Final Review Report 2025

Review of National Air Pollutant Emission Inventory Data 2025 under Directive (EU) 2016/2284 (National Emission reduction Commitments Directive) Service Contract No. 09.0202/2023/903481/SER/ENV.C.3

Germany

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Umweltbundesamt GmbH
Spittelauer Lände 5
1090 Vienna
Austria

Aether Limited
Calle Serrano, 3, 5° izquierda
28001 Madrid
Spain

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Abbreviations

AD	Activity data
BaP	Benzo[a]pyrene
BC	Black Carbon
C	Confidential
Cd	Cadmium
CLRTAP	Convention on Long-range Transboundary Air Pollution: the first international treaty to deal with air pollution on a broad regional basis signed by the UNECE in 1979 – 'the Air Convention'
CO	Carbon Monoxide
E-PRTR	European Pollutant Release and Transfer Register
EC	European Commission
EEA	European Environment Agency
EF	Emission factor
EIONET	European Environment Information and Observation Network
EMEP	The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (unofficially 'European Monitoring and Evaluation Programme' = EMEP)
EMRT-NECD	EEA Emission Review Tool (EMRT) for the National Emission reduction Commitments Directive (NECD)
ERC	Emission Reduction Commitment
EU	European Union
GHG	Greenhouse gas
g I-TEQ	Gram(s) International Toxic Equivalents
HCB	Hexachlorobenzene
Hg	Mercury
HM	Heavy metals
IE	Included elsewhere (notation key)
IEF	Implied emission factor
IPPU	Industrial Processes and Product Use
kt	Kilotonnes
NA	Not applicable (notation key)
NE	Not estimated (notation key)
NECD	National Emission reduction Commitments Directive
NFR	Nomenclature for reporting
NH_3	Ammonia
NMVOC	Non-methane volatile organic compounds
NO_X	Nitrogen oxides
NO	Not occurring (notation key)

NR	Not relevant (notation key)
PAHs	Polycyclic aromatic hydrocarbons
Pb	Lead
PCB	Polychlorinated biphenyls
PCDD/F	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PM_{10}	Fine particulate matter: particles with an aerodynamic diameter equal to or less than 10 micrometres (µm)
$PM_{2.5}$	Fine particulate matter: particles with an aerodynamic diameter equal to or less than 2.5 micrometres (µm)
POPs	Persistent organic pollutants
PTC	Potential technical correction
RE	Revised estimate
SO_2	Sulphur dioxide
SO_2	Sulphur oxides
t	Tonne(s)
TC	Technical correction
TERT	Technical expert review team
TSP	Total suspended particulates
UPTC	Unquantified potential technical correction

I. Introduction

1. The review of the air pollutant emission data submitted by Member States under the European Union's National Emission reduction Commitments Directive (Directive (EU) 2016/2284[1]) is established in Article 10(3):

"The Commission, assisted by the European Environment Agency and in consultation with the Member States concerned, shall review the national emission inventory data in the first year of reporting and regularly thereafter. That review shall involve the following:

(a) checks to verify the transparency, accuracy, consistency, comparability and completeness of information submitted;

(b) checks to identify cases where inventory data is prepared in a manner which is inconsistent with the requirements set out under international law, in particular under the LRTAP Convention;

(c) where appropriate, calculation of the resulting technical corrections necessary, in consultation with the Member State concerned.

Where the Member State concerned and the Commission are unable to reach an agreement on the necessity or on the content of the technical corrections pursuant to point (c), the Commission shall adopt a decision laying down the technical corrections to be applied by the Member State concerned."

2. The technical review of the National Emission reduction Commitments Directive (NECD) inventories in 2025 (hereafter referred to as the '2025 NECD inventory review') was undertaken in accordance with the NECD air emission inventory review guidelines 2025.

II. Objectives of the review

3. The general objective of the technical review of Member States' NECD inventories as reported in February 2025 (and resubmitted before 2 April 2025) is to provide recommendations to drive improvements of transparency, consistency, comparability, completeness and accuracy of information submitted. As such the review will contribute to establishing accurate, reliable and verified emission inventories for all Member States, which will also be used for compliance checks with article 4.1 of the NEC Directive.

4. The specific objectives of the 2025 NECD inventory review were:

- An in-depth review of national emission inventories for the pollutants NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10} and heavy metals (HMs) and persistent organic pollutants (POPs). The in-depth review included a follow-up on findings from the 2024 NECD inventory review for main pollutants and PM_{10} and from the 2021[2] NECD inventory

[1] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC

[2] Heavy metals and POPs were last reviewed in the 2020 and the 2021 NECD inventory reviews in the form of a follow-up to the in-depth review, which had been performed as part of the 2018 and 2019 NECD inventory reviews.

review for HMs and POPs[3][4], a review of all findings from the initial checks and a detailed assessment of all submitted data and inventories by the TERT;

- A review of the recalculations between the 2024 and 2025 national inventory submissions for the pollutants NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$, PM_{10}, HMs and POPs for the years 2005, 2020 -2022;
- A review of the time series consistency with a special focus on the years 2005 and 2020 to 2023 for the pollutants: NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$, PM_{10}, HM and POPs[5];
- In accordance with the requirements of the NECD (Article 5 and Annex IV) and in line with the "Technical guidance for Parties making adjustment applications and for the expert review of adjustment applications (ECE/EB.Air/130)"[6] and the technical guidance on "Inventory adjustments in the context of emission reduction commitments"[7], an expert review of:
    i. All flexibility applications as detailed in Article 5 of the NECD, including an assessment whether the conditions listed in Article 5 were fulfilled;
    ii. In particular, for adjustment applications, the review of the supporting documentation as requested in part 4 of Annex IV to the NECD and an assessment of whether the adjustment application is consistent with the circumstances described therein.
- A comparison of the reviewed national totals for compliance for the pollutants NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ with the maximum allowed emission levels calculated on the basis of the national emission reduction commitments set out in the NECD.

