ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Austria's Inventory Adjustment Report 2020

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

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Austria's applications for inventory adjustment pursuant to Article 5 (1) of the NEC Directive 2016/2284 (Addendum to Austria's IIR 2020)

REPORT
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Project management
Michael Anderl

Authors
Michael Anderl
Martin Kriech

Layout and typesetting
Elisabeth Riss

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CONTENT

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_x emissions from sector transport based on significantly different methodologies,
- NO_x emissions from sector agriculture, based on new emission source categories.

Adjustments were proposed by Austria in 2017[1] and 2018[2] (UMWELTBUNDESAMT 2017 & UMWELTBUNDESAMT 2018) and accepted[3] in the 2017, 2018 and 2019 NEC Reviews of the adjustment applications of Austria (EEA 2017, EEA 2018 & EEA 2019).

Due to inventory revisions carried out in the agriculture ammonia inventory for submission 2020, NH_3 emissions are now below the national emission ceiling in all years from 2010 to 2018. Thus, in submission 2020 Austria does not apply for its approved adjustments for NH_3 emissions from 3.D.a.2.b Sewage sludge applied to soils and 3.D.a.2.c Other organic fertilisers applied to soils (see chapter 2.3).

The report *"Declaration on consistent reporting of Approved Adjustments"* (submitted on 13th February 2020) declares that Austria's criteria and methodologies used for the calculation of emissions for the years 2010 – 2018 (as submitted on 13th February 2020) for all sectors and pollutants (1.A.3.b Road transport – NO_x; 3.B Manure management – NO_x; 3.D.a.2.a Animal manure applied to soils – NO_x; 3.D.a.2.b Sewage sludge applied to soils – NO_x; 3.D.a.2.c Other organic fertilisers applied to soils – NO_x) are exactly the same as in the year the adjustments were approved (2019).

The details on the approved adjustments are included below.

2.1 NO_x 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.

[1] http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0613.pdf

[2] http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0648.pdf

[3] http://ec.europa.eu/environment/air/reduction/implementation.htm

In the meantime it has been found that the actually achieved reductions in vehicle specific NO_x 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 1 to EURO 6 as well as for heavy duty vehicles from EURO I to EURO V.

Austria's inland road transport emissions, which are based on current (significantly higher) NO_x emission factors, are about 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 approved adjustments (NO_x emissions) from the sub-category *road transport (1.A.3.b)* submitted in 2019 and in 2020, and the difference between these two submissions:

Table 1: Approved adjustments submitted in 2019 and 2020, sub-category road transport (1.A.3.b).

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Submission 2019	-29.27	-31.80	-33.07	-34.51	-35.74	-35.34	-34.01	-31.32	-
Submission 2020	-45.80	-48.95	-50.43	-51.88	-53.31	-53.17	-50.90	-46.19	-42.23
Difference	-16.54	-17.14	-17.36	-17.37	-17.57	-17.83	-16.89	-14.87	-

The difference can be mainly explained with the use of updated emission factors (in submission 2019 HBEFA version 3.3 was used, in submission 2020 HBEFA version 4.1 was used).

More information on the calculation methods used in the current inventory can be found in the IIR 2020 (UMWELTBUNDESAMT 2020) and in the supporting report "Assessment of transport emissions in Austria for the year 2018 based on the Inventory 2019 with emission factors from HBEFA1.2 and HBEFA4.1" (SCHWINGSHACKL & REXEIS 2020).

2.2 NO_x emissions from the agriculture sector

For the sector Agriculture the following new NO_x emission sources have been included 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_x emissions from manure management (from manure storage) for the first time in its NEC submission of 31st 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_x emissions from animal manure applied to soils (under source category *manure management*) for the first time in its NEC submission of 31st December 2003.
- Austria reported NO_x emissions from sewage sludge application for the first time in its NEC submission of 31st December 2010.
- Austria reported NO_x emissions from energy crops applied to soils as fertilisers after the digestion process (digestate) for the first time in its NEC submission of 31st December 2014.
- Austria reported NO_x emissions from compost applied to soils for the first time in its NEC submission of 15th February 2017.

Table 2 shows approved adjustments (NO_x emissions) from category *Manure Management (3.B)* submitted in 2019 and in 2020, and the difference between these two submissions:

Table 2: Approved adjustments submitted in 2019 and 2020, category manure management (3.B).

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Submission 2019	-0.59	-0.59	-0.58	-0.58	-0.57	-0.57	-0.56	-0.57	-
Submission 2020	-0.56	-0.56	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55	-0.55
Difference	0.03	0.03	0.03	0.03	0.02	0.02	0.01	-0.01	-

The difference in emissions is due to inventory improvements carried out within submission 2020. In submission 2020, the Tier 2 methodology according to the new 2019 EMEP/EEA Guidebook was used including improvements in the N-flow calculations. Although there were no changes in methodology for NO_x between the Guidebook versions 2016 and 2019, revised ammonia calculations had an impact on NO_x and resulted in slightly lower emissions for the whole time series.

