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# Austria's National Air Emission Projections 2025 for 2030

Addendum to Austria's IIR 2025

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

# AUSTRIA'S NATIONAL AIR EMISSION PROJECTIONS 2025 FOR 2030

***Pollutants: $NO_x$, $SO_2$, NMVOC, $NH_3$ and $PM_{2.5}$***
***Scenarios: With Existing Measures (WEM) & With Additional Measures (WAM)***
***March 2025***
***(Addendum to Austria's IIR 2025)***

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# 1 GENERAL APPROACH

In 2023, Austria published its report "National Air Emission Projections 2023 for 2020, 2025, and 2030", which provides detailed emission projections for pollutants such as nitrogen oxides ($NO_x$), sulphur dioxide ($SO_2$), non-methane volatile organic compounds (NMVOC), ammonia ($NH_3$), and particulate matter ($PM_{2.5}$).

The current report provides a comprehensive update, detailing emission projections for both the 'with existing measures' (WEM) and 'with additional measures' (WAM) scenarios. The WEM scenario includes all mitigation measures implemented by 30 June 2024, while the WAM scenario includes the planned policies and measures outlined in the National Air Pollution Control Programme (BMK, 2023a) and the Integrated National Energy and Climate Plan for Austria (BMK, 2024a).

The implementation status of these measures has been determined through expert consultations with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK). Detailed information on the national policies and measures included in these scenarios can be found in Chapter 3.

The air pollutant projections are fully consistent with the current GHG emission projections reported under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action (UMWELTBUNDESAMT, 2025a).

The report also provides relevant background information to enable a better understanding of the key socio-economic assumptions used in the preparation of the projections. For comparison purposes, emission data from the National Air Emission Inventory of March 2025 (UMWELTBUNDESAMT, 2025b) have also been included.

## 1.1 Legal background

By signing the UNECE Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution of 1 December 1999[1], the EU agreed on national emission ceilings for nitrogen oxides ($NO_x$), sulphur dioxide ($SO_2$), ammonia ($NH_3$) and non-methane volatile organic compounds (NMVOC) for the year 2010 and, under the amendment in 2012, on emission reduction commitments for the year 2020. Austria initially signed the Gothenburg Protocol and later ratified it, making the commitments legally binding. Moreover, the Directive of the European Parliament and of the Council of 23 October 2001 on national emission

[1] Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone, https://unece.org/environment-policy/air/protocol-abate-acidification-eutrophication-and-ground-level-ozone

ceilings for certain atmospheric pollutants (NEC Directive 2001/81/EC)[2] has set national emission ceilings for these air pollutants, which are relevant for Austria. The obligation to comply with the 2010 ceilings has been transposed into national law by the Air Emission Ceilings Act (*Emissionshöchstmengengesetz-Luft*)[3]. The revised NEC Directive (EU) 2016/2284 has set national emission reduction commitments (including fine particulate matter $PM_{2.5}$) for the years 2020 and 2030 and has been transposed into national law by the Air Emissions Act 2018 (*Emissionsgesetz-Luft 2018*)[4].

Pursuant to Article 8(1) of the revised NEC Directive, Member States must prepare and biennially update their national emission projections. In addition, Article 10(2) requires Member States to submit their national emission inventories and projections to the Commission and to the European Environment Agency.

This report provides emission projection data based on 'fuel sold' to verify projected compliance with the emission reduction commitments of the NEC Directive.

Annex I to NEC Directive 2001/81/EC sets national emission ceilings for certain atmospheric pollutants. By the year 2010, Member States had to limit their annual national emissions of these pollutants to amounts not exceeding these emission ceilings. Directive 2001/81/EC was repealed by the revised NEC Directive. Emission reduction commitments from 2020 onwards are stated in Annex II to the revised NEC Directive (EU) 2016/2284 (see Table 1).

*Table 1: National emission ceilings and emission reduction commitments for Austria according to NEC Directive 2001/81/EC and NEC Directive (EU) 2016/2284, respectively.*

| | **From 2010 onwards*** | **From 2020 to 2029**** | **From 2030 onwards**** |
|---|---|---|---|
| **Obligation under:** | **Directive 2001/81/EC** | **Directive (EU) 2016/2284** | **Directive (EU) 2016/2284** |
| $NO_x$ | 103 kt | 37% | 69% |
| $SO_2$ | 39 kt | 26% | 41% |
| NMVOC | 159 kt | 21% | 36% |
| $NH_3$ | 66 kt | 1% | 12% |
| $PM_{2.5}$ | - | 20% | 46% |

* *Absolute emission ceiling in kt per year, in force until 31 December 2019*

** *Reduction compared to base year 2005 in %*

[2] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, OJ L 309/22, 27 November 2001. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:309:0022:0030:EN:PDF

[3] Bundesgesetz über nationale Emissionshöchstmengen für bestimmte Luftschadstoffe (Emissionshöchstmengengesetz-Luft, EG-L), BGBl. I Nr. 34/2003

[4] Bundesgesetz über nationale Emissionsreduktionsverpflichtungen für bestimmte Luftschadstoffe (Emissionsgesetz-Luft 2018 – EG-L 2018), BGBl. I Nr. 75/2018

## 1.2 Data structure of projections and national inventory

The activity scenarios are structured in line with the Austrian Air Emission Inventory, ensuring consistency and coherence in data management and reporting. The data framework includes activities, input data, emission factors, and emission calculations, all organised according to the Selected Nomenclature for sources of Air Pollution (SNAP) categories, which have to be converted into the current reporting format as required under the LRTAP Convention, i.e. the NFR (Nomenclature for Reporting) format.

Where appropriate and applicable, emissions were calculated and projected on the basis of the methodologies used in the Austrian Inventory. These are described in Austria's Informative Inventory Report 2025 (UMWELTBUNDESAMT, 2025b).The air pollutant projections are fully consistent with the historical emission data from the Austrian Emission Inventory (submitted in March 2025) up to the latest available data year of 2023.

The emission projections are based on economic scenarios up to 2050, using different models. The energy scenario is derived from analyses of total energy demand and production conducted by an econometric input-output model (MIO-ES), with sector-specific calculations for buildings carried out by the Zentrum für Energiewirtschaft und Umwelt (E-THINK 2025) and for transport by the University of Graz (HAUSBERGER & SCHWINGSHACKL 2025). Other models address the agriculture and waste sectors.

The emission factors and underlying parameters are described in the methodology presented in Chapter 4 of this report.

## 1.3 Underlying models

Model calculations are based on custom-made methodologies for the individual sectors.

- Energy forecasts (fuel combustion) are based on the National Energy Balance (STATISTIK AUSTRIA, 2024a) and on an econometric input-output model (MIO-ES), supported by calculations carried out using the following bottom-up models:
  - INVERT/EE-Lab (e-think energy research (E-THINK, 2024, 2025): domestic heating and hot water supply.
  - NEMO & GEORG (SCHWINGSHACKL & REXEIS 2025): energy demand and emissions of transport (incl. off-road, excl. aviation).
- Forecasts of emissions from industrial processes and solvent emissions are based on expert assessments by the Umweltbundesamt and projections of the respective gross value added (NACE code).
- The forecast of aviation emissions is based on the scenario developed in the SAF Roadmap (BMK 2024b).

- For the estimation of emissions of fluorinated gases, the results of the Austrian model are extrapolated, taking into account current EU legislation.
- For the agricultural sector, the following models were used:
  - For the calculation of activity data (livestock, crop yields, mineral fertilizers and agriculture area), the PASMA model of the Austrian Institute of Economic Research (WIFO & BOKU 2023) was used.
  - For the determination of the economic impact on the overall economy, the PASMA results were transferred to ADAGIO, WIFO's input-output model.
  - For the emission calculation, the agricultural model of the Austrian GHG Inventory was used. Existing measures of agricultural practice projected for Austria were taken into account.

Waste projections (expert judgements on waste amounts and a global waste treatment model with econometrically estimated behavioural equations) were prepared by the Umweltbundesamt.

A detailed description of the models is provided in a report entitled 'GHG Projections and Assessment of Policies and Measures in Austria 2025', submitted under the Governance Regulation (Regulation (EU) 2018/1999) in 2023 (UMWELTBUNDESAMT, 2025a).

## 1.4 General socio-economic assumptions

The data used for the general socio-economic assumptions which form the basis of Austria's emission projections are presented in Table 2. The methodological assumptions are presented in Chapter 4. Further assumptions about key input parameters are set out in UMWELTBUNDESAMT, 2025a.

*Table 2: Key input parameters for emission projections (UMWELTBUNDESAMT, 2025a).*

| Year | Scenario | 2023 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|
| GDP [billion € 2023] | WEM | 473 | 502 | 574 | 655 |
| GDP real growth rate [%] | WEM | 0.6 | 1.4 | 1.4 | 1.3 |
| Population [1 000] | WEM | 9 129 | 9 367 | 9 654 | 9 853 |
| Stock of dwellings [1 000] | WEM | 4 095 | 4 269 | 4 495 | 4 682 |
| Heating degree days | WEM | 3 280 | 3 210 | 3 110 | 3 010 |
| Exchange rate [US$/€] | WEM | 1.2 | 1.2 | 1.2 | 1.2 |
| International coal price [€ 2023/GJ] | WEM | 4.4 | 4.0 | 3.8 | 4.0 |
| International oil price [€ 2023/GJ] | WEM | 12.5 | 13.9 | 15.8 | 19.7 |
| International natural gas price [€ 2023/GJ] | WEM | 10.9 | 9.0 | 10.1 | 9.6 |
| $CO_2$ certificate price [€ 2023/t $CO_2$] | WEM | 85.0 | 95.0 | 100.0 | 190.0 |
| GDP [billion € 2023] | WAM | 421 | 470 | 537 | 603 |
| GDP real growth rate [%] | WAM | 4.9 | 1.3 | 1.4 | 1.2 |
| Population [1 000] | WAM | 9 011 | 9 251 | 9 470 | 9 626 |
| Stock of dwellings [1 000] | WAM | 4 052 | 4 274 | 4 528 | 4 762 |
| Heating degree days | WAM | 3 280 | 3 210 | 3 110 | 3 010 |
| Exchange rate [US$/€] | WAM | 1.2 | 1.2 | 1.2 | 1.2 |
| International coal price [€ 2020/GJ] | WAM | 5.3 | 3.1 | 3.3 | 3.7 |
| International oil price [€ 2020/GJ] | WAM | 15.4 | 15.4 | 16.2 | 19.7 |
| International natural gas price [€ 2020/GJ] | WAM | 33.2 | 11.3 | 11.3 | 11.8 |
| $CO_2$ certificate price [€ 2020/t $CO_2$] | WAM | 75.0 | 140.0 | 200.0 | 300.0 |

# 2 MAIN RESULTS

The following table shows Austria's national total emissions (both historical and projected) based on 'fuel sold' in accordance with the reporting requirements under the UNECE LRTAP Convention and the revised NEC Directive (EU) 2016/2284.

NEC Directive (EU) 2016/2284 sets emission reduction commitments for five air pollutants: nitrogen oxides ($NO_x$), sulphur dioxide ($SO_2$), non-methane volatile organic compounds (NMVOC), ammonia ($NH_3$) and particulate matter ($PM_{2.5}$).

The 'with existing measures' scenario leads to significant emission reductions for all pollutants by 2030. The most substantial reduction (about 68%) from 2005 to 2030 is projected for NOx, provided that road vehicles meet the latest emission standards under real-world driving conditions. Emission reductions for the other pollutants range from 16% to 60% (see Table 3).

Compared to the WEM scenario, the 'with additional measures' scenario leads to higher emission reductions for all pollutants, except for $PM_{2.5}$.