[3] Recommendations initially raised in previous review years that cover pollutants to be reviewed as part of the 2025 NECD inventory review (main pollutants and PM_{10}) and HMs and POPs **and** recommendations that cover any other pollutant previously reviewed under the NECD inventory review (BC, CO) and that are of significance to the emission estimates of the pollutants under review in 2025 were included in the 2025 NECD inventory review. This means that Member States received follow-up questions in relation to BC and CO in cases where observations also relate to a pollutant subject to the 2025 NECD inventory review.

[4] NECD inventory review reports from previous years are available at https://environment.ec.europa.eu/topics/air/reducing-emissions-air-pollutants/emissions-inventories_en#review-of-national-emission-inventories

[5] Checking whether the 2005 emission value is an outlier within the 2000-2010 time series. Checking whether any of the 2020 to 2023 emission values are outliers within the 2019-2023 time series. Note that the aviation subsectors are excluded from the check between 2019 and 2023 as they have been severely impacted by the effects of Covid-19.

[6] Available at https://www.ceip.at/fileadmin/inhalte/ceip/4_adjustments/ece_eb_air_130_av_for_the_web.pdf

[7] Available at https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2022/technical_guidance_for_erc_adjustments_issue1.1.pdf

III. Review approach, team and scope

5. The scope of the 2025 NECD inventory review is summarised in Table 1.

Table 1: Scope of the 2025 NECD inventory review (under Directive (EU) 2016/2284)

Element	Scope	Further information
Geographical coverage	EU geographical coverage of the Member States as of 1 January 2025	Includes the geographical territory of the Member States, their exclusive economic zones and pollution control zones. Excludes the Canary Islands, the French overseas departments, Madeira, and the Azores, as per Article 2 of the NECD.
Years	2005, 2020-2023	In addition, time series consistency for 2005 and between the years 2020 - 2023 was reviewed.
Pollutants	• Main pollutants NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$, and other pollutants: PM_{10} • Heavy metals (Cd, Hg, Pb) • POPs (total PAHs, benzo(a) pyrene, benzo(b)-fluoranthene, benzo(k)-fluoranthene, indeno(1,2,3-cd)pyrene, PCDD/PCDF (dioxins/furans), PCBs, HCB	See also NECD (Directive (EU) 2016/2284) Annex I
Categories	All NFR categories, including selected memo items	All NFR categories that contribute to the national total, and the national total itself, shall be considered. The following memo items shall also be included: 1A3ai(ii) International aviation cruise (civil) 1A3aii(ii) Domestic aviation cruise (civil) 1A3di(i) International maritime navigation 1A3 Transport (fuel used) – where it is used for compliance purposes
National totals	National total and national total for compliance	Rows 141 and 154 in Annex 1 of reporting guidelines

6. The review was split into two phases:

a) **Initial checks** were carried out by the project team. Significant findings from the initial checks that were not resolved within the initial checks phase were followed up by the technical expert review team (TERT) during the desk review and centralised review.

b) **A desk review and centralised review** were performed by the TERT. The TERT consisted of the following experts:

- **Lead Reviewers:** Anne Misra, Kristina Saarinen, Kevin Hausmann, Susana Lopez Aparicio
- **Energy – stationary:** Robert Stewart, Stephan Poupa, Marlene Plejdrup, Bob Boyce
- **Energy – mobile:** Giannis Papadimitrou, Marlies Vanhulsel, Yvonne Pang
- **IPPU:** Ben Richmond, Torleif Weydahl, Kirsten May, Jeroen Kuenen
- **Agriculture:** Olga Gavrilova, Tim van der Zee, Richard German, Jonathan Hercule
- **Waste:** Dirk Wever, Elisabeth Kampel, Céline Gueguen

This year, the review started with a desk review of the NECD submissions for SO_2, NO_X, $PM_{2.5}$, NH_3, NMVOC, PM_{10}, HMs and POPs and of flexibility applications under Article 5 of the NECD, which lasted for 4.5 weeks. Member States then had two weeks to reply to questions from the desk review. After this, the centralised review took place for one week, before and during which the TERT could send follow-up questions to Member States.

7. The desk review and centralised review were coordinated by the project team (led by Sabine Schindlbacher and Chris Dore).

8. The EEA Review Secretariat led by Siiri Latvala supported the 2025 NECD inventory review.

9. The review was performed on the basis of NECD emission data officially reported by Germany by 15 February 2025 for emission inventories. The Informative Inventory Reports (IIR) reported by 15 March 2025 under the NECD informed the review. Resubmissions and other additional information officially submitted by Member States were taken into account until 2 April 2025.

10. To avoid any potential conflicts of interest, the lead reviewers and sector experts did not review emission inventories of Member States where these individuals had themselves contributed to the compilation of that inventory, or presently are or have been part of the decision-making process related to the compilation of that inventory. Reviewers who are nationals of the Member State whose inventory is concerned, did not act as the sector expert for this Member State.

11. All sector experts signed confidentiality agreements in which they agreed to keep information received by Member States confidential.

