

# AUSTRIA'S INVENTORY ADJUSTMENT REPORT 2021

Austria's applications for inventory adjustment  
pursuant to Article 5 (1) of the NEC Directive  
2016/2284 (Addendum to Austria's IIR 2021)

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# 1 INTRODUCTION

Following the NEC Directive Article 5 – Flexibilities, Member States may establish, in accordance with Part 4 of Annex IV, adjusted annual national emission inventories for sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and fine particulate matter where non-compliance with their national emission reduction commitments would result from applying improved emission inventory methods updated in accordance with scientific knowledge.

Annex IV, Part 4, includes three broad categories under which adjustments to the national emission inventories may be applied:

- New emission source categories are identified which were not included in the relevant historic national emission inventory at the time when emission reduction commitments were set;
- The emission factors used for determining emission levels for specific source categories at the time when emission reduction commitments are to be attained differ significantly from the original emission factors used when the emission reduction commitments were set;
- The methodologies used for determining emission levels for specific source categories have undergone significant changes since the time when the emission reduction commitments were set.

## 2 APPROVED ADJUSTMENTS

Due to exceedance of the national emission ceilings from 2010 onwards, Austria applied for the following adjustments to be made to its national emission inventory, in accordance with Article 5(1):

- NO<sub>x</sub> emissions from sector transport based on significantly different methodologies,
- NO<sub>x</sub> emissions from sector agriculture, based on new emission source categories.

Adjustments were proposed by Austria in 2017<sup>1</sup> and 2018<sup>2</sup> (UMWELTBUNDESAMT 2017 & UMWELTBUNDESAMT 2018) and accepted<sup>3</sup> in the 2017, 2018, 2019 and 2020 NEC Reviews of the adjustment applications of Austria (EEA 2017, EEA 2018, EEA 2019 & EEA 2020).

Due to inventory revisions carried out in the agriculture ammonia inventory for submission 2020, NH<sub>3</sub> emissions are now below the national emission ceiling in all years from 2010 to 2019. Therefore, as in the previous year, Austria is not applying for its approved adjustments for NH<sub>3</sub> emissions from 3.D.a.2.b Sewage sludge applied to soils and 3.D.a.2.c Other organic fertilisers applied to soils this year (see chapter 2.3).

The report “*Declaration on consistent reporting of Approved Adjustments*” (submitted on 15<sup>th</sup> February 2021) declares that Austria's criteria and methodologies used for the calculation of NO<sub>x</sub> emissions for the years 2010 – 2019 (as submitted on 15<sup>th</sup> February 2021) for all sectors (1.A.3.b Road transport, 3.B Manure management, 3.D.a.2.a Animal manure applied to soils, 3.D.a.2.b Sewage sludge applied to soils, 3.D.a.2.c Other organic fertilisers applied to soils) are exactly the same as in the year the adjustments were approved (2020).

The details on the approved adjustments are included below.

### 2.1 NO<sub>x</sub> emissions from transport sector

The emission ceilings laid down in Directive 2001/81/EC were derived from model calculations within the RAINS model of the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, which were based on knowledge available at the end of the 1990s. Concerning the trend in vehicle specific emissions, it was assumed that emission levels would decrease at the same rate as the emission limits required under the vehicle type approval system.

In the meantime it has been found that the actually achieved reductions in vehicle specific NO<sub>x</sub> emissions under real world driving conditions are much smaller than expected at the time when the targets were established. The findings are based on test bench measurements which were performed in the course of several studies through international co-operation. The findings apply especially to diesel passenger cars and light commercial vehicles certified according to the emission standards EURO 2 to EURO 6 as well as for heavy duty vehicles from EURO II to EURO V.