*Table 3: Austrian national total emissions trend in kt compared to the base year 2005 in % based on fuel sold for the 'with existing measures' and 'with additional measures' scenarios (source: Umweltbundesamt).*

| **Pollutant [kt]** | **Emission Inventory 2025** | | | | | **Emission Scenario** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **WEM** | | **WAM** | |
| | **1990** | **2005** | **2010** | **2020** | **2023** | **2025** | **2030** | **2025** | **2030** |
| **$NO_x$*** | 215.86 | 247.73 | 205.82 | 124.42 | 108.76 | 100.49 | 78.77 | 98.86 | 75.94 |
| | | *+0%* | *-17%* | *-50%* | *-56%* | -59% | -68% | -60% | -69% |
| **$SO_2$** | 73.70 | 25.89 | 15.98 | 10.44 | 10.58 | 10.65 | 10.42 | 10.37 | 10.23 |
| | | *+0%* | *-38%* | *-60%* | *-59%* | -59% | -60% | -60% | -60% |
| **NMVOC*** | 337.97 | 163.49 | 140.97 | 112.76 | 103.71 | 102.32 | 96.55 | 100.97 | 95.65 |
| | | *+0%* | *-14%* | *-31%* | *-37%* | -37% | -41% | -38% | -41% |
| **$NH_3$** | 89.83 | 78.68 | 79.91 | 77.27 | 74.11 | 71.76 | 65.84 | 70.84 | 60.96 |
| | | *+0%* | *+2%* | *-2%* | *-6%* | -9% | -16% | -10% | -23% |
| **$PM_{2.5}$** | 27.36 | 23.13 | 20.32 | 13.64 | 12.87 | 12.68 | 11.97 | 12.50 | 12.43 |
| | | *+0%* | *-12%* | *-41%* | *-44%* | -45% | -48% | -46% | -46% |

** $NO_x$ and NMVOC emissions in sub-sectors 3.B and 3.D are included in the sums and should not be taken into account when verifying compliance with emission reduction commitments.*

**Compliance with national emission reduction commitments**

According to Article 4(3) of NEC Directive (EU) 2016/2284, emissions of $NO_x$ and NMVOC from the source categories NFR 3.B (manure management) and 3.D (agricultural soils) are not taken into account for compliance purposes. The following table meets this requirement.

Austria will meet the 2030 targets for all pollutants in the 'with additional measures' scenario.

*Table 4: Austrian national total emissions in kt for compliance purposes compared to the 2030 target and the 'with existing measures' and 'with additional measures' scenarios (source: Umweltbundesamt).*

| Pollutant [kt] | Emission Inventory 2025 | | | Emission Scenario | | | | Target | Difference from Target | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *WEM* | | WAM | | | WEM | WAM |
| | **2005** | **2020** | **2023** | ***2025*** | ***2030*** | ***2025*** | ***2030*** | **2030** | **2030** | **2030** |
| **$NO_x$** | 237.02 | 113.74 | 98.80 | 90.31 | 68.86 | 88.92 | 67.23 | | | |
| | 0% | -52% | -58% | -62% | -71% | -62% | -72% | -69% | -2% | -3% |
| **NMVOC** | 122.96 | 77.72 | 70.28 | 70.35 | 68.31 | 69.17 | 68.49 | | | |
| | 0% | -37% | -43% | -43% | -44% | -44% | -44% | -36% | -8% | -8% |
| **$SO_2$** | 25.89 | 10.44 | 10.58 | 10.65 | 10.42 | 10.37 | 10.23 | | | |
| | 0% | -60% | -59% | -59% | -60% | -60% | -60% | -41% | -19% | -19% |
| **$NH_3$** | 78.68 | 77.27 | 74.11 | 71.76 | 65.84 | 70.84 | 60.96 | | | |
| | 0% | -2% | -6% | -9% | -16% | -10% | -23% | -12% | -4% | -11% |
| **$PM_{2.5}$** | 23.13 | 13.64 | 12.87 | 12.68 | 11.97 | 12.50 | 12.43 | | | |
| | 0% | -41% | -44% | -45% | -48% | -46% | -46% | -46% | -2% | -0.2% |

## 2.1 Nitrogen oxides ($NO_x$)

Austria's national total $NO_x$ emissions amounted to 216 kt in 1990. After peaking between 2003 and 2005, emissions have fallen steadily, mainly due to improvements in heavy-duty vehicle after-treatment technology. By 2023, $NO_x$ emissions had dropped to 109 kt, which is about 50% less than in 1990.

The majority of Austria's $NO_x$ emissions come from fuel combustion activities, accounting for 90% of total emissions in 2023. With a share of 43% of national $NO_x$ emissions, the road transport sector remains the largest single contributor.

Emissions from mobile sources are calculated on the basis of fuel sold, which has historically been higher than fuel used due to significant fuel exports since the 1990s. While $NO_x$ emissions from petrol passenger cars have almost disappeared, the current diesel passenger car fleet remains a major source of $NO_x$ emissions, emitting significantly more than the heavy-duty vehicle (HDV) fleet. Thanks to improvements in SCR and EGR technology, $NO_x$ emissions from HDVs have been significantly reduced in recent years.

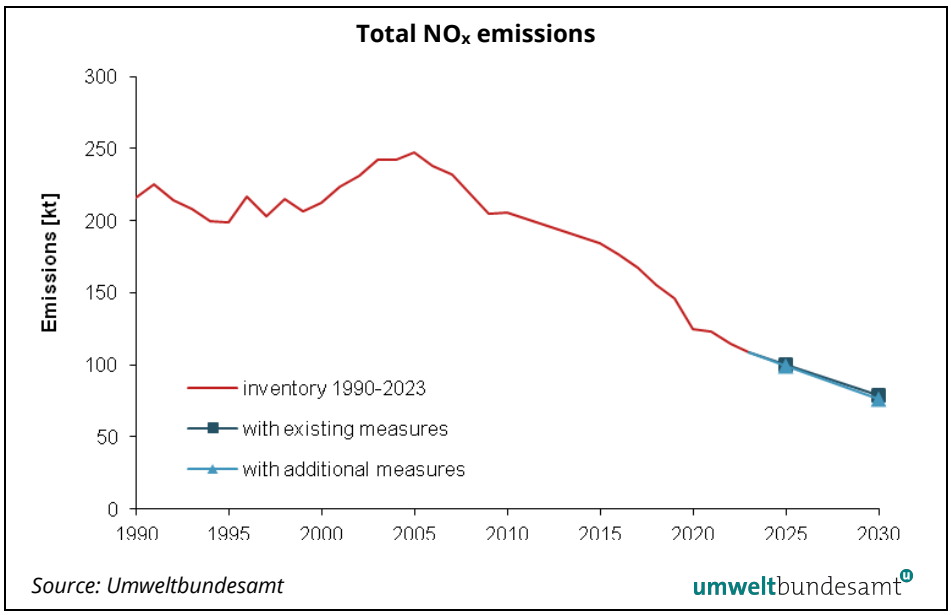
Apart from combustion-related emissions, the agricultural sector (NFR 3) is the second largest contributor to $NO_x$ emissions, accounting for 9.2% of the national total in 2023. Within this sector, agricultural soils (3.D) are the primary source, contributing 94% of $NO_x$ emissions. Emissions come mainly from the ap-

plication of nitrogen fertilisers and organic waste such as animal manure. Agricultural $NO_x$ emissions have decreased by 27% since 1990, mainly due to changes in livestock numbers and fertiliser use.

In the **'with existing measures'** scenario, the national total emissions are projected to fall to 78.8 kt by 2030 (-56% compared to 2005).

Road transport, households and the energy industry are expected to be the main drivers of the $NO_x$ emissions trend in the period to 2030. Contrary to the overall trend, emissions from manufacturing industries are expected to remain stable.

*Figure 1: Historical (1990-2023) and projected $NO_x$ emissions for WEM and WAM (2024-2030) based on fuel sold.*




$NO_x$ emissions from road transport (NFR 1.A.3.b.) are projected to decrease by 56% (i.e. -26.6 kt) from 2023 to 2030. $NO_x$ emissions from passenger cars are projected to decrease by 55% (i.e. 18.5 kt), while emissions from heavy-duty vehicles are projected to fall by 58% (i.e. -4.1 kt).

This reduction is based on the following assumptions:

- Vehicle fleet turnover in combination with decreasing specific emission factors for Euro VII (HDVs) and Euro 7 (PCs);
- Steady increase in BEVs (battery electric vehicles) among new car registrations. 2028 will be the first year with more than 100 000 BEVs in PC registrations per year;
- In the HDV category (including buses) around 18% of newly registered vehicles are expected to be emission-free in 2030.

Emissions from **NFR 1.A.4. Other Sectors** (households, commercial and agriculture) are projected to decrease by 19.6% (i.e. -3.1 kt) from 2023 to 2030. This is mainly due to the modernisation (and reduction in emissions) of non-road mobile machinery (NRMM, also known as off-road vehicles) and the switch to low-

emission technology. It is assumed that there will be a transition from fossil fuels to electric propulsion systems in parts of these categories. Mobile sources in households and agriculture (off-road) are projected to decrease by 30.4% (-1.6 kt) by 2030. Stationary sources are expected to decrease by 14.1% (-1.5 kt) by 2030 due to the declining use of fuel wood, gas oil and natural gas, the ongoing replacement of existing boilers with condensing gas boilers and improved combustion technologies for newly installed biomass heating systems.

Reduced use of gas and oil to fuel thermal power stations and a decrease in oil and gas extraction are responsible for lower emissions in NFR 1.A.1 Energy Industries (-46%, i.e. -6.5 kt) by 2030 compared to 2005.

Emissions from NFR 1.A.2 Manufacturing Industries and Construction decreased by 31% between 2005 and 2023, mainly due to efficiency improvements, implementation/installation of denitrification installations (SCR/SNCR) and/or low NOx burners, the introduction of modern fuel technology, gas-fired equipment and furnaces. More of these measures will be implemented by 2030, but the effect is expected to be offset by an increase in emissions due to economic growth.

In the **'with additional measures'** scenario, the national total emissions are projected to decrease to 75.9 kt by 2030 (-69% compared to 2005).

$NO_x$ emissions from road transport are projected to fall by 60% in 2030 compared to 2023. As there are no different assumptions regarding the introduction of Euro VII (HDVs) and Euro 7 (PCs) and regarding the registration of electric road vehicles, the result is similar to the WEM scenario.

Emissions from NFR 1.A.4. Other Sectors (households, commercial and agriculture) are projected to decrease by 17.5% (i.e. -2.8 kt) from 2023 to 2030. Mobile sources in households and agriculture (off-road) are projected to decrease by 29.2% (i.e. -1.6 kt) by 2030 due to improved emission behaviour and a less conservative electrification rate of new vehicle registrations per year. Stationary sources are expected to decrease by 11.4% (i.e. -1.2 kt) by 2030 due to a larger reduction in the use of natural gas for heating and a strong use of new biomass heating systems as a replacement (instead of heat pumps and district heating).

The reduced use of coal and oil to fuel thermal power stations and the increased consumption of biomass in NFR 1.A.1 Energy Industries leads to a decrease of 25.2% (i.e. -3.6 kt) by 2030 compared to 2005.

*Table 5: Austrian national $NO_x$ emissions in kt and trend based on 'fuel sold' (source: Umweltbundesamt).*

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | Total | 215.86 | 247.73 | 205.82 | 124.42 | 108.76 | 100.49 | 78.77 | WEM |
| | | 215.86 | 247.73 | 205.82 | 124.42 | 108.76 | 98.86 | 75.94 | WAM |
| **1.A.1** | Energy Industries | 17.78 | 14.30 | 12.80 | 9.58 | 8.49 | 8.71 | 7.79 | WEM |
| | | 17.78 | 14.30 | 12.80 | 9.58 | 8.49 | 10.45 | 10.70 | WAM |
| **1.A.2** | Manufacturing Industries and Construction | 33.04 | 33.98 | 32.15 | 24.48 | 23.36 | 24.18 | 23.49 | WEM |
| | | 33.04 | 33.98 | 32.15 | 24.48 | 23.36 | 22.06 | 20.35 | WAM |
| **1.A.3.a, c, d, e** | Off-Road Transport | 4.01 | 6.03 | 5.11 | 2.37 | 3.47 | 3.81 | 3.77 | WEM |
| | | 4.01 | 6.03 | 5.11 | 2.37 | 3.47 | 4.04 | 3.97 | WAM |
| **1.A.3.b** | Road Transport | 115.80 | 155.56 | 121.21 | 58.55 | 47.15 | 38.23 | 20.58 | WEM |
| | | 115.80 | 155.56 | 121.21 | 58.55 | 47.15 | 37.02 | 18.64 | WAM |
| **1.A.4** | Other Sectors | 29.81 | 26.28 | 23.59 | 18.20 | 15.79 | 14.85 | 12.70 | WEM |
| | | 29.81 | 26.28 | 23.59 | 18.20 | 15.79 | 14.80 | 13.04 | WAM |
| **1.A.5** | Other | 0.10 | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | WEM |
| | | 0.10 | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | WAM |
| **1.B** | Fugitive Emissions | IE | IE | IE | IE | IE | IE | IE | WEM |
| | | IE | IE | IE | IE | IE | IE | IE | WAM |
| **2.A,B,C, H,I,J,K,L** | Industrial Processes | 1.50 | 0.67 | 0.52 | 0.46 | 0.44 | 0.43 | 0.43 | WEM |
| | | 1.50 | 0.67 | 0.52 | 0.46 | 0.44 | 0.43 | 0.43 | WAM |
| **2.D, 2.G** | Solvent and Other Product Use | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | WEM |
| | | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | WAM |
| **3.B** | Manure Management | 1.17 | 0.97 | 0.90 | 0.70 | 0.61 | 0.60 | 0.54 | WEM |
| | | 1.17 | 0.97 | 0.90 | 0.70 | 0.61 | 0.59 | 0.49 | WAM |
| **3.D** | Agricultural Soils | 12.47 | 9.74 | 9.41 | 9.98 | 9.36 | 9.58 | 9.38 | WEM |
| | | 12.47 | 9.74 | 9.41 | 9.98 | 9.36 | 9.34 | 8.22 | WAM |
| **3.F, I** | Field Burning and Other Agriculture | 0.03 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.03 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **5** | Waste | 0.12 | 0.06 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | WEM |
| | | 0.12 | 0.06 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | WAM |