12. Definitions for findings included in the Final Review Report can be found in Table 2.

Table 2: Definitions for finding classifications of the 2025 NECD inventory review

Recommendation	A finding where an identified issue with an expected impact below the threshold of significance has not been resolved during the course of the review.
Revised Estimate (RE)	A finding for which a Member State provided new estimates in response to an issue raised by the technical expert review team during the course of the review.
Unquantified potential technical correction (UPTC)	A finding for which quantifying a technical correction is currently not possible for the TERT. This is for cases where the expected impact is likely to exceed the determined thresholds of significance, but it is not possible to quantify the technical correction as part of the review. Situations where this may arise include but are not limited to situations where Tier 1 methods are used to make emission estimates for a key category[8].
Technical correction (TC)	Issued by the TERT for findings identified which result in an over- or under-estimate of more than a 0.5% of the national total for main pollutants and PM_{10} and 2% of the national total for HMs and POPs[9] in one of the reported years under review and where Member States did not provide a revised estimate which was accepted by the

[8] UPTCs were used in NECD inventory reviews prior to 2022. In the 2022 NECD inventory review, the TERT did not assign any issues as unquantified technical correction, but labelled issues for which uncertainty was too high and a quantification was not possible as recommendation. UPTCs have been used again since the 2023 NECD inventory review in order to clearly label issues where the TERT has not been able to quantify a potential technical correction.

[9] The TERT calculated technical corrections for all of the main pollutants and PM_{10} concerned when the threshold of significance was exceeded for a main pollutant or PM_{10} (irrespective of whether some are below the threshold of

	TERT. This may require using partial solutions as an interim measure, which provide significant improvement on the existing reporting and still follow good practise (such as using proxy data).

significance). Similarly, the TERT calculated technical corrections for all of the HMs and POPs concerned when the threshold of significance was exceeded for a HM and POP (irrespective of whether some are below the threshold of significance).

IV. Overall assessment of the quality of the submissions

13. The TERT considered the 2025 inventory submission for NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10} to be of very good quality in terms of completeness and accuracy. The IIR submitted in 2025 described the methods used for the NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10} transparently.

14. The TERT considered the 2025 inventory submission for HMs and POPs to be of good quality in terms of completeness and accuracy. The IIR submitted in 2025 described the methods used for the HMs and POPs transparently.

15. To improve the quality of these submissions, the TERT suggests that Germany:

- Further improve the transparency of the IIR by providing detailed information on assumptions and methodologies e.g. recommendations DE-2D3a-2023-0001 and DE-2D3g-2018-0001
- Include the improvements agreed upon during the review e.g., recommendations DE-1A3dii-2025-0001 and DE-2C3-2021-0001.

16. The TERT considers that it received responses from Germany that were sufficient in order to undertake the 2025 NECD inventory review.

V. Findings and Conclusions from the TERT for the in-depth review of national emission inventories for NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10}

17. The TERT assessed the implementation of all findings from the 2024 NECD inventory review.

18. The TERT carried out in-depth checks to verify the transparency, accuracy, consistency, comparability and completeness of the main pollutants and PM_{10} inventory. The focus was on the years 2005 and 2020 to 2023.

19. The assessment was based on the emission inventory submitted in 2025 by Germany pursuant to Directive (EU) 2016/2284 and on the German review report from the 2024 NECD inventory review.

20. Resubmissions and other additional information provided by Member States during the review were taken into account until 2 April 2025.

21. Table 3 gives an overview of the number of recommendations, revised estimates and technical corrections and unquantified potential technical corrections for NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10} that are described in detail in Table 4. The table also shows the range of these figures for all Member States from the 2025 NECD inventory review reports.[10]

22. Table 4 provides all the findings from the TERT related to NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10}, including those made during the 2025 NECD inventory review for the first time and those not implemented from the 2024 NECD inventory review. The implementation of the recommendations will be followed up in the 2026 NECD inventory review. The findings are presented in the following order (TC, RE, UPTC, recommendation); within each of these groups, findings are listed by order of NFR code.

Table 3: Overview of the number of findings included in the 2025 NECD inventory review report related to NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10}[11]

	TC*	RE*	UPTC*	Recommendation
Number of findings included in the 2025 Review Report (see Table 4 below)	0	0	0	2
Out of which new findings resulting from the 2025 NECD inventory review	0	0	0	0
(Range for all Member States)	(0-2)	(0-4)	(0-1)	(5-37)

* TC = technical correction, RE = revised estimate, UPTC = unquantified potential technical correction

[10] Some findings relate to both a main pollutant (NO_X, NMVOC, SO2, NH_3, $PM_{2.5}$) or PM_{10}, and a HM or POP. If a finding is related to both it is included in Table 3 and Table 4.

[11] The numbers here represent the sum of findings originally issued in previous years and not yet implemented and new findings first issued as part of the 2025 NECD inventory review.