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<sup>1</sup> <http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0613.pdf>

<sup>2</sup> <http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0648.pdf>

<sup>3</sup> <http://ec.europa.eu/environment/air/reduction/implementation.htm>

Austria's inland road transport emissions, which are based on current (significantly higher) NO<sub>x</sub> emission factors, are almost twice as high for recent years as the emissions based on the original emission factors. The emission factors are taken from the "Handbook of emission factors for road transport" (HBEFA): HBEFA version 1.2 (released in January 1999; basis for the definition of the NEC limits) and HBEFA version 4.1 (November 2019; latest reference database including all available in-use emission tests and recent forecasts for upcoming vehicle technology). The update of the emission factors in the inventory has been accompanied by an improvement in the way in which emission factors are applied to different vehicle types across the time series.

Table 1 shows the approved adjustments (NO<sub>x</sub> emissions) from the sub-category *road transport (1.A.3.b)* submitted in 2020 and in 2021, and the difference between these two submissions:

Table 1: Approved adjustments submitted in 2020 and 2021, sub-category road transport (1.A.3.b).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Submission 2020	-45.80	-48.95	-50.43	-51.88	-53.31	-53.17	-50.90	-46.19	-42.23	-
Submission 2021	-40.09	-45.19	-45.59	-48.70	-50.28	-48.86	-46.63	-42.02	-38.11	-34.31
Difference	5.71	3.76	4.84	3.18	3.03	4.32	4.27	4.17	4.12	-

Reason for the difference is the calibration of the mileage model of the vehicle categories to the energy balance resulting in minor changes in activity data and emissions per vehicle category over the entire time series.

## 2.2 NO<sub>x</sub> emissions from the agriculture sector

The following new NO<sub>x</sub> emission sources were included in the agriculture sector after the 1999 submission:

- Manure Management (3.B) and
- Organic fertilisers (3.D.a.2) including the following sub-categories:
  - Animal manure applied to soils (3.D.a.2.a)
  - Sewage sludge applied to soils (3.D.a.2.b)
  - Other organic fertilisers applied to soils (3.D.a.2.c), including
    - Digestates applied to soils
    - Compost applied to soils

These sources of nitrogen oxide were not included in the EMEP/CORINAIR atmospheric emission inventory guidebook, second edition 1999 and third edition 2001.

These sources were not included in the considerations for establishing the emission ceiling; nor were they included in the RAINS model.

- Austria reported NO<sub>x</sub> emissions from manure management (from manure storage) for the first time in its NEC submission of 31<sup>st</sup> December 2009 by applying the default Tier 1 emission factors for NO as outlined in the EMEP/EEA air emission inventory guidebook 2009.
- Austria reported NO<sub>x</sub> emissions from animal manure applied to soils (under source category *manure management*) for the first time in its NEC submission of 31<sup>st</sup> December 2003.

- Austria reported NO<sub>x</sub> emissions from sewage sludge applied to soils for the first time in its NEC submission of 31<sup>st</sup> December 2010.
- Austria reported NO<sub>x</sub> emissions from energy crops applied to soils as fertilisers after the digestion process (digestates) for the first time in its NEC submission of 31<sup>st</sup> December 2014.
- Austria reported NO<sub>x</sub> emissions from compost applied to soils for the first time in its NEC submission of 15<sup>th</sup> February 2017.

Table 2 shows the approved adjustments (NO<sub>x</sub> emissions) from category *Manure Management (3.B)* submitted in 2020 and in 2021, and the difference between these two submissions:

*Table 2: Approved adjustments submitted in 2020 and 2021, category manure management (3.B).*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Submission 2020	-0.56	-0.56	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55	-
Submission 2021	-0.56	-0.56	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-

Emission data reported in submission 2021 are identical with the approved ones based on inventory submission 2020.

Table 3 shows the approved adjustments (NO<sub>x</sub> emissions) from sub-category *Animal manure applied to soils (3.D.a.2.a)* submitted in 2020 and in 2021, and the difference between these two submissions:

*Table 3: Approved adjustments submitted in 2020 and 2021, sub-category Animal manure applied to soils (3.D.a.2.a).*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Submission 2020	-5.16	-5.08	-5.04	-5.03	-5.04	-5.04	-5.05	-5.09	-5.05	-
Submission 2021	-5.16	-5.08	-5.04	-5.03	-5.04	-5.04	-5.05	-5.09	-5.05	-4.99
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-

Emission data reported in submission 2021 are identical with the approved ones based on inventory submission 2020.