* *Data source: Austrian Emission Inventory 2025 (UMWELTBUNDESAMT, 2025b)*

*IE: included elsewhere; NA: not applicable; NO: not occurring*

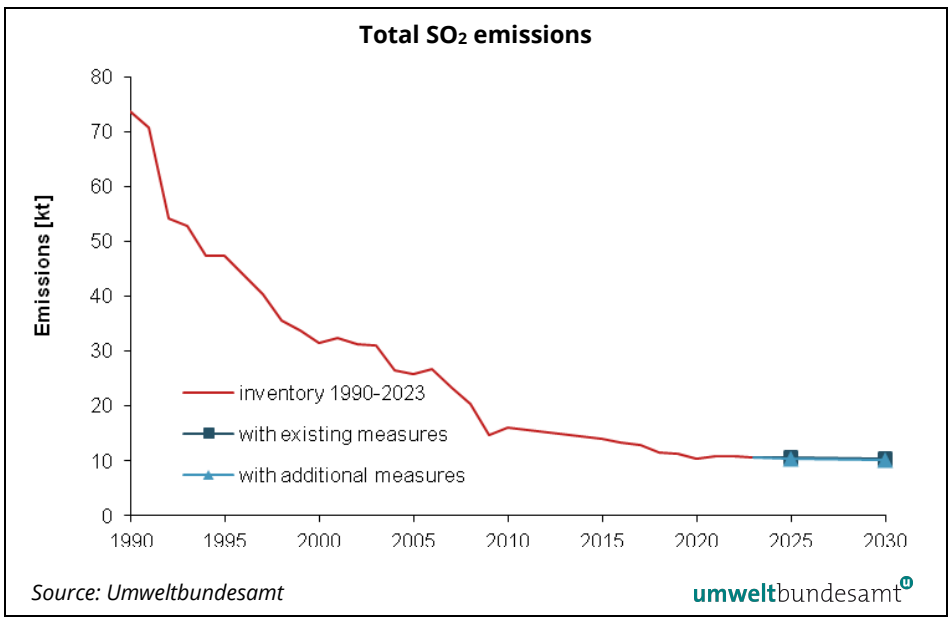
## 2.2 Sulphur dioxide ($SO_2$)

In 1990, Austria's total $SO_2$ emissions amounted to 74 kt. Emissions have fallen steadily to 11 kt in 2023, which is a reduction of 86% compared to 1990. This decline is mainly due to a reduction in the sulphur content of mineral oil products and fuels (as prescribed by the Austrian Fuel Ordinance (*Kraftstoffverordnung*), the installation of desulphurisation units in plants (in accordance with the Clean Air Act for Steam Boilers (*Emissionsschutzgesetz für Kesselanlagen*)) and the increased use of low-sulphur fuels such as natural gas.

The primary source of $SO_2$ emissions in Austria in 2023 was NFR sector 1.A Fuel Combustion Activities, which accounted for 94% of national total $SO_2$ emissions. Sector 2 Industrial Processes and Product Use contributed 5.3%. NFR sectors 1.B Fugitive Emissions and 5 Waste were minor contributors with 0.3% and 0.1%, respectively.

In the **'with existing measures' (WEM)** scenario, the national total $SO_2$ emissions are projected to reach 10.4 kt by 2030. Compared to 2005, this represents a reduction of 59.7%. Compared to 2023, this is a reduction of 1.5% (i.e. 0.15 kt). Appropriate mitigation measures (e.g. reduction of the sulphur content of liquid fuels, waste gas treatment) have already been largely implemented. The reduction potential is therefore only small. The largest decrease by 2030 is expected in NFR 1.A.4 Other Sectors (-17.5%; -0.2 kt), mainly due to a further shift in residential heating from solid fuels (coal) and fuel wood towards the use of heat pumps and district heating in gradually more energy-efficient buildings. Emissions from manufacturing industries and construction (NFR 1.A.2) are projected to remain stable until 2030.

*Figure 2: Historical (1990-2023) and projected SO2 emissions for WEM and WAM (2024-2030) based on fuel sold.*



In the **'with additional measures' (WAM)** scenario, minor additional effects are observed at sectoral level, mainly due to a further shift from fossil fuels (oil, coal) towards renewables. National total emissions are projected to decrease to 10.2 kt by 2030 (-60.5% compared to 2005).

*Table 6: Austrian national $SO_2$ emissions in kt and trend based on 'fuel sold' (source: Umweltbundesamt).*

| NFR | Description | Emission Inventory 2025* [kt] | | | | | Scenario [kt] | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | Total | 73.70 | 25.89 | 15.98 | 10.44 | 10.58 | 10.65 | 10.42 | WEM |
| | | 73.70 | 25.89 | 15.98 | 10.44 | 10.58 | 10.37 | 10.23 | WAM |
| **1.A.1** | Energy Industries | 14.07 | 6.71 | 2.74 | 1.04 | 0.86 | 1.01 | 0.9 | WEM |
| | | 14.07 | 6.71 | 2.74 | 1.04 | 0.86 | 1.04 | 1.26 | WAM |
| **1.A.2** | Manufacturing Industries and Construction | 17.83 | 10.12 | 9.40 | 7.28 | 7.78 | 7.80 | 7.73 | WEM |
| | | 17.83 | 10.12 | 9.40 | 7.28 | 7.78 | 7.46 | 7.23 | WAM |
| **1.A.3.a, c, d, e** | Off-Road Transport | 0.36 | 0.19 | 0.18 | 0.08 | 0.13 | 0.15 | 0.15 | WEM |
| | | 0.36 | 0.19 | 0.18 | 0.08 | 0.13 | 0.15 | 0.15 | WAM |
| **1.A.3.b** | Road Transport | 4.76 | 0.16 | 0.13 | 0.12 | 0.12 | 0.11 | 0.10 | WEM |
| | | 4.76 | 0.16 | 0.13 | 0.12 | 0.12 | 0.11 | 0.09 | WAM |
| **1.A.4** | Other Sectors | 32.66 | 7.88 | 2.76 | 1.27 | 1.08 | 0.97 | 0.89 | WEM |
| | | 32.66 | 7.88 | 2.76 | 1.27 | 1.08 | 1.00 | 0.90 | WAM |
| **1.A.5** | Other | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WEM |
| | | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WAM |
| **1.B** | Fugitive Emissions | 2.00 | 0.04 | 0.05 | 0.02 | 0.03 | 0.02 | 0.02 | WEM |
| | | 2.00 | 0.04 | 0.05 | 0.02 | 0.03 | 0.03 | 0.02 | WAM |
| **2.A,B,C, H,I,J,K,L** | Industrial Processes | 1.93 | 0.72 | 0.70 | 0.59 | 0.55 | 0.56 | 0.56 | WEM |
| | | 1.93 | 0.72 | 0.70 | 0.59 | 0.55 | 0.55 | 0.55 | WAM |
| **2.D, 2.G** | Solvent and Other Product Use | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **3.B** | Manure Management | NA | NA | NA | NA | NA | NA | NA | WEM |
| | | NA | NA | NA | NA | NA | NA | NA | WAM |
| **3.D** | Agricultural Soils | NA | NA | NA | NA | NA | NA | NA | WEM |
| | | NA | NA | NA | NA | NA | NA | NA | WAM |
| **3.F, I** | Field Burning and Other Agriculture | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **5** | Waste | 0.07 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WEM |
| | | 0.07 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WAM |

* *Data source: Austrian Emission Inventory 2025 (UMWELTBUNDESAMT, 2025b)*

*IE: included elsewhere; NA: not applicable; NO: not occurring*

## 2.3 Non-methane volatile organic compounds (NMVOC)

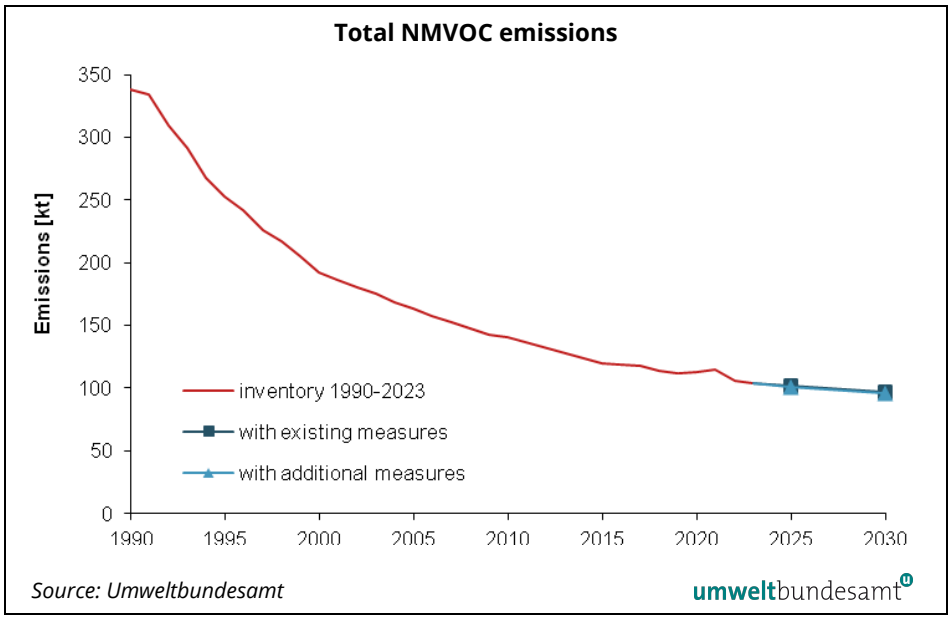
National total NMVOC emissions amounted to 337 kt in 1990. Since then, emissions have decreased steadily and in 2023 emissions were reduced by 69% compared to 1990 to 103 kt. From 2022 to 2023, NMVOC emissions decreased by 2.0 kt (-1.9%).

The largest reductions since 1990 have been achieved in the road transport sector due to the increased use of catalytic converters and diesel vehicles. Currently, road transport (1.A.3.b) accounts for only a small share (3.5%) of Austria's total NMVOC emissions. Reductions in the solvent sector (2.D.3) have been driven by the implementation of the EU Solvent Emissions Directive and the Austrian *Ordinance on VOC Emissions from Industrial Installations*.

The main sources of NMVOC emissions in Austria in 2023 are NFR sector 2 Industrial Processes and Product Use with a share of 37% of national total emissions, as well as NFR sectors 3 Agriculture and 1.A Fuel Combustion Activities, contributing 32% and 29% respectively. NMVOC emissions from NFR sectors 1.B Fugitive Emissions and 5 Waste are minor, contributing 2.4% and 0.05% respectively.

In the **'with existing measures' (WEM)** scenario, the national total NMVOC emissions are expected to decrease to 96.6 kt by 2030 (-40.9% compared to 2005).

*Figure 3: Historical (1990-2023) and projected NMVOC emissions for WEM and WAM (2024-2030) based on fuel sold.*




Total NMVOC emissions are projected to decrease by 6.9% by 2030 (compared to 2023). The largest reduction is expected to be achieved in NFR 1.A.4 Other Sectors (mainly households and commercial) with a decrease of 5.0%

(i.e. -1.2 kt) from 2023 to 2030. This is mainly due to a trend towards low-emission biomass heating technologies, heat pumps and district heating as well as a decline in the use of fuel wood as a source of energy.

