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

2023

Türkiye

FINAL REPORT

CONTENT

INTRODUCTION

1.   The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document 'Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention'([1]) – hereafter referred to as the 'Review Guidelines 2018'.

2.   Paragraph 7 (c) of the 'Review Guidelines 2018' defines that Stage 3 Reviews may be annual centralized reviews or ad hoc reviews. Paragraph 18 of the 'Review Guidelines 2018' further specifies that such ad hoc reviews could, for instance, focus on specific source sectors, specific pollutants such as heavy metals or persistent organic pollutants, gridded and projections data, or on other areas as requested by the Implementation Committee and that where appropriate, ad hoc reviews could be conducted in line with the present Methods and Procedures for the In-depth (Stage 3) review.

3.   At its eighth joint session in September 2022, the Steering Body and the Working Group on Effects approved the plan that the in-depth review in 2023 focuses on emissions from agriculture with a special emphasis on ammonia, NMVOC and NO_x emissions including gridded data. While the focus was set on NH_3, NMVOC and NO_x emissions, also all other pollutants covered by LRTAP Convention and its protocols (i.e. SO_2, NOx, NMVOC, NH_3, plus PM_{10} $PM_{2.5}$, BC, priority HMs and POP_S) have been checked for the time series years 1990 – 2021 <u>to the extent possible</u>. For these other pollutants especially completeness of reporting was assessed.

4.   This report covers the results of the Stage 3 Review (ad hoc review) 2023 of Türkiye's air emission inventory submitted under the UNECE LRTAP Convention. The review was coordinated by the EMEP Centre on Emission Inventories and Projections (CEIP) acting as Review Secretariat. The review took place between April and June 2023 and was performed as a desk review between 31 March to 5 May 2023 and an in-person meeting between 22 of May 2023 and 26 May 2023 (centralized review). The following team of nominated experts from the Roster of Experts performed the review.

<u>Agriculture experts:</u>

Ms. Armine ARTENYAN (Republic of Armenia)

Ms. Ajla BASOVIC (Montenegro)

Ms. Aleksandra NESTOROVSKA-KRSTESKA (North Macedonia)

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[1] Decision 2018/1 adopted by EB: *Updated methods and procedures for the technical review of air pollutant emission Inventories reported under the Convention.* ECE/EB.AIR/142/Add.1
http://www.unece.org/fileadmin/DAM/env/documents/2002/eb/air/EB%20Decisions/Decision_2018_1.pdf

Mr. Lasha AKHALAIA (Georgia)

Mr. Hakam AL-HANBALI (Sweden)

Ms. Susana LOPEZ-APARICIO (EU/ETC(EEA))

Ms. Simone MAYER (Austria)

Ms. Andjelka RADOSAVLJEVIC (Serbia)

Ms. Kristina Tonhauzer (Slovakia)

Mr. Tim VAN DER ZEE (Netherlands)

Experts for gridded emission data:

Ms. Christine BRENDLE (Austria)

Mr. Christopher EVANGELIDES (United Kingdom)

Mr. Christian MIELKE (Germany)

5.   Mr. Ben RICHMOND (United Kingdom), Ms. Rikke ALBREKTSEN (Denmark), Mr. Etienne MATHIAS (France), Ms. Kristina SAARINEN (Finland) were the lead reviewers. The review was coordinated by Ms. Sabine Schindlbacher and Mr. Bernhard Ullrich (EMEP Centre on Emission Inventories and Projections - CEIP).

6.   The review was performed on the basis of CLRTAP emission data officially reported by Türkiye, due by 15 February 2023. The Informative Inventory Reports (IIR), reported due by 15 March 2023 under the CLRTAP, informed the review.

7.   The EMEP/EEA Guidebook 2019[2] was used as a base for the review.

8.   The emission inventory of Türkiye was received on 15 February 2023 and thus by the deadline of 15 February. The Informative Inventory Report was received on 15 March 2023 and thus by the deadline of 15 March. Türkiye provided resubmissions of the emission inventory on 15 March 2023. The resubmission has been considered for the review.