Table 4: All findings for NO_x, NMVOC, SO_2, NH_3, $PM_{2.5}$ and PM_{10}, including those made during the 2025 NECD inventory review and those not implemented from the 2024 NECD inventory review

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2024	RE, TC, or UPTC in 2025
2023 (3)	DE-1A3di(i)-2023-0002	No	1A3di(i) International Maritime Navigation - Memo Item, $PM_{2.5}$, 2005	No	No
Assessment of the implementation of the initial recommendation For category 1A3di(i) International Maritime Navigation - Memo Item, for $PM_{2.5}$, for 2005, the TERT notes that the implied emission factor (IEF) for $PM_{2.5}$, where natural gas has been excluded from the activity, is outside of the 95% confidence interval when compared to the other Member States for 2005. The 2005 IEF for Germany is 540.6 kg/TJ, while the average or maximum IEF for other member states are 99.4 kg/TJ and 178.4 kg/TJ, respectively (which are roughly similar to the range of the 2023 EMEP/EEA Guidebook Tier 1 emission factors). The sector is within the top 10 sectors across all EU member states for all relevant pollutants. This was raised during the 2023 and 2024 NECD inventory reviews. In response to a question raised during the review, Germany explained how the emission factor was derived and indicated that they will examine the situation together with the modellers and check as to what extent the extrapolated particulate matter emission factors require correction. **The TERT recommends that Germany review and update the emission factor if appropriate and update the IIR regarding the outcome of their review in the next submission.**					
Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2024	RE, TC, or UPTC in 2025
2023 (3)	DE-2D3a-2023-0001	Yes	2D3a Domestic Solvent Use Including Fungicides, NMVOC, 1990-2023	No	No
Assessment of the implementation of the initial recommendation For 2D3a Domestic Solvent Use Including Fungicides, for NMVOC, for all years, the TERT notes that there is a lack of transparency regarding reporting of NMVOC emissions for household disinfectant products and hand sanitisers in the IIR. This does not relate to an over- or under-estimate of emissions. This was raised during the 2023 and 2024 NECD inventory reviews. The TERT notes that the IIR states that the issue has been included in the list of improvements but it is not indicated when the recommendation will be addressed. During the course of the review Germany provided further information on the two sorts of disinfectants included within the solvent inventory: disinfection cleaners including sprays and alcohol containing cleaners for surface disinfection. Given that the 2023 EMEP/EEA Guidebook does not ask for disaggregation of household disinfectant products in emission estimates Germany asked for further information on what should be included in the next IIR submission to aid transparency. The TERT considers from analysis of the 2D3a trend from other Member States, that it may be considered unusual that solvent emissions did not increase significantly in 2020 as a result of the COVID-19 pandemic, and therefore it may be worth investigating this absence of trend feature to establish if activity data included within the German solvent model is capturing this. For example, it may be interesting to compare the German model to the ESIG emission factor of 0.9 kg NMVOC/kg product for the use of hand sanitiser. Greater transparency could also be achieved through reporting activity data in the NFR-tables and/or IIR. **In this manner, the TERT reiterates the recommendation that Germany include further information in the IIR for the next submission.**					

VI. Findings and Conclusions from the TERT for the in-depth review of national emission inventories for heavy metals and POPs

23. The TERT assessed the implementation of all findings from the 2021 NECD inventory review[12].

24. The TERT carried out in-depth checks to verify the transparency, accuracy, consistency, comparability and completeness of the HMs and POPs inventory. The focus was on the years 2005 and 2020 to 2023.

25. The assessment was based on the emission inventory submitted in 2025 by Germany pursuant to Directive (EU) 2016/2284 and on the German review reports from the 2021 NECD inventory review.

26. Resubmissions and other additional information provided by Member States during the review were taken into account until 2 April 2025.

27. Table 5 gives an overview of the number of recommendations, revised estimates and technical corrections and unquantified potential technical corrections for heavy metals and POPs that are described in detail in Table 6. The table also shows the range of these figures for all Member States from the 2025 NECD inventory review reports.[13]

28. Table 6 provides all the findings from the TERT related to HMs and POPs, including those made during the 2025 NECD inventory review for the first time, and those not implemented from the 2021 NECD inventory review. The findings are presented in the following order (TC, RE, UPTC, recommendation); within each of these groups, findings are listed by order of NFR code.

Table 5: Overview of the number of findings included in the 2025 NECD inventory review report related to heavy metals and POPs[14]

	TC*	RE*	UPTC*	Recommendation
Number of findings included in the 2025 Review Report (see Table 6 below)	0	0	0	6
Out of which new findings resulting from the 2025 NECD inventory review	0	0	0	2
(Range for all Member States)	(0-2)	(0-4)	(0-1)	(2-7)

* TC = technical correction, RE = revised estimate, UPTC = unquantified potential technical correction

[12] Heavy metals and POPs were last reviewed in the 2020 and the 2021 NECD inventory reviews in the form of a follow-up review to the in-depth review, which had been performed as part of the 2018 and 2019 NECD inventory reviews.

[13] Some findings relate to both a main pollutant (NO_x, NMVOC, SO2, NH_3, $PM_{2.5}$) or PM_{10}, and a HM or POP. If a finding is related to both it is included in Table 3 and Table 4.

[14] The numbers here represent the sum of findings originally issued in previous years and not yet implemented and of new findings first issued as part of the 2025 NECD inventory review.

Table 6: All findings for heavy metals and POPs, including those made during the 2025 NECD inventory review and those not implemented from the 2021 NECD inventory review[15]