NMVOC emissions from road transport (NFR 1.A.3.b) are projected to decrease by 27% (i.e. -1.0 kt) by 2030 compared to 2023, due to the use of state-of-the-art exhaust gas treatment (regulated catalytic converter) in earlier years and a substantial share of electric vehicles in the long term. In particular, substantial NMVOC emission reductions can be expected in the vehicle categories 'PC' and 'mopeds and motorcycles'.

On the other hand, emissions from NFR 2.D.3 Solvent Use are expected to increase by 1.3% (i.e. 0.4 kt) by 2030 due to projected economic growth resulting in an increase in solvent use. Emission regulations for the relevant sectors have been enforced at EU level, with some of the legal requirements in Austria being even stricter. The requirements for paints and varnishes have been harmonised at EU level, and existing regulations do not foresee any further tightening of emission standards. Calculations are based on solvent balances from companies and linked to economic projections for the respective sub-sectors, coupled with expert judgement on the actual increase in solvent use, taking into account the offset due to new technologies.

Emissions from agriculture are projected to decrease by 15.5% (i.e. 5.2 kt) by 2030 compared to 2023, mainly caused by livestock developments in Austria.

In the **'with additional measures' (WAM)** scenario, the national total NMVOC emissions are expected to decrease to 95.7 kt by 2030 (-41.5% compared to 2005).

Emissions from **NFR 1.A.4. Other Sectors** are projected to decrease by 3.8% (i.e. -0.9 kt) from 2023 to 2030. This is mainly due to a strong use of new biomass heating systems to replace fossil fuels (instead of heat pumps and district heating) in 1.A.4.b.1 Residential: stationary and more active fuel wood heating systems in 1.A.4.c.1 Agriculture/Forestry/Fishing: Stationary.

Mobile sources in households and agriculture (off-road) show a slight decrease of -0.2 kt by 2030 due to improved emission behaviour and a less conservative electrification rate in new vehicle registrations per year.

NMVOC emissions from agriculture are projected to decrease by 18.8% (i.e. -6.3 kt) from 2023 to 2030, mainly due to the assumed livestock developments in Austria.

*Table 7: Austrian national NMVOC emissions in kt and trend based on 'fuel sold' (source: Umweltbundesamt).*

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | Total | 337.97 | 163.49 | 140.97 | 112.76 | 103.71 | 102.32 | 96.55 | WEM |
| | | 337.97 | 163.49 | 140.97 | 112.76 | 103.71 | 100.97 | 95.65 | WAM |
| **1.A.1** | Energy Industries | 0.32 | 0.24 | 0.35 | 0.30 | 0.29 | 0.29 | 0.29 | WEM |
| | | 0.32 | 0.24 | 0.35 | 0.30 | 0.29 | 0.29 | 0.29 | WAM |
| **1.A.2** | Manufacturing Industries and Construction | 1.68 | 2.06 | 1.94 | 0.99 | 0.90 | 0.88 | 0.86 | WEM |
| | | 1.68 | 2.06 | 1.94 | 0.99 | 0.90 | 0.88 | 0.87 | WAM |
| **1.A.3.a, c, d, e** | Off-Road Transport | 1.53 | 1.79 | 1.44 | 0.51 | 0.74 | 0.79 | 0.75 | WEM |
| | | 1.53 | 1.79 | 1.44 | 0.51 | 0.74 | 0.84 | 0.81 | WAM |
| **1.A.3.b** | Road Transport | 97.88 | 20.84 | 10.37 | 3.98 | 3.59 | 3.30 | 2.61 | WEM |
| | | 97.88 | 20.84 | 10.37 | 3.98 | 3.59 | 3.34 | 2.48 | WAM |
| **1.A.4** | Other Sectors | 48.42 | 33.47 | 34.60 | 26.58 | 24.21 | 24.62 | 23.01 | WEM |
| | | 48.42 | 33.47 | 34.60 | 26.58 | 24.21 | 23.26 | 23.28 | WAM |
| **1.A.5** | Other | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WEM |
| | | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WAM |
| **1.B** | Fugitive Emissions | 15.92 | 3.90 | 3.07 | 2.54 | 2.50 | 2.54 | 2.32 | WEM |
| | | 15.92 | 3.90 | 3.07 | 2.54 | 2.50 | 2.62 | 2.30 | WAM |
| **2.A,B,C, H,I,J,K,L** | Industrial Processes | 4.36 | 3.56 | 3.72 | 3.84 | 3.90 | 3.89 | 3.89 | WEM |
| | | 4.36 | 3.56 | 3.72 | 3.84 | 3.90 | 3.89 | 3.89 | WAM |
| **2.D, 2.G** | Solvent and Other Product Use | 114.61 | 56.94 | 46.05 | 38.92 | 34.08 | 33.98 | 34.52 | WEM |
| | | 114.61 | 56.94 | 46.05 | 38.92 | 34.08 | 33.98 | 34.52 | WAM |
| **3.B** | Manure Management | 32.37 | 26.63 | 26.40 | 24.42 | 23.88 | 23.15 | 20.85 | WEM |
| | | 32.37 | 26.63 | 26.40 | 24.42 | 23.88 | 23.01 | 19.83 | WAM |
| **3.D** | Agricultural Soils | 20.66 | 13.90 | 12.89 | 10.62 | 9.55 | 8.81 | 7.39 | WEM |
| | | 20.66 | 13.90 | 12.89 | 10.62 | 9.55 | 8.79 | 7.33 | WAM |
| **3.F, I** | Field Burning and Other Agriculture | 0.06 | 0.04 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.06 | 0.04 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **5** | Waste | 0.17 | 0.12 | 0.09 | 0.06 | 0.06 | 0.05 | 0.05 | WEM |
| | | 0.17 | 0.12 | 0.09 | 0.06 | 0.06 | 0.05 | 0.05 | WAM |

* *Data source: Austrian Emission Inventory 2025 (UMWELTBUNDESAMT, 2025b)*

*IE: included elsewhere; NA: not applicable; NO: not occurring*

## 2.4 Ammonia ($NH_3$)

National total $NH_3$ emissions amounted to 90 kt in 1990. In 2023, emissions were 17.5% lower than in 1990, amounting to 74 kt. In Austria, $NH_3$ is almost exclusively emitted by the agricultural sector. The lower $NH_3$ emissions can be explained by decreasing cattle numbers, more efficient feeding and increased use of low-emission spreading techniques (e.g. band spreading, trailing shoe, rapid incorporation of manure).

The main sources of $NH_3$ emissions in Austria are predominantly in the agricultural sector, which accounted for about 94% of total $NH_3$ emissions in 2023. Sector 1.A Fuel Combustion Activities contributed 3.2% to national total emissions. $NH_3$ emissions from NFR sectors 2 Industrial Processes and Product Use and 5 Waste were minor, contributing 0.2% and 1.7% respectively to total $NH_3$ emissions in 2023.

NFR 3.B Manure Management accounted for 45% of national $NH_3$ emissions in 2023. Emissions result from animal husbandry and manure storage, with cattle manure management contributing 70%. Emissions are influenced by livestock numbers, housing systems, and manure treatment methods. $NH_3$ emissions from loose housing systems are significantly higher than from tied housing systems. Since 1990, emissions from this sub-sector have decreased by 6.4%, mainly due to declining livestock numbers, particularly dairy cattle, and improved feeding efficiency.

NFR 3.D Agricultural Soils accounted for 49% of national $NH_3$ emissions in 2023. These emissions result from the application of mineral N fertilisers and organic fertilisers (including animal manure, sewage sludge, energy crops, and compost). Another source of $NH_3$ emissions is the urine and dung deposited by grazing animals on pastures. Emissions in 2023 decreased by 3.2% compared to 2022.

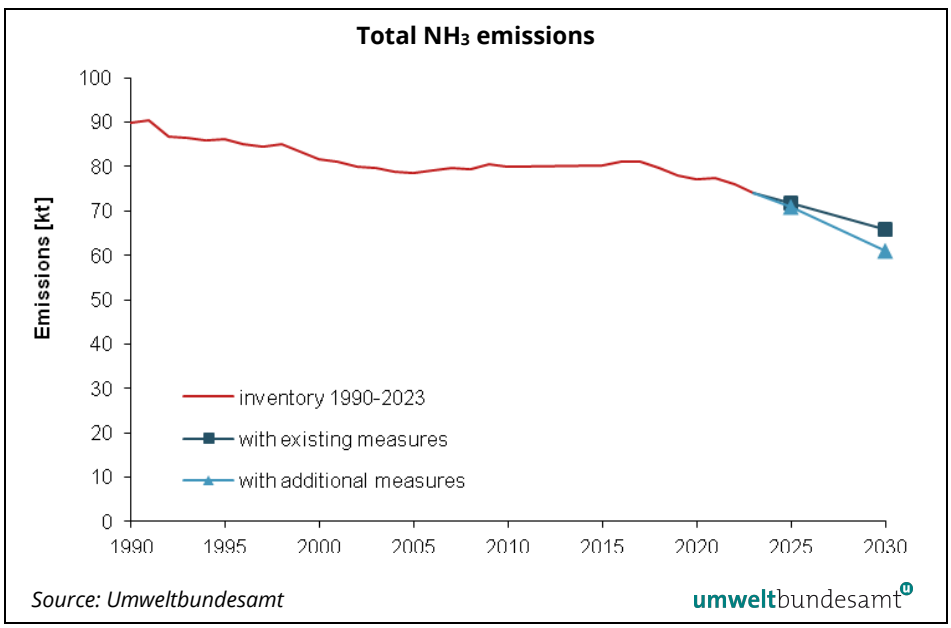



*Figure 4: Historical (1990-2023) and projected NH3 emissions for WEM and WAM (2024-2030) based on fuel sold.*

In the **'with existing measures' (WEM)** scenario, national total emissions are expected to decrease to 65.8 kt by 2030 (-16.3% compared to 2005). For the period between 2023 and 2030, $NH_3$ emissions show a 7.1% reduction.

Declining animal numbers and existing measures, such as the increased use of low-emission manure spreading techniques and the measures regulated by the Austrian Ammonia Reduction Ordinance ('Ammoniakreduktionsverordnung') in the agricultural sector, are the main reasons for reduced emissions by 2030. National forecasts for agricultural production in Austria (WIFO & BOKU, 2023) show that cattle numbers will fall by 11% between 2023 and 2030. The number of pigs will decrease by 7.6%, poultry numbers will decline at a higher rate of 18% by 2030. In accordance with Austria's CAP-SP, the share of low-emission spreading techniques will be increased significantly in the coming years (see Chapter 4.5).

In the **'with additional measures' (WAM)** scenario, the national total emissions are expected to decrease to 61.0 kt by 2030 (-22.5% compared to 2005). Between 2023 and 2030, national total $NH_3$ emissions are projected to decrease by 17.7%.

The main reason for the emission reductions is the projected decline in livestock numbers. In the WAM scenario, cattle numbers are projected to fall by 14% between 2023 and 2030 (WIFO & BOKU, 2023). The number of pigs and poultry is also expected to decrease, by 9.3% and 21% respectively.

Additional measures listed in the Austrian NAPCP and NECP are responsible for the falling trend. The analyses at sub-sector level show that the lower livestock numbers and additional measures in animal feeding, animal husbandry and slurry storage will reduce emissions in the sub-sector NFR 3.B Manure Management by 17% (i.e. -5.7 kt) between 2023 and 2030. Emissions in the sub-sector NFR 3.D Agricultural Soils are expected to decrease by 22% (i.e. -7.8 kt) by 2030, mainly due to lower emissions from manure spreading as a result of lower livestock numbers and increased use of low-emission manure application techniques. Furthermore, according to the Austrian NECP and NAPCP, there will be a reduced need for mineral N fertilisers due to improved nitrogen management.