Table 4 shows approved adjustments (NO<sub>x</sub> emissions) from sub-category Sewage sludge applied to soils (3.D.a.2.b) submitted in 2020 and in 2021, and the difference between these two submissions:

*Table 4: Approved adjustments submitted in 2020 and 2021, sub-category sewage sludge applied to soils (3.D.a.2.b).*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Submission 2020	-0.07	-0.07	-0.06	-0.06	-0.06	-0.07	-0.08	-0.07	-0.08	-
Submission 2021	-0.07	-0.07	-0.06	-0.06	-0.06	-0.07	-0.08	-0.07	-0.08	-0.08
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-

Emission data reported in submission 2021 are identical with the approved ones based on inventory submission 2020.

Table 5 shows approved adjustments (NO<sub>x</sub> emissions) from sub-category Other organic fertilisers applied to soils (3.D.a.2.c) submitted in 2020 and in 2021, and the difference between these two submissions:

*Table 5: Approved adjustments submitted in 2020 and 2021, sub-category other organic fertilisers applied to soils (3.D.a.2.c).*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Submission 2020	-0.42	-0.41	-0.43	-0.44	-0.45	-0.47	-0.41	-0.44	-0.44	-
Submission 2021	-0.42	-0.41	-0.43	-0.44	-0.45	-0.47	-0.41	-0.44	-0.46	-0.46
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-

The small difference in emissions 2018 is due to updated activity data (digestates from biogas plants used as fertiliser) in submission 2021.

## 2.3 NH<sub>3</sub> emissions from the agriculture sector

In submission 2017, 2018 and 2019 Austria applied for adjustments for the following new sources of ammonia emissions included after the 1999 submission:

- Sewage sludge applied to soils (3.D.a.2.b)
- Other organic fertilisers applied to soils (3.D.a.2.c)
  - Digestates applied to soils
  - Compost applied to soils

These sources of ammonia were not included in the EMEP/CORINAIR atmospheric emission inventory guidebook, second edition 1999 and third edition 2001.

Proposed adjustments were accepted<sup>4</sup> in the 2017, 2018 and 2019 NEC Reviews of the adjustment applications of Austria (EEA 2017, EEA 2018 and EEA 2019)

In submission 2020, NH<sub>3</sub> emissions from sector agriculture were significantly revised downwards. The main reason for revised NH<sub>3</sub> emissions was the implementation of the new EMEP/EEA Guidebook 2019 into Austria's air emission inventory. The 2019 version of the Guidebook provides updated NH<sub>3</sub> emission factors for the livestock categories layers, broilers, sheep and other animals. Furthermore, the calculation method of the fraction of TAN that is immobilised in organic matter ( $f_{imm}$ ) when the manure is managed as a litter-based solid and the litter is straw, has been revised. In accordance to (EEA 2019), this immobilisation greatly reduced the potential NH<sub>3</sub>-N emission during storage and after application.

Additionally, new information on agriculture practice regarding urea application on agricultural soils based on a national study was implemented into the national ammonia inventory which resulted in reduced ammonia emissions from inorganic N-fertilizers.

Due to these recalculations national NH<sub>3</sub> emissions are now below the national emission ceiling in all years from 2010 to 2019. Therefore, as in the previous year, Austria is not applying for its approved adjustments for NH<sub>3</sub> emissions from 3.D.a.2.b Sewage sludge applied to soils and 3.D.a.2.c Other organic fertilisers applied to soils this year.