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2025 (1)	DE-1A3b-2025-0001	Yes	1A3b Road Transport, BaP, PAHs, PCDD/F, 1990-2023	N/A	No
Recommendation For category 1A3b Road Transport, pollutant POPs, all years, the TERT notes that there is a lack of transparency regarding the source of PCB emission factors used and the implied emission factor trend for dioxins and furans, and that reference of the 2017 version of the 2016 EMEP/EEA Guidebook and 2019 EMEP/EEA Guidebook are made for PAHs. In response to a question raised during the review, Germany explained that the emission factors for POPs are not part of the TREMOD model and are therefore not automatically checked for possible updates on an annual basis. Germany also confirmed that more differentiated values by Euro Standard are applied for PCB, dioxins and furans, resulting in the decreasing trend over time as observed by the TERT. Germany also indicated that they will carry out further check on the issues raised by the TERT in order to update both the information provided in its IIR and the PAH emission factors applied. **The TERT recommends that Germany update the information provided in the IIR and to use the emission factors from the 2023 EMEP/EEA Guidebook where relevant in the next submission.**					
Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2025 (1)	DE-1A3dii-2025-0001	No	1A3dii National Navigation (Shipping), BaP, PAHs, 1990-2023	N/A	No
Recommendation For category 1A3dii National Navigation (Shipping), pollutant PAHs, for all years, the TERT notes that there is a lack of transparency for the rationales for using default factors from 1A3c Railways and 1A3b Road Transport for estimating PAHs emission from 1A3dii. The TERT notes that the 1A3d chapter of the 2023 EMEP/EEA Guidebook provides default factors for all of these PAHs. In response to a question raised during the review, Germany explained that the adoption of the default emission factors from 1A3c and 1A3b was carried out some time ago for gap-filling and based on the 2016 EMEP/EEA Guidebook. Germany also indicated that they would include the emission factors available from the 2023 EMEP/EEA Guidebook in the next annual submission. **The TERT recommends that Germany implement the update of emission factors and descriptions in the IIR in the next submission.**					

[15] Heavy metals and POPs were last reviewed in the 2020 and the 2021 NECD inventory reviews in the form of a follow-up review to the in-depth review, which had been performed as part of the 2018 and 2019 NECD inventory reviews.

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2018 (8)	DE-1A4cii-2018-0001	No	1a4cii Agriculture/Forestry/Fishing: Off-Road Vehicles and Other Machinery, Cd, 2007-2018	No	No

Assessment of the implementation of the initial recommendation

For category 1A4cii Agriculture/Forestry/Fishing: Off-Road Vehicles and Other Machinery, pollutant Cd, the TERT noted an erratic trend in the emissions and IEF between years 2007 and 2018. This was raised during 2018, 2019, 2020 and 2021 NECD reviews. In response to a question raised during the review, Germany explained that the activity data estimated from the annual inland fuel deliveries cannot be revised without a previous revision of the underlying statistics and that this revision cannot be executed or demanded by the inventory compiler. The TERT also notes in the IIR that "besides a routine revision of TREMOD MM, no specific improvements are planned".

The TERT reiterates the recommendation that Germany keep on reviewing this issue (for example, to investigate why the likely faulty trend in annual gasoline inland deliveries are not affecting other metal emissions in similar way) and correcting the erratic trends in emissions and IEF for the relevant pollutant, and to clarify in the next IIR submission the progress in following up this recommendation.

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2021 (5)	DE-2C1-2021-0001	Yes	2C1 Iron and Steel Production, PAHs, 1990-2023	No	No

Assessment of the implementation of the initial recommendation

For category 2C1 Iron and Steel Production, for PAHs, for years 1990-2023, the TERT noted that Germany has implemented the revised estimate provided as part of the 2024 NECD inventory review in its 2025 NFR and IIR submission as expected. Upon reviewing the IIR it is noted that the stated emission factor for PAHs as given in Table 6 'Overview of the emission factors applied for iron and steel casting' is different to that previously given in the revised estimate provided by Germany. This does not relate to an over- or under-estimate of emissions. During the review Germany clarified that the value for PAH stated in the IIR 2025 is wrong and provided the reference for the emission factor.

The TERT recommends that Germany improve the transparency of the IIR by correcting the stated emission factor and providing the reference to the emission factor in the IIR in the next submission.

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2021 (5)	DE-2C3-2021-0001	No	2C3 Aluminium Production, BaP, PAHs, 1990-2023	No	No

Assessment of the implementation of the initial recommendation
For category 2C3 Aluminium Production, for pollutants PAH and BaP, for the whole time series, the TERT notes that Germany reports 'NE' for 3 of the PAHs (B[b]F, B[k]F, I[1,2,3-c,d]P), whilst emission factors exist in the 2023 EMEP/EEA Guidebook. This was previously raised in the 2021 NECD inventory review. The TERT notes that the issue is below the threshold of significance for a technical correction. The TERT notes that the IIR states that the issue has been included in the list of improvements and to a question raised during the review Germany explained that the recommendation will be addressed in the 2026 submission.
The TERT reiterates the recommends that Germany assess the use of default EFs for the 3 other PaHs (B[b]F, B[k]F, I[1,2,3-c,d]P), currently reported 'NE', and include the missing estimates to the next submission.

Review year of initial recommendation (number of years since it has first been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2021	RE, TC, or UPTC in 2025
2018 (8)	DE-2D3g-2018-0001	No	2D3g Chemical Products, PAHs, 1990-2023	No	No

Assessment of the implementation of the initial recommendation
For category 2D3g Chemical Products, PAHs, whole time series, the TERT noted that emissions have been reported in the 2025 submission for total PAHs, however there is a lack of transparency regarding the notation key 'NA' which is still reported for the PAH indicator species. This does not relate to an over- or under-estimate of emissions. This was raised during the 2018, 2019, 2020, 2021 NECD inventory review. In response to a question raised during the review, Germany agreed that the notation key 'NE' (Not Estimated) would be more appropriate to report in the NFR tables.
The TERT recommends that Germany update the notation key reported for the next submission.

VII. Effect of revised estimates and technical corrections on the national total and national total for compliance

29. The tables below show the changes to the national totals and national totals for compliance resulting from the 2025 NECD inventory review. These changes include all revised estimates and technical corrections. The tables also show the impact that these changes have on the reported national total (row 141, Annex I) and national total for compliance (row 154, Annex I).