*Table 8: Austrian national $NH_3$ emissions in kt and trend based on 'fuel sold' (source: Umweltbundesamt).*

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | Total | 89.83 | 78.68 | 79.91 | 77.27 | 74.11 | 71.76 | 65.84 | WEM |
| | | 89.83 | 78.68 | 79.91 | 77.27 | 74.11 | 70.84 | 60.96 | WAM |
| **1.A.1** | Energy Industries | 0.20 | 0.32 | 0.47 | 0.43 | 0.41 | 0.41 | 0.41 | WEM |
| | | 0.20 | 0.32 | 0.47 | 0.43 | 0.41 | 0.41 | 0.41 | WAM |
| **1.A.2** | Manufacturing Industries and Construction | 0.33 | 0.43 | 0.42 | 0.39 | 0.40 | 0.28 | 0.28 | WEM |
| | | 0.33 | 0.43 | 0.42 | 0.39 | 0.40 | 0.40 | 0.40 | WAM |
| | | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | WEM |

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| **1.A.3.a, c, d, e** | Off-Road Transport | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | WAM |
| **1.A.3.b** | Road Transport | 0.80 | 2.59 | 1.84 | 0.88 | 0.99 | 0.99 | 0.91 | WEM |
| | | 0.80 | 2.59 | 1.84 | 0.88 | 0.99 | 1.00 | 0.87 | WAM |
| **1.A.4** | Other Sectors | 0.78 | 0.75 | 0.75 | 0.60 | 0.54 | 0.53 | 0.47 | WEM |
| | | 0.78 | 0.75 | 0.75 | 0.60 | 0.54 | 0.51 | 0.48 | WAM |
| **1.A.5** | Other | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **1.B** | Fugitive Emissions | IE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | IE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **2.A,B,C, H,I,J,K,L** | Industrial Processes | 0.27 | 0.07 | 0.09 | 0.10 | 0.08 | 0.08 | 0.08 | WEM |
| | | 0.27 | 0.07 | 0.09 | 0.10 | 0.08 | 0.08 | 0.08 | WAM |
| **2.D, 2.G** | Solvent and Other Product Use | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | WEM |
| | | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | WAM |
| **3.B** | Manure Management | 35.56 | 33.16 | 34.32 | 34.05 | 33.29 | 32.75 | 30.61 | WEM |
| | | 35.56 | 33.16 | 34.32 | 34.05 | 33.29 | 32.15 | 27.58 | WAM |
| **3.D** | Agricultural Soils | 50.88 | 39.53 | 40.08 | 38.63 | 36.23 | 34.55 | 30.87 | WEM |
| | | 50.88 | 39.53 | 40.08 | 38.63 | 36.23 | 34.10 | 28.39 | WAM |
| **3.F, I** | Field Burning and Other Agriculture | 0.03 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.03 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **5** | Waste | 0.37 | 1.09 | 1.17 | 1.24 | 1.24 | 1.23 | 1.24 | WEM |
| | | 0.37 | 1.09 | 1.17 | 1.24 | 1.24 | 1.25 | 1.78 | WAM |

* *Data source: Austrian Emission Inventory 2025 (UMWELTBUNDESAMT, 2025b)*

*IE: included elsewhere; NA: not applicable; NO: not occurring*

## 2.5 Fine particulate matter ($PM_{2.5}$)

$PM_{2.5}$ emissions amounted to 27 kt in 1990 and have been steadily decreasing since then, resulting in a 53% reduction (to 13 kt) by 2023.

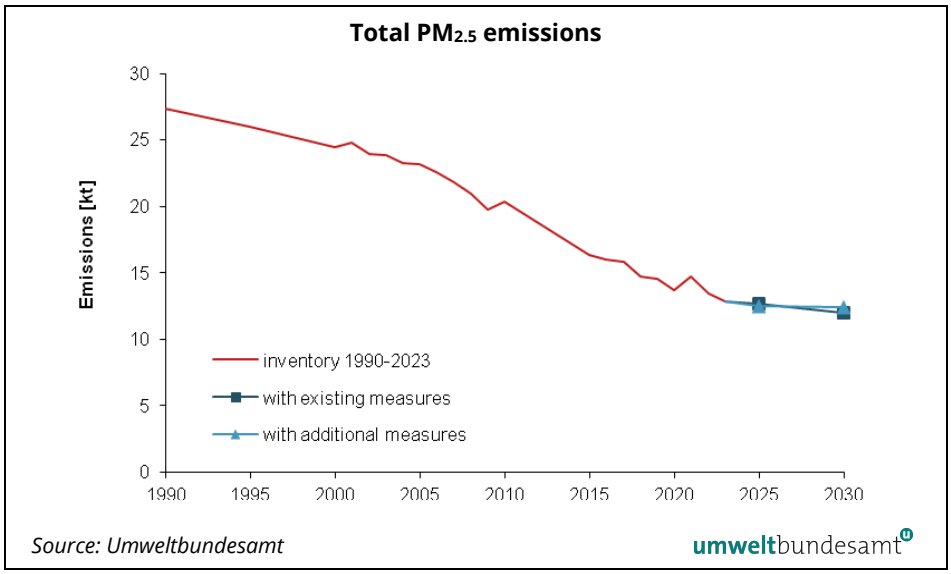
In general, the reduction of $PM_{2.5}$ emissions is due to the installation of flue gas collection and modern flue gas cleaning technologies in several industries, improved vehicle exhaust after-treatment technologies in road transport (NFR 1.A.3.b) and reduced coal consumption as well as improved biomass combustion technology in households (NFR 1.A.4.b.1).

$PM_{2.5}$ emissions in Austria come mainly from combustion processes in the energy sector, accounting for 81% of total emissions in 2023. Another emission

source is NFR sector 2 Industrial Processes and Product Use, which contributed 14% to national total emissions.

In the **'with existing measures' (WEM)** scenario, the national total emissions are expected to decrease to 12.0 kt by 2030 (-48.2% compared to 2005).

*Figure 5: Historical (1990-2023) and projected PM2.5 emissions for WEM and WAM (2024-2030) based on fuel sold.*




In the WEM scenario, $PM_{2.5}$ emissions from NFR 1.A.4 Other Sectors are expected to decrease by 5.9% (i.e. -0.4 kt) by 2030 compared to 2023. $PM_{2.5}$ emission reductions are mainly due to a trend away from manually fed fuel wood boilers and wood stoves. Furthermore, biomass heating systems will be used in increasingly energy-efficient buildings. Thus, a declining energy demand for fuel wood (and coal) is responsible for the $PM_{2.5}$ reductions. This is also supported by the improved combustion technologies for newly installed biomass heating systems.

Total $PM_{2.5}$ emissions from the road transport sector (NFR 1.A.3.b) are expected to decrease by about 21% (i.e. -0.2 kt) by 2030 compared to 2023. While exhaust emissions from cars and trucks are expected to decline significantly by 2030 due to a higher penetration of vehicles equipped with filters and an increased share of BEVs, emissions from automobile road abrasion and vehicles (tyre and brake wear) are expected to increase slightly due to an increase in total vehicle kilometres driven.

In the energy industries sector (NFR 1.A.1), $PM_{2.5}$ emissions remain relatively constant from 2023 to 2030. In subsequent years, emissions are projected to be lower due to a decrease in the use of biomass for electricity and heat generation. Emissions from NFR 1.A.2 Manufacturing Industries and Construction decreased to 62.2% between 2005 and 2023 due to the installation of electrostatic precipitators and bag filters. By 2030, more of these devices will be in use, but the effect will be offset by an increase in emissions resulting from economic growth.

In the **'with additional measures' (WAM)** scenario, the national total emissions are expected to decrease to 12.4 kt by 2030 (-46.2% compared to 2005).

$PM_{2.5}$ emissions from NFR 1.A.4 Other Sectors are expected to decrease by 5.4% (i.e. -0.3 kt) by 2030 compared to 2023. Total $PM_{2.5}$ emissions from the road transport sector (including 'fuel exports') are expected to decrease by about 28.2% (i.e. -0.6 kt) compared to 2023.

Higher biomass use in energy consumption in the WAM scenario is offset by generally higher energy consumption in the WEM scenario, so that $PM_{2.5}$ emissions in the NFR 1.A.2 and NFR 2 sectors are very similar.

However, $PM_{2.5}$ emissions in the NFR 1.A.1 (Public electricity and heat production) sector are higher in the WAM scenario. This is mainly due to the increased use of biomass for electricity and heat generation, which contributes significantly to the overall emissions.

*Table 9: Austrian national $PM_{2.5}$ emissions in kt and trend based on 'fuel sold' (source: Umweltbundesamt).*

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | Total | 27.36 | 23.13 | 20.32 | 13.64 | 12.87 | 12.68 | 11.97 | WEM |
| | | 27.36 | 23.13 | 20.32 | 13.64 | 12.87 | 12.50 | 12.43 | WAM |
| **1.A.1** | Energy Industries | 0.85 | 0.80 | 1.13 | 0.97 | 0.90 | 0.96 | 0.89 | WEM |
| | | 0.85 | 0.80 | 1.13 | 0.97 | 0.90 | 1.21 | 1.48 | WAM |
| **1.A.2** | Manufacturing Industries and Construction | 1.90 | 1.85 | 1.52 | 0.67 | 0.64 | 0.71 | 0.70 | WEM |
| | | 1.90 | 1.85 | 1.52 | 0.67 | 0.64 | 0.61 | 0.61 | WAM |
| **1.A.3.a, c, d, e** | Off-Road Transport | 0.70 | 0.66 | 0.52 | 0.26 | 0.37 | 0.34 | 0.34 | WEM |
| | | 0.70 | 0.66 | 0.52 | 0.26 | 0.37 | 0.38 | 0.39 | WAM |
| **1.A.3.b** | Road Transport | 5.79 | 7.67 | 5.33 | 2.33 | 2.10 | 1.84 | 1.65 | WEM |
| | | 5.79 | 7.67 | 5.33 | 2.33 | 2.10 | 1.78 | 1.51 | WAM |
| **1.A.4** | Other Sectors | 13.30 | 8.98 | 9.14 | 6.93 | 6.39 | 6.41 | 6.01 | WEM |
| | | 13.30 | 8.98 | 9.14 | 6.93 | 6.39 | 6.09 | 6.04 | WAM |
| **1.A.5** | Other | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WEM |
| | | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | WAM |
| **1.B** | Fugitive Emissions | 0.11 | 0.09 | 0.07 | 0.05 | 0.05 | 0.05 | 0.03 | WEM |
| | | 0.11 | 0.09 | 0.07 | 0.05 | 0.05 | 0.05 | 0.04 | WAM |
| **2.A,B,C, H,I,J,K,L** | Industrial Processes | 3.55 | 2.04 | 1.51 | 1.43 | 1.44 | 1.40 | 1.40 | WEM |
| | | 3.55 | 2.04 | 1.51 | 1.43 | 1.44 | 1.42 | 1.41 | WAM |
| **2.D, 2.G** | Solvent and Other Product Use | 0.53 | 0.49 | 0.50 | 0.40 | 0.40 | 0.40 | 0.40 | WEM |
| | | 0.53 | 0.49 | 0.50 | 0.40 | 0.40 | 0.40 | 0.40 | WAM |
| **3.B** | Manure Management | 0.13 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.09 | WEM |
| | | 0.13 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.09 | WAM |
| **3.D** | Agricultural Soils | 0.14 | 0.15 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | WEM |

| NFR | Description | Emission Inventory 2025* [kt] | | | | Scenario [kt] | | | Type of Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | | 1990 | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 | |
| | | 0.14 | 0.15 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | WAM |
| **3.F, I** | Field Burning and Other Agriculture | 0.07 | 0.06 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | WEM |
| | | 0.07 | 0.06 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | WAM |
| **5** | Waste | 0.25 | 0.22 | 0.30 | 0.33 | 0.33 | 0.31 | 0.31 | WEM |
| | | 0.25 | 0.22 | 0.30 | 0.33 | 0.33 | 0.31 | 0.31 | WAM |

* *Data source: Austrian Emission Inventory 2025 (UMWELTBUNDESAMT, 2025b)*

*IE: included elsewhere; NA: not applicable; NO: not occurring*

# 3 POLICIES AND MEASURES (PAMS)

For all sectors, reduction measures were identified and emissions were projected using specifically designed models. The methodology used for the projections and emission calculations is described in the respective chapters. Consistency between the sector models was ensured through regular expert meetings where potential overlaps and gaps were identified and discussed.

Compared to the last submission in 2023, reporting on policies and measures has further improved. Additional measures in the WAM scenario are based on the National Climate and Energy Plan (BMK, 2024a) and the National Air Pollution Control Programme (BMK, 2023a).