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

PART A: GENERAL RECOMMENDATIONS FOR THE CHAPTER AGRICULTURE

9.   The ERT recognises the level of effort undertaken by Türkiye in providing an inventory including a significant level of detail and the cooperation and responsiveness during the centralised review.

The IIR describes the methods used for the sector agriculture partly transparently. The ERT considers the agriculture part of the inventory submission to be of adequate quality in terms of completeness and of adequate quality in terms of accuracy, comparability and consistency.

To improve the overall quality of the agriculture air emission inventory the ERT recommends Türkiye to

- provide a detailed description of applied methodologies, data sources, choice of emission factors and activity data for all categories in the IIR.

- apply a Tier 2 or higher method to all key categories.

- use the latest available version of the EMEP/EEA air pollutant emission inventory Guidebook 2019.

- ensure that the agriculture emission inventory is complete

- ensure that also emissions of the following pollutants are included: PM and NO_x

- perform and present an uncertainty analysis and use it as a tool to focus on planned improvements to the key categories.

- provide gridded data.

- provide transparent information on recalculations

- ensure that the time series are consistent

- ensure that activity data is included in the NFR tables

- increase the capacities of the air pollution inventory team in order to manage a transparent, complete, comparable, consistent and accurate inventory within deadlines set up in the UNECE reporting Guidelines.

- provide detailed information on its QA/QC plan for its air emission inventory in future submissions and stick to the plan of implementation.

PART B: SPECIFIC RECOMMENDATIONS FOR THE SECTOR AGRICULTURE

10.   Table 1 provides the findings from the 2023 CLRTAP Stage 3 Review including those not implemented from previous CLTRAP Stage 3 Reviews. While the focus was set on NH_3, NMVOC and NO_x emissions, also all other pollutants covered by the LRTAP Convention and its protocols (i.e. SO_2, NOx, NMVOC, NH_3, plus PM_{10} $PM_{2.5}$, BC, priority HMs and POP_S) have been checked for the years 1990 – 2021 <u>to the extent possible</u>, especially regarding the completeness of reporting. The implementation of the recommendations will be followed up in a future CLRTAP inventory review.

Table 1: Findings from the CLRTAP Stage 3 Review 2023 for the Sector Agriculture[3]

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3-1	PM	3	-	-	PTC	C$_1$

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning PM emissions from sector agriculture (3B, 3D) was not implemented. It was strongly recommended to include PM emissions, which could be a key category. Activity data as well as methodology in the EMEP/EEA GB 2019 are available. The ERT found plans to implement PM emissions in the IIR (chapter 8.2.2), however without timeline. During the review Türkiye responded that they could not implement the recommendations but that work is in progress. The ERT calculated a potential technical correction for 3B Manure Management for PM emissions as a starting point in order to further complete and improve the Turkish inventory.

Recommendation

The ERT recommends Türkiye to use the potential technical correction provided by the ERT as a starting point in order to further complete and improve the Turkish inventory and to include PM emissions for the next submission. More details on the issue can be found in section "Revised Estimates and Technical Corrections considered and/or calculated by ERT". The ERT also recommends Türkiye to follow its plans on implementing PM emissions for all relevant sources for the next submission.

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[3] Note: There are four possible types of findings: R: Recommendation, TC: Technical Correction, PTC: Potential Technical Correction; RE : Revised Estimate

The findings have been assigned to one or more of the following criteria: TACCC T (Transparency), A (Accuracy), C$_1$ (Completeness), C$_2$ (Comparability), C$_3$ (Consistency) for definitions of these criteria see EMEP/EEA Guidebook 2019

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3-2	Uncertainties	3	-	-	R	T

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning uncertainty analysis was not implemented. It was recommended to include an uncertainty analysis for the agriculture sector inventory. The ERT did not find plans to implement this recommendation in the IIR. During the review Türkiye explained that the whole analysis of the NFR sectors will be applied by a national project, which currently is under progress.