30. For the pollutants NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$ for the years 2020 to 2023, the national emission reduction commitments 2020 to 2029, as set out in Directive (EU) 2016/2284, have been applied to the 2005 emissions to express the maximum allowed emission per annum in absolute numbers in order to allow for a comparison with the national total for compliance. 2005 emissions (E_{2005}) reported in the 2025 inventory submission after taking into account any technical corrections and revised estimates were used for the calculation. The emission reduction commitment for 2020 to 2029 from the NECD was applied to E_{2005}, which gives the maximum allowed emission per year ($MaxE_{p.a.}$). If the national total for compliance reported for a given year and after taking into account any technical corrections and revised estimates is smaller than $MaxE_{p.a.}$, then compliance in that year is considered achieved.

Table 7: National totals for compliance as reported and, where relevant, national totals for compliance[16] including revised estimates (RE) and technical corrections (TC) for NO_X, NMVOC, SO_2, NH_3, $PM_{2.5}$, PM_{10} and maximum national allowed emissions calculated on the basis of the national emission reduction commitments [17]

Description	Reference	Pollutant estimates (kt)				
		2005	2020	2021	2022	2023
NO_X						
National total (row 141)	Annex I, 14/02/2025	1 602.333	983.207	964.489	926.844	844.878
National total for compliance (row 154)	Annex I, 14/02/2025	1 479.598	870.623	856.666	824.032	745.458
Maximum allowed emissions stemming from the National Emission Reduction Commitments		-	902.555	902.555	902.555	902.555
NMVOC						
National total (row 141)	Annex I, 14/02/2025	1 497.490	1 038.332	1 058.234	1 051.456	974.819
National total for compliance (row 154)	Annex I, 14/02/2025	1 167.338	725.446	751.366	749.288	673.474
Maximum allowed emissions stemming from the National Emission Reduction Commitments		-	1 015.584	1 015.584	1 015.584	1 015.584
SO_2						
National total (row 141)	Annex I, 14/02/2025	471.994	239.202	249.036	246.271	216.617
National total for compliance (row 154)	Annex I, 14/02/2025	471.994	239.202	249.036	246.271	216.617
Maximum allowed emissions stemming from the National Emission Reduction Commitments		-	372.875	372.875	372.875	372.875
NH_3						
National total (row 141)	Annex I, 14/02/2025	714.282	611.447	593.122	576.621	569.003
National total for compliance (row 154)	Annex I, 14/02/2025	714.282	611.447	593.122	576.621	569.003
Maximum allowed emissions stemming from the National Emission Reduction Commitments		-	678.568	678.568	678.568	678.568
$PM_{2.5}$						

[16] The national total for compliance is based on fuel sold data. For NMVOC and NO_x, emissions from agriculture (3B and 3D) were subtracted from the national total.

[17] The tables presented in this report show numbers rounded to three decimal places for presentation purposes. However, for all calculations, all available decimal places were used. Therefore, a calculation undertaken with the data with three decimal places shown in this table may lead to slightly different results than from the calculations undertaken with the precise data used for the assessment.

Description	Reference	Pollutant estimates (kt)				
		2005	2020	2021	2022	2023
National total (row 141)	Annex I, 14/02/2025	131.056	79.055	80.577	82.309	77.472
National total for compliance (row 154)	Annex I, 14/02/2025	131.056	79.055	80.577	82.309	77.472
Maximum allowed emissions stemming from the National Emission Reduction Commitments		-	96.982	96.982	96.982	96.982
PM_{10}						
National total (row 141)	Annex I, 14/02/2025	240.100	178.504	179.685	181.988	181.551

Table 8: National totals as reported and, where relevant, national totals including revised estimates (RE) and technical corrections (TC) for heavy metals and POPs[18]

Description	Reference	Pollutant estimates					
		Units	2005	2020	2021	2022	2023
Pb							
National total (row 141)	Annex I, 14/02/2025	(t)	229.723	144.214	156.419	152.453	151.076
Cd							
National total (row 141)	Annex I, 14/02/2025	(t)	12.424	11.049	11.272	10.616	9.357
Hg							
National total (row 141)	Annex I, 14/02/2025	(t)	13.879	6.080	6.669	6.556	5.430
PCDD/ PCDF (dioxins/ furans)							
National total (row 141)	Annex I, 14/02/2025	(g I-TEQ)	145.439	106.779	109.329	112.497	110.975
PAHs (Total)							
National total (row 141)	Annex I, 14/02/2025	(t)	51.197	65.606	75.707	80.267	67.134
Benzo(a) pyrene							
National total (row 141)	Annex I, 14/02/2025	(t)	11.640	15.092	17.541	18.809	15.659
HCB							
National total (row 141)	Annex I, 14/02/2025	(kg)	38.100	5.186	4.563	4.676	3.854
PCBs							
National total (row 141)	Annex I, 14/02/2025	(kg)	192.364	209.347	218.898	209.457	203.804

[18] The tables presented in this report show numbers rounded to three decimal places for presentation purposes. However, for all calculations, all available decimal places were used. Therefore, a calculation undertaken with the data with three decimal places shown in this table may lead to slightly different results than from the calculations undertaken with the precise data used for the assessment.

VIII. Compliance with Emission Reduction Commitments (ERCs)

31. The national emission reduction commitments listed in Annex II of the NEC Directive 2016/2284 are applicable from 2020 to 2029. Therefore, the 2025 NECD inventory review included a compliance check of 2020 to 2023 air pollutant emission data against emission reduction commitments for 2020 to 2029 for the pollutants NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$.