The Austrian air pollutant projections are consistent with current GHG emission projections under the EU Governance Regulation (EU) 2018/1999. A detailed description of the individual measures for GHGs is provided in the report submitted under the Governance Regulation in 2023 (UMWELTBUNDESAMT, 2025a).

Measures to reduce GHG emissions and air pollutants have been identified and are considered in the scenarios. There is strong interaction between the measures for GHG emissions and those for air pollutants. Either they have impacts across a number of sectors (cross-cutting measures) or they target specific sectors and form the basis for Austria's air pollutant projections.

## 3.1 Cross-cutting measures

- **EU Emissions Trading System (WEM, WAM)**
  - The system covers $CO_2$ emissions from large emitters in the industrial sectors, from energy and heat supply to aircraft operators as well as $N_2O$ emissions from the chemical industry. The EU ETS also has positive side-effects for $SO_2$ and $NO_x$ by encouraging operators to upgrade their facilities in order to reduce emissions and increase efficiency.
- **Carbon pricing of fossil fuels (WEM, WAM)**
  - The National Emissions Certificate Trading Act *(Nationales Emissionszertifikatehandelsgesetz*, NEHG 2022) covers energy-related greenhouse gas emissions from the non-ETS sectors (buildings, transport, agriculture, waste and small industrial plants). The objective of this law is to create cost transparency for $CO_2$ emissions. Entities placing energy sources in circulation on the Austrian market, known as trading participants, must purchase emissions certificates for fossil energy sources such as petrol, gas oil (diesel), heating oil, natural gas, liquefied gas, coal and kerosene (Annex 1 of the Act). Will be replaced by ETS2 in 2027.

- Emissions Trading System for Buildings, Road Transport and Additional Sectors *('ETS2'):*
  As part of the 2023 revisions of the ETS Directive, a new emissions trading system named ETS2 has been created. This new system will cover and address the $CO_2$ emissions from fuel combustion in buildings, road transport and additional sectors. Under Delegated Decision (EU) 2024/2986, additional sectors were unilaterally included in the ETS2 in Austria. Fuel suppliers will be required to monitor and report their emissions. These entities will be regulated under the ETS2, which means that they will be required to surrender sufficient allowances to cover their emissions. Regulated entities will purchase these allowances at auctions. The ETS2 cap will be set to bring emissions down by 42% by 2030 compared to 2005 levels. The ETS2 will become fully operational in 2027. In the event of exceptionally high gas or oil prices in 2026, the implementation of the ETS2 system could be postponed to 2028 to ensure a smooth implementation.

## 3.2 Energy industries (NFR 1.A.1) and manufacturing industries and construction (NFR 1.A.2)

- **Increased share of renewable energy in power supply and district heating (WEM)**

  Increasing the share of renewable energy in power supply and district heating is the main purpose of this policy, which is designed to reduce the impact of energy systems on the climate. Beyond the traditional use of large-scale hydropower for electricity generation, the Renewable Energy Expansion Act (*Erneuerbaren-Ausbau-Gesetz*) has established quantitative targets for increasing the share of wind power, photovoltaics, small hydropower plants and biomass/biogas in electricity generation. These targets are to be achieved through market premiums. Investment support has been granted for biomass-based district heating systems (see PaM Domestic Environmental Support Scheme).
- **Increased energy efficiency in energy and manufacturing industries (WEM)**

  Increasing energy efficiency in the energy and manufacturing industries is essential to reduce growing fuel demand and environmental impacts. Based on EU legislation (Energy Efficiency Directive (2012/27/EU)), Austria adopted an Energy Efficiency Act in 2014, which was revised in 2023.
- **Decarbonisation of the industry (WAM)**

  Reducing greenhouse gas emissions in the industry sector is the main purpose of this policy, which is designed to reduce the climate impact of this sector. The measure focuses on large enterprises and hard-to-abate sectors of the industry.

- **Further expansion of renewable energy in the electricity sector (WAM)**

  Further increasing the share of renewable energy in the supply of electricity and district heating is the main purpose of this policy, which is designed to reduce the climate impact of the energy system. Beyond the WEM scenario, the potential is largely limited to PV and wind power plants. This potential is to be unlocked by a mix of support and reduction of barriers through improved market design.

- **Further expansion of renewable energy through green gas (WAM)**

  Austria aims to increase the share of renewable energy in its final energy demand. As natural gas is the predominant fuel, it is essential to increase the share of renewable gas in the national gas grid.

  The aim of this measure is to ensure the market uptake of renewable gases (mainly biomethane and hydrogen) both in the existing gas grid and in dedicated hydrogen grids.

- **Expansion of geothermal energy and large heat pumps (WAM)**

  This measure aims to unlock the potential of geothermal energy with a focus on district heating.

## 3.3 Transport (NFR 1.A.3)

- **Increased share of cleaner vehicles in road transport (WEM)**

  With the implementation of Regulation (EU) 2024/1257, the targets of EURO 7 for PCs, LDVs and EURO VII for HDVs are combined in one legislative act, succeeding EURO 6 for PCs and LDVs (Regulation (EU) No 715/2007) and EURO VI for HDVs (Regulation (EU) No 595/2009). In the broadest sense, the implementation of the greening of the truck toll is also part of this topic, as the costs for higher emitting HDVs are higher on Austrian motorways.

- **Increased share of renewable energy sources in transport (WEM)**

  Implementation of the Renewable Energy Directives (Directive 2009/28/EC and Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources) with the Austrian Fuel Ordinance, which sets minimum targets for the proportion of biofuels (fatty acid methyl ester and ethanol) in diesel and petrol sold in Austria. In the aviation sector, minimum blending quotas for SAF (sustainable aviation fuels) have been considered in accordance with the ReFuelEU Aviation Regulation.

- **Promotion of e-mobility (WEM)**

  The EU has set $CO_2$ reduction targets for PCs, LDVs and HDVs with Regulation (EU) 2023/851 on the strengthening of CO2 emission performance standards for new passenger cars and new light commercial vehicles (meaning no new registrations of vehicles with conventional internal

combustion engines from 2035 onwards). For HDVs, Regulation (EU) 2024/1610 is in force.

In addition, incentive mechanisms at the national level through federal funding programmes for both zero emission buses (EBIN) and trucks (ENIN) plus charging infrastructure (LADIN) have been included in the projections.

- **Fuel price control (WEM)**

  Increasing the cost per litre of fossil fuel consumed is intended to create incentives for drivers or companies to reduce fuel consumption and thus their costs. The fiscal policy instruments used were the fuel tax increase in 2011 and the implementation of the National Emissions Trading Act 2022.

- **Increased fuel efficiency in road transport (WEM)**

  Supported by the following instruments: air quality induced speed limits to tackle local air quality problems and the Eco-Driving Initiative of the National Action Programme for Mobility Management 'klimaaktiv mobil' to save fuel.

- **Modal shift in passenger and freight transport (WEM)**

  Promoting a modal shift towards active and environmentally friendly modes of transport (cycling and walking) is a cornerstone of the 'klimaaktiv mobil' initiative for mobility management and awareness. It is a funding programme for companies, municipalities and associations and includes target-group-oriented counselling programmes, awareness-raising initiatives, partnerships, and training and certification initiatives.

  The instruments for boosting the share of public transport are the Austrian Federal Railways Framework Plan 2024-2029 and nationwide and regional public transport tickets.

  The instruments for achieving a shift in the modal split in freight transport towards rail and waterborne transport are the Austrian Federal Railways Framework Plan 2024-2029, rail freight subsidies, the promotion of corporate rail connections for freight transport and the Danube Action Plan until 2022.

**WAM measures for transport**

Only WAM measures for the transport sector that go beyond the policies and measures of the WEM25 scenario are described below. (Due to the later cut-off date, several instruments that are part of WAM24 developed for NECP in 2024 have already entered into force and are now part of the WEM25 scenario).

- **Accelerated growth of renewable energy sources in transport (WAM24-NEKP)**

  Implementation of Directive (EU) 2023/2413 (Renewable Energy Directive RED III). The energy target for 2030 according to the RED III Directive is modelled at 29% (energy content), including electricity for road and other land transport and the current biofuel blending. The sub-target of 5.5% is

modelled with 1% RFNBOs and 4.5% advanced biofuels (added to the current biofuels).

- **Further promotion of active mobility and mobility management (WAM24-NEKP)**

  The WAM24 NEKP includes further improvements in the area of active mobility as well as measures to increase the attractiveness of car sharing and carpooling services. These will reduce the number of car journeys and increase the shift to walking and cycling. The three pull elements of this measure are the

  - Expansion of walking and cycling infrastructure,
  - Implementation of an attractive nationwide car sharing scheme,
  - Promotion of carpooling to work.

  These three elements are accompanied by mobility management measures.

- **Increased attractiveness of public transport including a guaranteed minimum service (WAM24-NEKP)**

  By improving and expanding public transport services to a guaranteed minimum level ("mobility guarantee"), significantly more car journeys will be shifted to public transport.

  - Increased stop density / shorter access distance to the stops (max. 750 m)
  - Operating hours: 4:00 a.m. to midnight, with a service every 30 minutes
  - Significantly expanded range of publicly accessible on-demand services

- **Further promotion of rail freight funding (WAM24-NEKP)**

  The funding programmes for rail freight transport (rail freight transport subsidies, funding for company connections and terminals for freight transport) will be further developed and used in line with demand. This will maintain the existing share of rail freight transport and promote an additional shift of freight transport from road to rail. This will increase the share of rail freight transport to 32% of the total transport volume (in tonne-kilometres) by 2030.

## 3.4 Other sectors (NFR 1.A.4)

- **Climate neutral new buildings (WEM)**
  In the WEM scenario, the full implementation of Directive 2010/31/EU sets the nearly zero-energy building standard for new buildings. High-efficiency alternative heating systems have to be considered, if available. Renewable energy requirements encourage the installation of solar appliances. Fossil fuel heating systems are prohibited at federal level. In the case of subsidies from the Housing Support Scheme (*Wohnbauförderung*),

additional funding is granted if higher standards are met than the minimum criteria for energy efficiency of the building envelope and for the choice of modern heating systems. All other subsidies for the construction of new buildings are linked to the fulfilment of environmental requirements within specific funding initiatives.

Due to reporting date regulations, the transition to the zero-emission building standards of Directive (EU) 2024/1275 is not part of the WEM scenario. The following instruments are taken into account:

- OIB Guideline 6 – Energy Savings and Thermal Insulation, 2023 edition (OIB-330.6-036/23)
- Oil Boiler Installation Prohibition Act (*Ölkesseleinbauverbotsgesetz – ÖKEVG 2019*)
- Renewable Heat Act (*Erneuerbare-Wärme-Gesetz – EWG*)
- Funding Programmes for New Buildings

  All subsidies support renewable heating systems and improved thermal energy efficiency of the building envelope of new buildings:

  - Housing Support Scheme (*Wohnbauförderung*)
  - Domestic Environmental Support Scheme, including Energy Efficiency Programme (*Umweltförderung im Inland inkl. Energieeffizienzprogramm*)
  - Austrian Climate and Energy Fund (*Klima- und Energiefonds*)

- **Thermal improvement of the building stock (WEM)**
  In the WEM scenario, the full implementation of Directive 2010/31/EU maintains a mandatory energy performance building standard for major renovations (and for individual building components). In the case of subsidies from the Housing Support Scheme (*Wohnbauförderung*), additional funding is granted if higher standards than the minimum criteria for energy efficiency of the building envelope are met. All other subsidies and public investments for the renovation of existing buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. Renovation quotas for federal buildings are met. Mandatory energy performance certificates may influence people's decisions to improve energy efficiency when renting, leasing or selling buildings or dwellings. However, there is no obligation to renovate buildings with poor thermal envelope quality, which are taken into account in the WEM scenario.
- Due to reporting date regulations, the conversion of the existing building stock to zero-emission buildings by 2050 as outlined in mandatory national building renovation plans and other objectives of Directive (EU) 2024/1275 regarding the building envelope, is not part of the WEM scenario.
- There are interdependencies with the measures outlined in the paragraph below, *Replacement of fossil fuels in building stock*, as energy efficiency measures include, for example, the replacement of heating systems with renewable and low-carbon technologies.