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<sup>4</sup> <http://ec.europa.eu/environment/air/reduction/implementation.htm>

### 3 REFERENCES

- EEA – European Environment Agency (2017): Final Review Report – 2017 Comprehensive Technical Review of National Emission Inventories pursuant to the Directive on the Reduction of National Emissions of Certain Atmospheric Pollutants (Directive (EU) 2016/2284) – Austria. Reference: No 07.0201/2016/741511/SER/ENV.C.3
- EEA – European Environment Agency (2018): Final Review Report 2018 – Second Phase of review of national air pollution emission inventory data pursuant to the Directive on the Reduction of National Emissions of Certain Atmospheric Pollutants (Directive (EU) 2016/2284 or 'NECD') – Austria. Reference: 070203/2017/765105/SER/ENV.C.3
- EEA – European Environment Agency (2019): Final Review Report 2019 – Third Phase of review of national air pollution emission inventory data pursuant to the Directive on the Reduction of National Emissions of Certain Atmospheric Pollutants (Directive (EU) 2016/2284 or 'NECD') – Austria. Reference: Service Request No 4 under Framework Contract No ENV.C.3/FRA/2017/0012.
- EEA – European Environment Agency (2020): Final Review Report 2020 – Review of National Air Pollutant Emission Inventory Data 2020 under Directive 2016/2284 (National Emission reduction Commitments Directive) (Directive (EU) 2016/2284 or 'NECD') – Austria. Reference: Service Contract No. 070201/2019/8159797/SER/ENV.C.3
- SCHWINGSHACKL, M. & REXEIS, M. (2021): Assessment of transport emissions in Austria for the year 2019 based on the Inventory 2020 with emission factors from HBEFA1.2 and HBEFA4.1. Report No. I 02/21/Schwi - Em I-21/01/679 from 08.02.2020. Institute for Internal Combustion Engines and Thermodynamics. Graz University of Technology. Graz 2021.
- UMWELTBUNDESAMT (2017): Anderl, M. & Kriech, M.: Austria's Inventory Adjustment Report 2017. Austria's applications for inventory adjustment pursuant to Article 5 (1) of the NEC Directive 2016/2284 (Addendum to Austria's IIR 2018). Reports, Bd. REP-0613 Umweltbundesamt Wien, 2017.
- UMWELTBUNDESAMT (2018): Anderl, M.; Haider, S.; Kriech, M. & Stranner, G.: Austria's Inventory Adjustment Report 2018. Austria's applications for inventory adjustment pursuant to Article 5 (1) of the NEC Directive 2016/2284 (Addendum to Austria's IIR 2018). Reports, Bd. REP-0648 Umweltbundesamt Wien, 2018.
- UMWELTBUNDESAMT (2019): Anderl, M.; Haider, S.; Kriech, M. & Stranner, G.: Austria's Inventory Adjustment Report 2019. Austria's applications for inventory adjustment pursuant to Article 5 (1) of the NEC Directive 2016/2284 (Addendum to Austria's IIR 2019). Reports, Bd. REP-0683 Umweltbundesamt Wien, 2019.
- UMWELTBUNDESAMT (2020): Anderl, M. & Kriech, M.: Austria's Inventory Adjustment Report 2020. Austria's applications for inventory adjustment pursuant to Article 5 (1) of the NEC Directive 2016/2284 (Addendum to Austria's IIR 2020). Reports, Bd. REP-0722 Umweltbundesamt Wien, 2020.
- UMWELTBUNDESAMT (2021): Haider, S.; Anderl, M.; Brendle, C.; Gangl, M.; Köther, T.; Lampert, C.; Mandl, N.; Perl, D.; Pinterits, M.; Poupa, S.; Purzner, M.; Schieder, W.; Schmidt, G.; Schodl, B.; Titz, M.; Wankmüller, R. & Zechmeister, A.: Austria's Informative Inventory Report 2021. Submission under the UNECE Convention on Long-range Transboundary Air Pollution and Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants. Unpublished draft Report, Umweltbundesamt Wien, 2021.