32. Table 9 provides an overview of Germany's compliance with the emission reduction commitments for the pollutants NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$ for emissions in 2020 to 2023. 2005 emissions reported in 2025 (E_{2005})[19] were used to perform the calculations underlying the compliance check. The % emission reduction commitment from the NEC Directive was applied to E_{2005}, which gives the maximum allowed emission per year ($MaxE_{p.a.}$) in the period 2020-2029. If the national total for compliance for a given year including technical corrections and revised estimates (accepted by the TERT) (see also Table 7) is smaller than $MaxE_{p.a.}$, compliance is considered achieved in that given year.

[19] National total for compliance estimates including, where applicable, revised estimates accepted by the TERT and technical corrections accepted by Member State (see also Table 7) were used as $E_{2005.}$

Table 9: Overview of compliance with emission reduction commitments based on 2025 inventory submission[20]

	NO_X	NMVOC	SO_2	NH_3	$PM_{2.5}$
National total for compliance (kt) 2005	1 479.598	1 167.338	471.994	714.282	131.056
Emission reduction commitments 2020-2029	-39%	-13%	-21%	-5%	-26%
Maximum allowed emissions per year 2020-2029 (kt)[a]	902.555	1 015.584	372.875	678.568	96.982
National total for compliance (kt) 2020	870.623	725.446	239.202	611.447	79.055
National total for compliance (kt) 2021	856.666	751.366	249.036	593.122	80.577
National total for compliance (kt) 2022	824.032	749.288	246.271	576.621	82.309
National total for compliance (kt) 2023	745.458	673.474	216.617	569.003	77.472
Compliance in 2020[b]	-4%	-40%	-56%	-11%	-23%
Compliance in 2021[b]	-5%	-35%	-50%	-14%	-20%
Compliance in 2022[b]	-10%	-36%	-51%	-18%	-18%
Compliance in 2023[b]	-21%	-51%	-72%	-19%	-25%

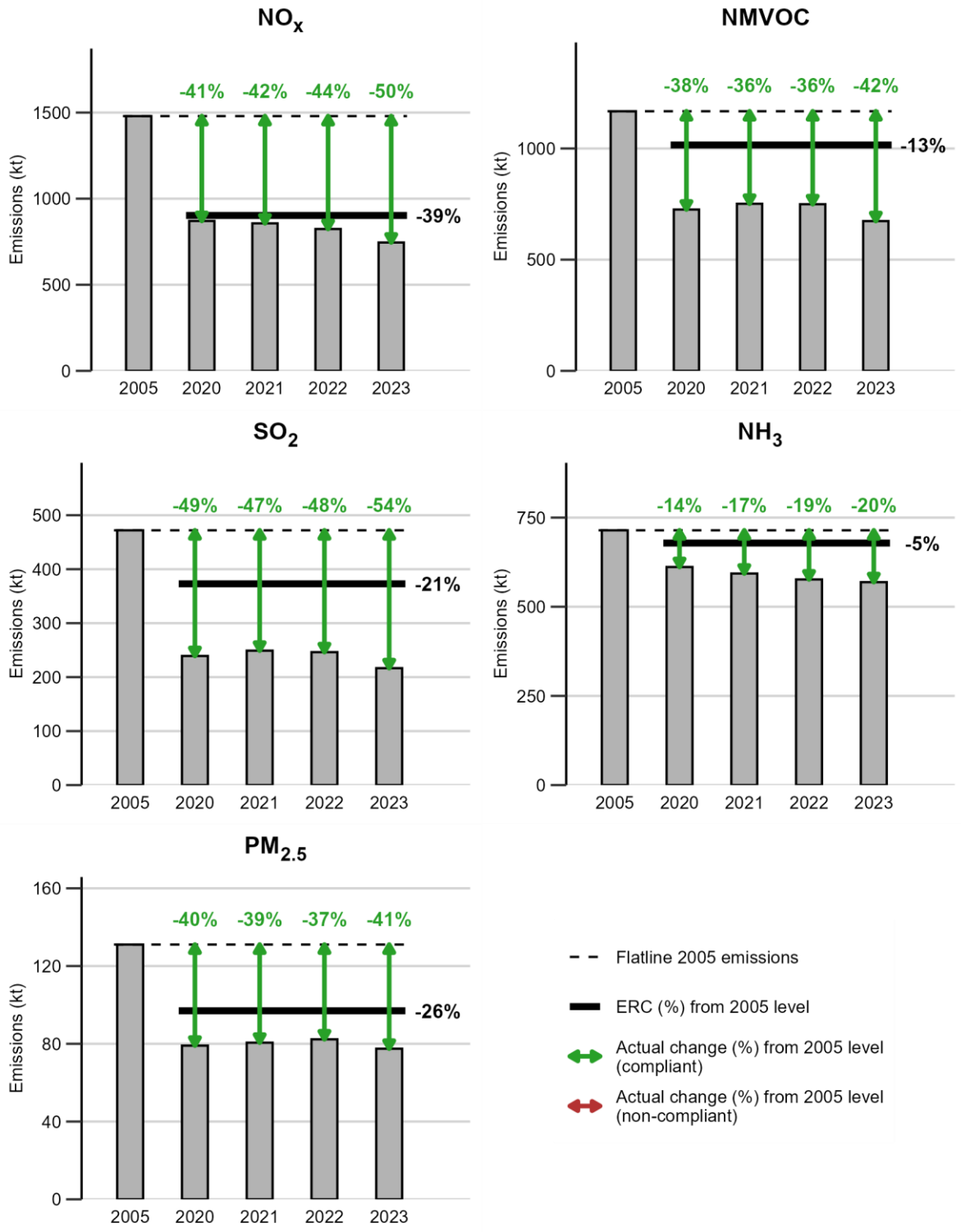
[a] $MaxE_{p.a.} = E_{2005}$ -% emission reduction commitments 2020-2029 x E_{2005}

[b] Percentages express how much national totals for compliance need to be reduced by (in case of percentages >0) to meet emission reduction commitments (or, in case of percentages <0, how much national totals could increase by, while remaining compliant). Green cells indicate where compliance is achieved, and red cells indicate where compliance is not achieved.