- OIB Guideline 6 – Energy Savings and Thermal Insulation, 2023 edition (OIB-330.6-036/23)
- Energy Efficiency Act – Federal buildings (*Bundes-Energieeffizienzgesetz – EEffG*)
  - Achieving an annual renovation rate of at least 3% of the total floor area of heated and/or cooled buildings owned and occupied by the central government, in order to transform them into at least nearly zero-energy buildings (in accordance with Directive 2010/31/EU). Exceptions for federal buildings worthy of protection, where lower requirements apply, are agreed in cooperation with the Federal Monuments Office.
- Funding programmes for thermal renovation

  All subsidies support the improvement of the thermal energy efficiency of the building envelope of existing buildings:
  - Housing Support Scheme (*Wohnbauförderung*)
  - Domestic Environmental Support Scheme, including Energy Efficiency Programme (*Umweltförderung im Inland inkl. Energieeffizienzprogramm*)
  - Building Renovation Initiative for Commercial/Institutional Buildings (*Sanierungsoffensive für Betriebe*)
  - Building Renovation Initiative for Residential Buildings (*Sanierungsoffensive für Private*)
  - Austrian Climate and Energy Fund (*Klima- und Energiefonds*)
  - Public investment in thermal renovation of federal buildings, federal provincial buildings and municipal buildings (*Kommunalinvestitionsgesetz 2023 – KIG 2023*)
- The WEM scenario takes into account fiscal policy measures regarding thermal insulation of existing buildings (*Federal Law Gazette No. 400/1988, as amended by Federal Law Gazette No. I 36/2024*):
  - In the WEM scenario, tax refunding for investment in thermal renovation for private households (*Öko-Sonderausgabenpauschale*) is available until 2025.
  - In the WEM scenario, special subsidies for investment in thermal renovation for landlords (*Öko-Investitionszuschlag*) are available until 2036.
- Act on the Presentation of an Energy Performance Certificate (*Energieausweis-Vorlage-Gesetz 2012 – EAVG 2012*)

- **Replacement of fossil fuels in building stock (WEM)**

  In the WEM scenario, the full implementation of Directive 2010/31/EU maintains that for buildings where heating systems are replaced (with or without thermal renovation of the building envelope), high-efficiency alternative systems have to be considered, if available. Renewable energy requirements encourage the installation of solar appliances. In the case of subsidies from the Housing Support Scheme (*Wohnbauförderung*), additional funding is granted if higher standards than the minimum criteria

for the choice of heating systems are met. All other subsidies and public investments for the replacement of fossil fuel heating systems in existing buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. Consequently, the installation of natural gas and gas oil heating systems in existing buildings is restricted, but still possible (without subsidies). Awareness-raising measures are expected to increase the replacement of fossil fuel heating systems. However, there is no obligation to replace existing fossil fuel heating systems with renewable heating systems, which is taken into account in the WEM scenario.

Due to reporting date regulations, the mandatory conversion of the existing building stock to zero-emission buildings by 2050, as outlined in the national building renovation plan and other objectives of Directive (EU) 2024/1275 regarding the heating system are not part of the WEM scenario.

- OIB Guideline 6 – Energy Savings and Thermal Insulation, 2023 edition (OIB-330.6-036/23)
- Funding Programmes for the Replacement of Fossil Heating Systems

  All subsidies support renewable heating systems in existing buildings:
  - Housing Support Scheme (*Wohnbauförderung*)
  - Domestic Environmental Support Scheme, including Energy Efficiency Programme (*Umweltförderung im Inland inkl. Energieeffizienzprogramm*)
  - Stepping out of Oil and Gas (*Raus aus Öl und Gas*) as a focus programme of the Building Renovation Initiative for Residential Buildings (*Sanierungsoffensive für Private*)
  - Austrian Climate and Energy Fund (*Klima- und Energiefonds*)
  - Public investment replacement of fossil fuel heating systems of federal buildings, federal province buildings and municipal buildings (*Kommunalinvestitionsgesetz 2023 – KIG 2023*)
- The WEM scenario takes into account fiscal policy measures to replace fossil fuel heating systems in existing buildings (*Federal Law Gazette No. 400/1988, as amended by Federal Law Gazette No. I 36/2024*):
- (*Federal Law Gazette No. 400/1988, as amended by Federal Law Gazette No. I 36/2024*):
  - In the WEM scenario, tax refunding for investment in the replacement of fossil fuel heating systems for private households (*Öko-Sonderausgabenpauschale*) is available until 2025.
  - In the WEM scenario, special subsidies for investment in the replacement of fossil fuel heating systems for landlords (*Öko-Investitionszuschlag*) are available until 2036 .

- **Energy efficiency measures in buildings (WEM)**

  Increasing the energy efficiency of electricity demand in buildings is another policy target to be achieved by far-reaching instruments at EU level.

In particular, the eco-design requirements (Directive 2005/32/EC) for energy-using products and the mandatory labelling of household appliances according to their energy consumption (see the Energy Labelling of Space and Water Heating Products instrument below). Measures to improve the energy efficiency of heating systems and appliances are supported by various information and networking activities, such as the Austrian Climate Protection Initiative (*klimaaktiv*) and consultancy services, information and education campaigns by the federal provinces.

The WEM scenario reflects this by assuming higher overall efficiency of new heating systems and appliances.

- Eco-design Ordinance (*Ökodesign-Verordnung 2007 – ODV 2007*)
- Energy Labelling of Space and Water Heating Products (*Elektrotechnikgesetz 1992*)
- Funding Programmes for Energy Efficiency Measures in Buildings
- All subsidies support the improvement of energy efficiency of heating systems and appliances:
  - Austrian Climate Protection Initiative (*klimaaktiv*)
  - Domestic Environmental Support Scheme, including Energy Efficiency Programme (*Umweltförderung im Inland inkl. Energieeffizienzprogramm*)
  - Funding for energy efficiency measures in buildings is provided under all relevant funding programmes of the federal government and the federal provinces.

- **Accelerated path to climate neutral new buildings (WAM)**
  The measures for climate neutral new buildings underlying the WEM scenario are also implemented in the WAM scenario. In the WAM scenario, advanced building codes and adaptations in funding programmes apply.

  The transition to the zero-emission building standards of Directive (EU) 2024/1275 is part of the WAM scenario.

  - OIB Guideline 6 – Energy Savings and Thermal Insulation, 2025 edition (OIB-330.6-005/25) (draft)
    - The zero-emission standard is defined in OIB Guideline 6, 2025 edition, and its successors at the level of ambition to meet the cost-optimal level (update of OIB document 'proof of cost optimality'). The maximum threshold for the energy demand of a zero-emission building is at least 10% below the threshold for total primary energy consumption of the previous nearly zero-energy building standard.
    - All new public buildings from 2028 and all new buildings from 2030 will be required to be zero-emission buildings with high efficiency. They cover the remaining energy demand through renewables and are suitable for solar systems.
  - Funding Programmes for New Buildings

  The same funding and national programmes described in the WEM scenario (see above) are extended to 2050 in the WAM scenario in order to

support renewable heating systems and improve the thermal energy efficiency of the building envelope of new buildings. The budget is set higher than in the WEM scenario.

- **Accelerated thermal renovation of the building stock (WAM)**

  The measures for thermal improvement of the building stock underlying the WEM scenario are also implemented in the WAM scenario. In the WAM scenario, advanced building codes, concerted thermal renovation planning, obligations for thermal renovation and adaptations in funding programmes apply. The conversion of the existing building stock to zero-emission buildings by 2050 is achieved.

  - OIB Guideline 6 – Energy Savings and Thermal Insulation, 2025 edition (OIB-330.6-005/25) (draft)
    - The zero-emission standard is defined in OIB Guideline 6, 2025 edition, and its successors at the level of ambition to meet the cost-optimal level (update of OIB document 'proof of cost optimality'). The maximum threshold for the energy demand of a zero-emission building is at least 10% below the threshold for total primary energy consumption of the previous nearly zero-energy building standard.
    - All buildings will be zero-emission buildings with high efficiency by 2050. They will cover the remaining energy demand through renewables and will be suitable for solar systems. Exceptions, such as for historic buildings, may apply.
    - The mandatory conversion of the existing building stock to zero-emission buildings by 2050 is outlined in the national building renovation plan. Interim targets for reducing primary energy consumption (residential buildings), for renovation obligations (non-residential buildings) and for considering the phasing out of fossil fuelled heating systems by 2040 are drawn up by OIB and implemented by all federal provinces.
    - Building renovation passports defined by OIB Guideline 6, 2025 edition (and its successors) and the establishment of central contact points (e.g. local consultancy service centres in the federal provinces) support the achievement of building renovation targets.
  - Energy Efficiency Act – Buildings Owned by Public Bodies (*Bundes-Energieeffizienzgesetz – EEffG*)
    - Achieving an annual renovation rate of at least 3% of the total floor area of heated and/or cooled buildings owned by the public, in order to transform them into at least nearly zero-energy buildings (or zero-emission buildings in accordance with Article 9 of Directive 2010/31/EU). Exceptions for buildings worthy of protection, where lower requirements apply, are agreed in cooperation with the Federal Monuments Office.

- Funding Programmes for Thermal Renovation

  The same funding and national programmes described in the WEM scenario (see above) are extended to 2050 in the WAM scenario in order to improve the thermal energy efficiency of the building envelope of existing buildings. The budget is set higher than in the WEM scenario.

- **Accelerated replacement of fossil fuels in building stock (WAM)**
  - The measures for the replacement of fossil fuels in buildings underlying the WEM scenario are also implemented in the WAM scenario.

    The mandatory conversion of the existing building stock to zero-emission buildings by 2050 outlined in the national building renovation plan and other objectives of Directive (EU) 2024/1275 regarding the heating system are part of the WAM scenario.

    Furthermore, energy prices increase compared to the WEM scenario (see chapter 3.1 Cross-cutting measures) and adaptations in funding programmes are assumed.
  - OIB Guideline 6 – Energy Savings and Thermal Insulation, 2025 edition (OIB-330.6-005/25) (draft)
    - The zero-emission standard is defined in OIB Guideline 6, 2025 edition and its successors at the level of ambition to meet the cost-optimal level (update of OIB document 'proof of cost optimality'). They are producing zero on-site carbon emissions from fossil fuels and zero or very low operational greenhouse gas emissions.
    - All buildings are zero-emission buildings with zero on-site carbon emissions from fossil fuels by 2050. Exceptions, such as for historic buildings, may apply.
    - The mandatory conversion of the existing building stock to zero-emission buildings by 2050 is outlined in the national building renovation plan. Interim targets for reducing primary energy consumption (residential buildings), for renovation obligations (non-residential buildings) and for considering the phasing out of fossil fuelled heating systems by 2040 are drawn up by OIB and implemented by all federal provinces.
    - Building renovation passports defined by OIB Guideline 6, 2025 edition (and its successors) and the establishment of central contact points (e.g. local consultancy service centres in the federal provinces) support the achievement of fossil fuel phase-out.
  - Funding Programmes for Replacement of Fossil Heating Systems

    The same funding and national programmes described in the WEM scenario (see above) are extended in the WAM scenario in order to support renewable heating systems in existing buildings. From around 2030, the budget is set higher than in the WEM scenario.

- **Advanced electrification of off-road mobile machinery (WAM24-NEKP)**

  In the WAM24-NEKP scenario, political measures are to be implemented to increase the share of new electric machines in NRMM (Non-Road Mobile Machinery). The following targets for new electric registrations in 2030 have been defined and implemented in the WAM24-NEKP:

  - Industrial & construction large equipment: 2.2% (WEM25 = 1.1%)
  - Construction small equipment: 5.3% (WEM25 = 3.5%)
  - Industrial small equipment: 83.3% (WEM25 = 82.4%)
  - Construction gasoline equipment: 10.6% (WEM25 = 7.1%)

## 3.5 Industrial processes and product use (NFR 2)

**Implementation of the EU Decorative Paints Directive (WEM)**

The Austrian Ordinance on Solvents 2005 (*Lösungsmittelverordnung*, Federal Law Gazette II No. 398/2005) implements the EU Decorative Paints Directive 2004/42/EC. It limits the solvent content in paints and varnishes and in vehicle refinishing products to reduce VOC emissions.

**Implementation of the EU Industrial Emissions Directive (WEM)**

The Austrian Ordinance on VOC Emissions from Industrial Installations (VOC-Anlagen-Verordnung, Federal Law Gazette II No. 301/2002) implements the Industrial Emissions Directive 2010/75/EU regarding industrial activities with relevant solvent use. Installations must either comply with the VOC emission limit values or work out a reduction plan for VOC emissions. In addition, all installations with an annual solvent consumption above a certain threshold are obliged to provide a balance on solvent use as well as emissions to authorities on an annual basis.