Table 3 shows approved adjustments (NO_x emissions) from sub-category Animal manure applied to soils (3.D.a.2.a) submitted in 2019 and in 2020, and the difference between these two submissions:

Table 3: Approved adjustments submitted in 2019 and 2020, sub-category Animal manure applied to soils (3.D.a.2.a).

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Submission 2019	-5.09	-5.01	-4.97	-4.96	-4.96	-4.96	-4.96	-4.99	
Submission 2020	-5.16	-5.08	-5.04	-5.03	-5.04	-5.04	-5.05	-5.09	-5.05
Difference	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.09	-0.10	-

Improved calculations of N-losses according to the EMEP/EEA GB 2019 in the manure management sector lead to higher N amounts available for application. As a consequence, higher NO_x emissions of manure application have been determined for the entire time series.

Table 4 shows approved adjustments (NO_x emissions) from sub-category Sewage sludge applied to soils (3.D.a.2.b) submitted in 2019 and in 2020, and the difference between these two submissions:

Table 4: Approved adjustments submitted in 2019 and 2020, sub-category sewage sludge applied to soils (3.D.a.2.b).

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

The figures reported in submission 2020 are identical with the approved figures from inventory submission 2019.

Table 5 shows approved adjustments (NO_x emissions) from sub-category Other organic fertilisers applied to soils (3.D.a.2.c) submitted in 2019 and in 2020, and the difference between these two submissions:

Table 5: Approved adjustments submitted in 2019 and 2020, sub-category other organic fertilisers applied to soils (3.D.a.2.c).

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Submisson 2019	-0.42	-0.41	-0.43	-0.44	-0.45	-0.47	-0.43	-0.44	
Submission 2020	-0.42	-0.41	-0.43	-0.44	-0.45	-0.47	-0.41	-0.44	-0.44
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	-

The small difference in emissions 2016 is due to updated and corrected activity data (digestates from biogas plants used as fertiliser) in submission 2020.

2.3 NH_3 emissions from the agriculture sector

In previous submission 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[4] in the 2017, 2018 and 2019 NEC Reviews of the adjustment applications of Austria (EEA 2017, EEA 2018 and EEA 2019)

Within the current submission, NH_3 emissions from sector agriculture were significantly revised downwards. The main reason for revised NH_3 emissions is the implementation of the new EMEP/EEA Guidebook 2019 into Austria's air emission inventory. The 2019 version of the Guidebook provides updated NH_3 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_3-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_3 emissions are now below the national emission ceiling in all years from 2010 to 2018. Thus, in submission 2020 Austria does not apply for its approved adjustments for NH_3 emissions from Sewage sludge applied to soils (3.D.a.2.b) and Other organic fertilisers applied to soils (3.D.a.2.c).

[4] 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.

SCHWINGSHACKL, M. & REXEIS, M. (2020): Assessment of transport emissions in Austria for the year 2018 based on the Inventory 2019 with emission factors from HBEFA1.2 and HBEFA4.1. Report No. I 03/20/Schwi - Em I-20/01/679 from 25.02.2020 Institute for Internal Combustion Engines and Thermodynamics. Graz University of Technology. Graz 2020.

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): Haider, S.; Anderl, M.; Köther, T.; Lampert, C.; Perl, D.; Pinterits, M.; Poupa, S.; Purzner, M.; Schieder, W.; Schmidt, G.; Schodl, B.; Titz, M. & Zechmeister, A.: Austria's Informative Inventory Report 2020. 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. Reports, Bd. REP-0723 Umweltbundesamt, Wien.

ENVIRONMENT AGENCY AUSTRIA **umweltbundesamt**

Umweltbundesamt GmbH
Spittelauer Lände 5
1090 Vienna/Austria

Tel.: +43-(0)1-313 04
Fax: +43-(0)1-313 04/5400

office@umweltbundesamt.at
www.umweltbundesamt.at

The report on Austria's Annual Air Emission Inventory 1990–2018, compiled by the Umweltbundesamt (Environment Agency Austria), provides a summary of Austria's SO_2, NO_x, NH_3, NMVOC and $PM_{2.5}$ emissions for the years 1990 to 2018.

The report includes first information on emission trends and performed recalculations for the years 1990 and 2018. More detailed descriptions will be provided in Austria's Informative Inventory Report (IIR) 2020, which is to be submitted under the NEC Directive on 15 March 2020.

The results of the calculations compiled in the report show that between 2017 and 2018 the emissions of all NEC pollutants decreased: emissions of sulphur dioxide (SO_2) decreased by 8.4 %, nitrogen oxide emissions (NO_x) decreased by 5.4 %, non-methane volatile organic compounds (NMVOCs) decreased by 3.1 %, ammonia emissions (NH_3) decreased by 1.5 % and particulate matter ($PM_{2.5}$) decreased by 6.4 %.

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