[20] The tables presented in this report show numbers rounded to three decimal places for presentation purposes. However, for all calculations, all available decimal places were used. Therefore, calculations undertaken with the data with three decimal places shown in this table may lead to slightly different results than calculations undertaken with the precise data used for the assessment.

33. Germany **is in compliance** with its national emission reduction commitments for NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$ in 2020, 2021, 2022 and 2023 (Figure 1).

Figure 1 Visual illustration of compliance with emission reduction commitments for NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$[21]



[21] The compliance checks are based on absolute numbers using all decimal places provided by the Member State. Figure 1 serves only as visual illustration.

IX. Statement from Germany on the conclusions presented by the TERT

34. Germany agrees with the calculated estimates in Table 7.

X. TERT response to the statement from Germany

35. Germany did not raise any issues with the calculated estimates presented in Table 7 and therefore no response from the TERT is required.

ANNEX I Technical corrections deemed necessary by the TERT and revised estimates provided by Germany

36. Germany did not have any technical corrections or revised estimates in the 2025 NECD Review.

37. The TERT calculated technical corrections for cases:

- where it did not agree with the way in which a revised estimate or technical correction from the 2024 NECD inventory review was implemented and where no revised estimate was accepted by the TERT during the 2024 review.
- and where the suggested finding of the TERT would change the national total by more than 0.5% for NO_X, NMVOC, SO_2, NH_3 and $PM_{2.5}$ and by more than 2% for heavy metals and POPs and where no revised estimate was accepted by the TERT during the review.

38. The TERT calculated technical corrections for all of the main pollutants and PM_{10} concerned when the threshold of significance was exceeded for a main pollutant or PM_{10} (irrespective of whether some are below the threshold of significance). Similarly, the TERT calculated technical corrections for all of the HMs and POPs concerned when the threshold of significance was exceeded for a HM and POP (irrespective of whether some are below the threshold of significance).

39. The methods for calculating the technical corrections are set up in the appendix to UNECE EB decision 2018/1 on technical revisions[22] and use the EMEP/EEA inventory guidebook as a reference for methods and emission factors.

[22] ECE/EB.AIR/142/Add.1

References and Supporting Documents

Annex I emission reporting template. Available at https://www.ceip.at/reporting-instructions

ECE/EB.AIR/111/Add.1: Decision 2012/3: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them https://unece.org/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_3.pdf

ECE/EB.AIR/113/Add.1: Decision 2012/12: Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them https://unece.org/DAM/env/documents/2012/EB/Decision_2012_12.pdf

ECE/EB.AIR/127/Add.1: Decision 2014/1: Improving the guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them https://unece.org/DAM/env/documents/2014/AIR/EB/Decision_2014_1.pdf

ECE/EB.AIR/130: Technical Guidance for Parties Making Adjustment Applications and for the Expert Review of Adjustment Applications, 14 April 2015 https://unece.org/DAM/env/documents/2014/AIR/EB/ECE_EB_AIR_130_ENG.pdf

ECE/EB.AIR/142/Add.1: Decision 2018/1: Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2019/decision_2018_1_advance_version_ece_eb.air_142_add.1.pdf

ECE/EB.AIR/150/Add.1: Guidelines for Reporting Emissions and Projections Data under the Convention on Longrange Transboundary Air Pollution. United Nations Economic Commission for Europe https://unece.org/sites/default/files/2023-09/ECE_EB.AIR_150_Add.1_2305250E.pdf

EEA 2024. Air pollution in Europe: 2024 reporting status under the National Emission reduction Commitments Directive, Copenhagen. https://www.eea.europa.eu//publications/national-emission-reduction-commitments-directive-2024

EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2013, EEA Technical report No 12/2013, European Environment Agency, Copenhagen. Available at: http://www.eea.europa.eu/publications/emep-eea-guidebook-2013

EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2016, EEA Report No. 21/2016 European Environment Agency, Copenhagen. Available at: http://www.eea.europa.eu//publications/emep-eea-guidebook-2016

EMEP/EEA: EMEP/EEA air pollutant emission inventory guidebook 2019, EEA Report No. 13/2019 European Environment Agency, Copenhagen. Available at: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019 EU 2019

EMEP/EEA air pollutant emission inventory guidebook 2023, EEA Report No. 06/2023 European Environment Agency, Copenhagen. Available at: https://www.eea.europa.eu/publications/emep-eea-guidebook-2023

EU 2025. Air Emission Inventory Review Guidelines 2025
https://emrt-necd.eionet.europa.eu/eea-review-tool/4/1/

NEC Directive 2016, Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2016.344.01.0001.01.ENG

TFEIP (2022): "Inventory adjustments in the context of emission reduction commitments (ERC)" available at:
https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2022/technical_guidance_for_erc_adjustments_issue1.1.pdf