Recommendation

The ERT recommends Türkiye to follow its plans by implementing an uncertainty analysis for the agriculture sector for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3-3	Activity data	3	-	-	R	T

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning activity data information covered in the NFR tables, was not implemented. During the 2019 review Türkiye indicated that ongoing work will compile all calculations by 2023 and the assessments will be finalized by that year and activity data information will be assessed for NFR tables to be covered by then. In the current submission no activity data was included in the NFR tables. During the review Türkiye informed the ERT that the main data suppliers for this category are TURKSTAT and Ministry of Agriculture and Forestry and that the official data from these institutions are used. Türkiye informed that they will consider this issue for the upcoming submissions.

Recommendation

The ERT reiterates its recommendation for Türkiye to include activity data in the NFR tables for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3-4	all	3	Yes/No	T1, T2	R	A

Observation

The ERT noted, that emissions from sector Agriculture are not calculated with the latest version of the EMEP/EEA GB (2019) consistently for

all NFR categories across all years. During the review Türkiye informed the ERT that the latest version of the EMEP/EEA GB will be applied for the next submission.

Recommendation
The ERT noted that for the sector Agriculture an older version of the EMEP/EEA Guidebook has been used. In response to a question from the ERT Türkiye explained that it is planned to use the 2019/2023 version of the EMEP/EEA Guidebook for the next submission. The ERT recommends to follow this plan and to use the latest version of the EMEP/EEA Guidebook.

ID	Pollutants	NFR category	Key Category	Tier level	Type	$TAC_1C_2C_3$
TR-2023-3-5	all	3	Yes/No	T1, T2	R	T

Observation
The ERT noted that recalculations of several NFR categories (e.g. 3B1a, 3B2, 3Da1 for NH3) were not described in the IIR. During the review Türkiye informed the ERT that it is planned to provide explanations in the next submission.

Recommendation
The ERT recommends to include explanations of recalculations in order to increase transparency of the IIR in the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-1	NMVOC	3B	Yes (3B1a)	T2	R	T

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning information on methodology used for estimation of NMVOC from 3B, was not implemented. It was strongly recommended to implement information on emission factors and tier method used for the calculations of NMVOC from 3B in the IIR. Currently, there is no information in the IIR. During the review Türkiye informed the ERT that an emission factor list for 3B will be added in the section of the IIR in the upcoming submission.

Recommendation

The ERT recommends Türkiye to include information on emission factors and methodology used for the calculations of NMVOC from 3B in the IIR for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-2	NO$_x$	3B, 3Da2a, 3Da3	No	-	PTC	AC$_1$

Observation

The ERT noted that for NO$_x$ emissions from 3B, 3Da2a and 3Da3 in the years 1990-2021 the notation key NA was reported while a Tier 1 method is available in the 2019 EMEP EEA Guidebook. No explanation for the use of the notation key was found in the IIR. During the review Türkiye informed the ERT that NO$_x$ emissions from 3B, 3Da2a and 3Da3 will be updated according to the latest version of the EMEP/EEA GB for the next submission. The ERT calculated a potential technical correction for 3.B Manure Management for NO$_x$ emissions as a starting point in order to further complete and improve the Turkish inventory.

Recommendation

The ERT recommends Türkiye to use the potential technical correction provided by the ERT as a starting point in order to further complete and improve the Turkish inventory and to include NO$_x$ emissions for NFR categories 3B, 3Da2a and 3Da3 in the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-3	NH$_3$, NMVOC	3B4gi	No	T2	R	AC$_3$

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning NH$_3$ and NMVOC from 3B4gi Laying hens, was not implemented. It was recommended to correct the emissions, however there is still the emissions peak in 1992. Furthermore, there might be a problem with consistency of the time series, as the ERT determined different IEFs since 2018 compared to the previous years. During the review Türkiye informed the ERT that the N excretion is high for this year, which explains the peak in the time series. Calculations of chicken could be divided into laying hens and broilers for NH$_3$ and NMVOC. Türkiye informed that all calculations will be revised for 3B4gi by checking the time series for the signified years in the upcoming submission.

