvements to the estimations of residential combustion emissions by disaggregation of biomass consumption according to the different existing appliances, by taking into account the information from a national study carried out by IDAE (MITECO). The study was under review at the time of preparing this document.

The ERT commends Spain for this planned improvement and recommends implementing this as a priority. The ERT finds this improvement item to be of crucial importance for the application of a Tier 2 methodology for estimating emissions from the key category of '1A4bi – Residential: stationary'.

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

18. Spain road transport sector emissions are calculated using a country specific emission calculation tool developed and implemented following the guidelines in the EMEP/EEA Guidebook. Emission factors are consistent with the EMEP/EEA Guidebook October 2019 version road transport emission factors (as used in COPERT 5.3), therefore effectively a Tier 3 methodology. The IIR provides details of the main features of the model. The IIR describes the calculation of transport emissions transparently.

19. The activity data is taken from official statistics. Fuel consumption is taken from national energy balances elaborated by MITECO. Vehicle fleets for 2007-2020 are taken from the Spanish Traffic Department and for remaining years these are estimated based on the General Statistical Yearbook from the Spanish Traffic Department. Distances travelled are taken from the General Directorate for Roads (Ministry of Transport, Mobility and Urban Agenda) and studies of road sampling carried out in Madrid (General Directorate of Sustainability and Environmental Control of Madrid City Council). The ERT recommends that Spain provide an explanation of how vehicle fleets prior to 2007 are aligned with fleets for 2007 to 2020 in order to ensure consistent time series in the next IIR submissions.

20. The PM<sub>2.5</sub> emissions from road transport exhaust include the condensable component of PM<sub>2.5</sub> emissions.

21. The ERT notes that the method is not documented transparently in the IIR. The ERT recommends Spain to include statistical information showing the trends in the fleet composition by vehicle and fuel type and the age distribution of the fleet in the next IIR submissions.

22. The time series is consistent.

23. Spain lists the following planned improvements for future submissions in their 2022 IIR

- Full alignment of the road transport methodology with further editions of the EMEP/EEA Guidebook, paying special attention to the emission estimation from alternatively fuelled vehicles.
- Continuous improvement of activity data when more accurate information becomes available.

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

24. In addition the ERT recommends implementing the following:

- In response to a question raised during the review Spain provided details of the version of COPERT emission factors used in emission modelling. The ERT recommends that Spain provide the version of COPERT emission factors used in the IIR in its next submission. Furthermore, the ERT recommends that Spain update to the latest version of COPERT emission factors in its next submission.

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

25. 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.

26. Spain did not provide any revised estimates and the ERT did not calculate technical corrections for Spain.

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



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

1. Spain IIR 2022
2. Annex 1: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants, SPAIN\_2022 CLRTAP Annex\_1\_1990-2020\_ES.xlsx

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

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