Recommendation

The ERT reiterates its recommendation for Türkiye to check activity data (N$_{excretion}$) and update NMVOC and NH$_3$ emissions from NFR 3B4gi Laying hens in order to use the latest methodology of the EMEP/EEA GB and by applying this methodology consistently over the time series.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-4	NH$_3$, NMVOC	3B4giv	No	T2	R	AC$_3$

Observation

The ERT noted, that there are zero (0) NH$_3$ emissions reported for NFR category 3B4giv Other Poultry for the years 2018-2021, which should not be used according to the CLRTAP Reporting Guidelines. Furthermore, for NMVOC emissions of this category, the IEF for 2020 and 2021 differs from the rest of the time series. During the review Türkiye informed the ERT that NH$_3$ emissions can be seen as zero (0) for some years because of the number of digits. The numbers that are reported as zero (0), are lower than 0.5.

Recommendation

The ERT recommends Türkiye to be consistent in the reporting of emissions and include the emission values of NFR category 3B4giv with the agreed 3 decimals format in the NFR tables for all years. The ERT also recommends to check and possibly update the calculations in order to provide a consistent time series based on the latest version of the EMEP/EEA GB.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-5	NH$_3$	3B4e, 3B4giii	Yes (3B4giii)	T2	R	C$_3$

Observation

The ERT noted a time series inconsistency for NFR categories 3B4e Horses, NH$_3$ and 2021 and 3B4giii Türkiyes, NH$_3$, for 2018 and 2021. NH$_3$ emissions of 3B4e increased significantly between 2020 and 2021, whereas livestock numbers decreased and the IEF for 2021 is different compared to all other years. During the review Türkiye informed the ERT that the time series will be checked for the next submission.

Recommendation

The ERT recommends Türkiye to check NH$_3$ emissions from NFR categories 3B4e and 3B4giii on using the methodology of the latest version of EMEP/EEA GB consistently over the complete time series for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3B-6	Activity data	3B4h	No	-	R	T

Observation

The ERT noted, that it is not clear, which animals are included in NFR category 3B4h Other animals (possibly camels). In the IIR it is described, that ducks and geese are accounted as other animals, however ducks & geese should be reported under 3B4giv Other Poultry. Referring to the IIR, ducks & geese are only held on pastures and no emissions are occurring in sector 3.B. During the review Türkiye informed the ERT that camel population is placed in NFR 3B4h Other Animals provided from TURKSTAT. Türkiye also informed the ERT that calculations of ducks and geese will be integrated under the NFR category 3B4giv Other Poultry in the next submission.

Recommendation

The ERT recommends Türkiye to provide information on which animals are included in the NFR category 3B4h in the IIR. The ERT also recommends to report emissions of ducks and geese under NFR category 3B4giv Other Poultry instead of NFR category 3B4h for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	$TAC_1C_2C_3$
TR-2023-3D-1	NMVOC	3Da1	-	-	R	C_2

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning NMVOC from agricultural soils reported under category 3Da1 inorganic N-fertiliser, was not implemented. Referring to the Guidebook 2019 in Chapter 3.D, emissions of NMVOC from agricultural soils should be reported in category 3De cultivated crops. In 2019, the ERT recommended Türkiye to report the emission of NMVOC from agricultural soils in NFR 3De. NMVOC is still reported under 3Da1. Furthermore, it is unclear which methodology is applied. During the review Türkiye informed the ERT that this issue will be integrated in the next submission.

Recommendation

The ERT reiterates its recommendation for Türkiye to report NMVOC under NFR category 3De cultivated crops instead of 3Da1 inorganic N-fertiliser for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	$TAC_1C_2C_3$
TR-2023-3D-2	NO_x	3Da1	-	-	R	TC_1

Observation

The ERT noted, that NO_x from 3Da1 Inorganic fertilizers is not estimated. The EMEP/EEA GB 2019 provides methodology, activity data is available. The ERT also noted, that in the IIR no activity data of inorganic fertilizers (N amounts) is included nor it is in the NFR tables. During the review Türkiye informed the ERT that these issues will be integrated in the next submission.

Recommendation

The ERT recommends Türkiye to report NO_x emissions from NFR category 3Da1 inorganic N-fertiliser based on the methodology of the latest version of the EMEP/EEA GB for the next submission. The ERT also recommends to include activity data in the NFR tables.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3D-3	NH$_3$	3B, 3Da2a, 3Da3	Yes	T2	R	AC$_1$

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning NH$_3$ from 3B, 3Da2a and 3Da3, was not implemented. It was recommended to report emissions from housing and storage in NFR 3B manure management, emissions from spreading in NFR 3Da2a animal manure applied to soils and emissions from grazing in NFR 3Da3 urine and dung deposited by grazing animals. Türkiye still reports most emissions in NFR 3B, some in NFR 3Da3 and for NFR 3Da2a the notation key "NE" is used. During the review Türkiye informed the ERT that these issues will be integrated in the next submission.

Recommendation

The ERT reiterates its recommendation for Türkiye to report NH$_3$ emissions from housing and storage in NFR 3B manure management, emissions from manure spreading in NFR 3Da2a animal manure applied to soils and emissions from grazing in NFR 3Da3 urine and dung deposited by grazing animals for the next submission.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3D-4	NMVOC	3B, 3Da3	Yes (3B1b, 3Da3)	No information	R	AC$_1$

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning NMVOC from 3Da3 was not implemented. It was strongly recommended to report emissions of NMVOC from manure management in NFR 3B and only emissions from grazing animals in NFR 3Da3. Values of 3B and 3Da3 are nearly the same in the current submission and it seems as this issue has not been solved yet. During the review Türkiye informed the ERT that there is no activity data except for grazing animals in NFR 3Da3. Therefore, values of 3B and 3Da3 are close to each other. Türkiye also explained that the activity data for the remaining categories will be researched for the upcoming submissions from data suppliers.

Recommendation

The ERT reiterates its recommendation for Türkiye to investigate NMVOC emissions from NFR 3B manure management and from

NFR 3Da3 grazing animals as values are nearly the same in the current submission. The ERT recommends to correct the values in the next submission, if necessary, and provide transparent explanations of the activity data and methodology used.

ID	Pollutants	NFR category	Key Category	Tier level	Type	TAC$_1$C$_2$C$_3$
TR-2023-3F-1	Activity data	3F	No	-	R	T

Observation

The ERT noted with reference to the 2019 stage 3 inventory review report for Türkiye that the recommendation concerning 3F Field burning, was not implemented. It was recommended to provide a reference for the legal restriction in the IIR, which has not been included yet. During the review Türkiye informed the ERT that field burning is forbidden by legislation and that activity data is not available. Türkiye will try to gather further data and information for future submissions.

Recommendation
The ERT recommends Türkiye to stick to its plans on gathering further data and information regarding NFR category 3F Field burning and to include this information in future submissions, at least to provide a reference for the legal restriction in the IIR.

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

No gridded emission data was reported.

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

11.   In the Appendix of the 'EMEP/UNECE Review Guidelines 2018[4]' it is stated that if the ERT considers that emissions are significantly under- or overestimated, the Party is during the review invited to submit 'Revised Estimates' that address the issue raised. Should the Party decline to do this, or should it not be possible to agree on the quantification of a Revised Estimate i.e. the ERT does not accept a Revised Estimate provided by the Party, the ERT may calculate a 'Technical Correction'. The threshold for significance for a Technical Correction for the in-depth review in 2023 was set at 2% of the national total, i.e. a finding that has been identified to result in an over- or under-estimate of emissions of more than 2% of the national total. The methods for calculating Technical Corrections are set up in the 'EMEP/UNECE Review Guidelines 2018' and use the EMEP/EEA Emission 'Inventory Guidebook' as a reference for methods and emission factors.

12.   The ERT calculated three Technical Corrections. Türkiye agreed with these Technical Corrections and they are thus treated as revised estimate.

13.   Details of the Revised Estimates presented in Table 3 are included in ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES.

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[4] https://www.ceip.at/fileadmin/inhalte/ceip/3_review/advance_version_ece_eb.air_142_add.1.pdf

Table 2 Summary of the revised estimate

NFR category (s)	Pollutants	Years	RE quantified (yes/no)	Potential contribution to national total (%)
3.B	NO_x	1990-2021	yes	1.3% (2021)
3.B	$PM_{2.5}$	1990-2021	yes	3.0% (2021)
3.B	PM_{10}	1990-2021	yes	7.4% (2021)

LIST OF MATERIALS PROVIDED TO ERT

1. Türkiye Annex I reporting template
2. Türkiye Stage 2 S&A report
3. Türkiye Stage 1 report 2023
4. Türkiye IIR 2023
5. Repdab-Report
6. Extended checks

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Responses to the question raised by ERT during the review
2. Material received from the Party during the Review
   - No additional information was provided by the Party either before or during the review.

ANNEX I TECHNICAL CORRECTIONS AND REVISED ESTIMATES

14.   The ERT calculated three Technical Corrections. Türkiye agreed with these Technical Corrections and they are thus treated as revised estimate. Detailed related information is provided separately in the Excel file[s]:

- Türkiye_TC1-2023-3B.xlsx

Table 3: Revised estimate

Revised Estimate for NO_x emissions in 3.B Manure Management			
Year	Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)
2005	NA	10.12	10.12
2020	NA	12.53	12.53
2021	NA	12.88	12.88

Revised Estimate for $PM_{2.5}$ emissions in 3.B Manure Management			
Year	Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)
2005	NA	4.35	4.35
2020	NA	7.01	7.01
2021	NA	7.07	7.07

Revised Estimate for PM_{10} emissions in 3.B Manure Management			
Year	Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)
2005	NA	14.68	14.68
2020	NA	21.69	21.69
2021	NA	22.10	22.10

Table 4: Effect of the Revised Estimate on the National Total for NO_x

Year	Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)
2005	1080.93	10.12	1091.06
2020	957.07	12.53	969.60
2021	980.10	12.88	992.98

Table 7: Effect of the Revised Estimate on the National Total for $PM_{2.5}$

Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)	Original estimate (kt)
2005	163.40	4.35	167.75

2020	244.35	7.01	251.35
2021	235.89	7.07	242.96

Table 8: Effect of the Revised Estimate on the National Total for PM$_{10}$

Original estimate (kt)	Revised Estimate (kt)	Difference between original estimate and Revised Estimate (kt)	Original estimate (kt)
2005	199.04	14.68	213.72
2020	315.56	21.69	337.26
2021	299.11	22.10	321.20

ABBREVIATIONS

This list includes abbreviations commonly used in the Review Reports

AD	Activity data
BaP	Benzo[a]pyrene
BC	Black Carbon
C	Confidential
Cd	Cadmium
CEIP	Centre on Emission Inventories and Projections
CLRTAP	Convention on Long-range Transboundary Air Pollution – 'the Air Convention'
CO	Carbon Monoxide
E-PRTR	European Pollutant Release and Transfer Register
EEA	European Environment Agency
EF	Emission factor
EMEP	The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (unofficially 'European Monitoring and Evaluation Programme' = EMEP)
ERC	Emission Reduction Commitment
ERT	Expert Review Team
GHG	Greenhouse gas
GIS	Geo Information System
GNFR	NFR Aggregation for Gridding and LPS
HCB	Hexachlorobenzene
Hg	Mercury
HM	Heavy metals
IEF	Implied emission factor
kt	Kilotonnes
LPS	Large Point Sources
NA	Not applicable
NE	Not Estimated
NECD	National Emission reduction Commitments Directive
NFR	Nomenclature for reporting
NH_3	Ammonia
NMVOC	Non-methane volatile organic compounds
NO	Not Occuring
NO_x	Nitrogen oxides
NR	Not relevant/Not Reported
PAHs	Polycyclic aromatic hydrocarbons
Pb	Lead
PCB	Polychlorinated biphenyls
PCDD/F	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PM_{10}	Fine particulate matter: particles with an aerodynamic diameter equal to or less than 10 micrometres (μm)

PM$_{2.5}$	Fine particulate matter: particles with an aerodynamic diameter equal to or less than 2.5 micrometres (µm)
POPs	Persistent organic pollutants
PTC	Potential technical correction
RE	Revised estimate
SO$_2$	Sulphur dioxide
SO$_x$	Sulphur oxides
TC	Technical correction
TSP	Total suspended particulates

LIST OF REFERENCES AND SUPPORTING DOCUMENTS

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

2.   ECE/EB.AIR/111/Add.1: Decision 2012/3: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them

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