## 3.6 Agriculture (NFR 3)

**Implementation of EU agricultural policies (WEM)**

The agricultural policy according to the CAP Strategic Plan (Regulation (EU) 2021/2115) was implemented in 2023. This includes the agri-environmental programme and subsidies for investments relevant to air pollution control.

The Austrian CAP Strategic Plan (CAP-SP) 2023-2027 was approved in September 2022. Under the Austrian CAP-SP (BML, 2022), a total of 98 interventions are jointly programmed and implemented. For more information, please refer to Chapter 4.5.

Assumptions (manure amounts 2021-2027) for low-loss application of manure and biogas slurry and solid-liquid separation are based on figures provided in the CAP-SP and are therefore included in the WEM scenario.

- **Austria's Ammonia Reduction Ordinance (WEM)**

The Austrian Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022) entered into force on 1 January 2023 and was last amended on 2 July 2024 (Federal Law Gazette II No. 172/2024). The following measures are included in the WEM scenario:

- Solid covers will be mandatory for new slurry storages from 1 January 2025 (except for overall storage capacity below 240 $m^3$).
- Flexible artificial covers will be mandatory for existing facilities from 1 January 2028 (except for overall storage capacity below 240$m^3$).
- Exempted from this requirement are existing facilities with permanently stable natural crusts. The natural crust may be subjected to a manipulation process no more than twice a year. Floating coverings (coverings made of chopped straw or comparable plant materials) must be completely restored immediately after each manipulation process.
- Urea fertilisers may only be applied to agricultural soils if either urease inhibitors are added or they are incorporated within 4 hours. This has been mandatory since 30 June 2023.
- Since 1 January 2023, the immediate incorporation (within 4 hours) of liquid manure, digestate and drainless sewage sludge as well as poultry manure into agricultural soils has been mandatory (except for agricultural holdings with less than 5 ha of cropland).
- From 1 January 2026, the immediate incorporation (within 4 hours) of all solid manures will be mandatory (except for agricultural holdings with less than 5 ha of cropland).

- **Feeding strategies and herd management (WAM)**

Further optimisation of feed rations and feed quality results in reduced nitrogen surpluses and thus lower reactive nitrogen emissions ($NH_3$, $N_2O$, $NO_x$, $N_2$) along the entire farm manure chain.

According to the Austrian NAPCP and NECP, the following animal feed-related measures are intended to reduce the nitrogen excretion rates for cattle and pigs by 2030 compared to the WEM scenario:

- Implementing feeding strategies;
- Adapting the feed to animal requirements (e.g. reducing the crude protein content of the feed, multiphase feeding);
- Raising awareness (education and advisory services);

- Promoting marketing opportunities for older cattle. Longer life and lower mortality mean lower emissions, but this requires that meat from older cattle can be sold on the market;
- Making progress in breeding (digestibility, lifetime performance).

In the NAPCP, the measures listed above are assigned to package 5 (see Table 10).

- **Promotion of grazing (WAM)**

On pastures, animals excrete faeces and urine separately, and urea infiltrates the soil faster, which reduces ammonia emissions. Grazing also means that less nitrogen is used in livestock feed. In addition, grazing is particularly beneficial from an animal welfare perspective.

With reference to the Austrian NAPCP and NECP, the intention is to expand the grazing of dairy and suckler cows by 2030.

In the NAPCP, this measure is assigned to package 3 (see Table 10).

- **Reduction in emissions from manure management (WAM)**

Additional measures, as listed in the Austrian NAPCP, will further reduce losses of N species emissions ($NH_3$, $N_2O$, $NO_x$, $N_2$) along the entire farm manure chain.

- Increased low-emission design of cattle, pig and chicken houses by 2030.
- The share of animal manure treated in biogas plants will be increased significantly by 2030, according to the Austrian NECP.

In the NAPCP, the measures listed above are assigned to packages 1, 3 and 4 (see Table 10).

- **Low-emission application of inorganic and organic fertilisers (WAM)**

**Mineral fertilisers**

With reference to the Austrian NAPCP and NECP, the amounts of mineral fertilisers will be further reduced by improving nitrogen management and precision farming methods. The Austrian Agri-environmental Programme ÖPUL already includes some effective instruments, which will be further developed or expanded.

- Improvement of demand-oriented dosage through fertiliser planning, soil testing and increased awareness raising (building on existing training and advisory services) in order to increase nitrogen efficiency and reduce losses.
- Legal regulations within the framework of the Nitrate Action Programme: the programme was amended, and additional obligations have to be met from 1 January 2023.

- Promotion of smart farming measures within the framework of the National Digitalisation Action Programme (e.g. precision farming technologies).
- Further development and expansion of ÖPUL measures that contribute to a reduced use of nitrogen mineral fertilisers, e.g. complete renunciation of mineral fertilisers, organic farming.
- Nitrogen fixation through cultivation of legumes, reducing the need for mineral fertilisers.
- Reduction of soil erosion and nitrogen losses (e.g. catch crops, environmentally sound crop rotations, mulch and no-till).
- Reduction of fertiliser use, e.g. through targeted measures in areas with increased pollution or risk situations.

**Organic fertilisers**

The measures 'increased use of low-emission application techniques for cattle and pig slurry' and 'solid-liquid separation' according to the Austrian CAP-SP and listed in the NAPCP are included in the WEM scenario of this report.

In the NAPCP, the measures listed above are assigned to packages 1 and 2 (see Table 10).

*Table 10: WAM measures according to the National Air Pollution Control Programme.*

| No. | Name and brief description of an individual strategy/measure or a package of strategies/measures: |
|---|---|
| **1** | Austria's Ammonia Reduction Ordinance |
| **2** | Optimised application of inorganic and organic fertilisers |
| **3** | Enhancement of animal husbandry (housing and grazing) |
| **4** | Treatment of manure (manure management) |
| **5** | Feeding strategies |

## 3.7 Waste (NFR 5)

- Reduce emissions from waste disposal through further implementation of the Landfill Ordinance Federal Law Gazette II No. 39/2008 (Ordinance on landfills)

  The Austrian Landfill Ordinance is the most effective instrument for reducing emissions in the waste sector. Based on this Ordinance, untreated biodegradable waste has been banned from landfills since 2004, with no exemptions since 2008. Furthermore, emissions from mass landfills are limited by the collection and use of landfill gas as required by the Landfill Ordinance. The provisions of the Landfill Ordinance 2008 focus on (1) managing the water balance and the aerobic in-situ stabilisation of closed landfills and (2) increasing efforts to collect landfill gas (e.g. through detection of leakages, examination of gas collection systems).

- Strengthen waste prevention and increase recycling. (Federal Law Gazette No 200/2021 (Amendment to the Waste Management Act (circular economy package)) Federal Law Gazette II No. 597/2021 ("Packaging Ordinance").

  Waste prevention is a key instrument to reduce future emissions. To this end, (pilot) projects, awareness-raising campaigns and networks have been established to minimise waste and to promote the re-use of waste (see also the Austrian Waste Prevention Programme 2023 in (BMK 2023b)). The following fields are considered:

  - Plastics & packaging
  - Recycling of construction waste
  - Reduction of food waste
  - Reducing textile waste
  - Re-use & repair
- Reduce emissions from biological treatment by implementing BAT in the waste treatment process

  Emissions from the aerobic treatment of biogenic waste can be limited by fully implementing the requirements stipulated in the "State of the Art of Composting". In addition, the EU report on the best available techniques (BREF Waste Treatment – JRC 2018) provides guidance on how to prevent emissions from aerobic and anaerobic treatment processes for IED installations. Related legally binding requirements to be transposed into the permits of the installations are published in EU Implementing Decision 2018/1147.

# 4 METHODOLOGY

## 4.1 Stationary fuel combustion activities (NFR 1.A)

Total energy demand and production were evaluated based on an energy scenario developed by a consortium of the Environment Agency Austria (Umweltbundesamt), e-think energy research and the Institute of Thermodynamics and Sustainable Propulsion Systems at the Graz University of Technology. The scenario was developed using several models:

- econometric input-output data (MIO-ES);
- domestic heating and domestic hot water supply (INVERT/EE-Lab);
- public electrical power and district heating supply (MIO-ES);
- energy demand and emissions of transport (NEMO & GEORG).

The econometric input-output model MIO-ES (UMWELTBUNDESAMT, 2023b) combines a private consumption module with an energy and environment module. Important input parameters are energy prices, population and household income. This model was also used to calculate the energy sector.

The software package INVERT/EE-Lab (E-THINK, 2025) was used for the modelling of energy consumption for domestic heating and domestic hot water supply. This model is based on a stochastic, non-recursive, myopic and economic algorithm with the objective function to minimise costs. The basic algorithm is based on the principle of the INVERT model. It allows the calculation of the energy demand for heating (space heating and hot water) in residential buildings and buildings of the public or private service sector by including the effects of various funding instruments. The main inputs for the calculation are:

- availability of resources;
- market penetration of different technologies;
- maximum replacement and refurbishment periods;
- minimum and maximum lifetime of technical installations.

The results produced by the different models were exchanged and adjusted over several modelling cycles. Umweltbundesamt experts combined the data produced by the different models and included additional calculations for:

- energy inputs for the iron and steel industry;
- production of electric power and district heating in industry;
- use of waste as a fuel in power plants and industry;
- energy input of compressor stations;
- total energy demand;
- electricity demand in the transport sector.

This chapter describes the methodology used for emission projections for stationary fuel combustion in the NFR 1.A.1, 1.A.2 and 1.A.4 sectors. The methodology applied to determine emission factors is described in the Austrian Inventory

Report (UMWELTBUNDESAMT, 2025b). Data on energy demand have been broken down according to the sub-sectors of the Austrian Air Emission Inventory.

### 4.1.1 Energy industries (NFR 1.A.1)

This chapter describes the methodology used for emission projections for stationary fuel combustion in the energy and transformation industries.

The MIO-ES model was used, which provides fuel-specific activity data for energy industries (i.e. electricity and heat production, including waste incineration). The data were multiplied by the same fuel-specific emission factors that were used in the Austrian Inventory.

#### $SO_2$, $NO_x$ and $PM_{2.5}$

Projected emissions of $SO_2$, $NO_x$ and $PM_{2.5}$ were calculated by multiplying projected energy data (UMWELTBUNDESAMT, 2025b) by the respective emission factors. The latter were determined based on the Austrian Inventory.

The only refinery operating in Austria installed a SNOX system in November 2007, significantly reducing its $SO_2$ and $NO_x$ emissions. As no other changes are expected over the next few years, emission projections have been based on current emission levels.

A detailed description of the methodologies used for the Austrian emission projections for the energy industries sector can be found in the following literature: UMWELTBUNDESAMT, 2003 a/b/c; BMLFUW, 2004; and UMWELTBUNDESAMT & BMLFUW, 2002.

For gas-fired power plants in the WEM scenario, it has been assumed that there will be no changes to the emission factor for gas-fired power plants until 2050.

For installations using solid biomass, emission factors for various plant sizes have been provided in the literature (UMWELTBUNDESAMT, 2007b). The emission factors have not been changed for the time period considered in the WEM scenario.

It has been assumed that the emission factors for waste incineration plants, oil and gas exploration and refineries will not change over time.

For the WAM scenario, the same methodology was used. Only the energy input is different in the WAM scenario.

#### NMVOC and $NH_3$

NMVOC and $NH_3$ emissions are assumed to remain constant at 2023 levels (UMWELTBUNDESAMT, 2025b). This simple approach was chosen because these emissions account for less than 1% of total emissions.

### 4.1.2 Manufacturing industries and construction (NFR 1.A.2)

This chapter describes the methodology used for emission projections for stationary fuel combustion in the manufacturing industries. A methodological description of the emission projections for mobile sources in NFR 1.A.2 is given in Chapter 4.2.

#### $SO_2$ and $NO_x$

$SO_2$ and $NO_x$ emissions were estimated for the NFR 1.A.2 and NFR 2 sectors combined (UMWELTBUNDESAMT, 2003a/c; UMWELTBUNDESAMT, 2007a; and UMWELTBUNDESAMT, 2009). The following industrial activities have been identified as major emission sources:

- production in the cement, glass, magnesia, lime and other mineral industries;
- iron and steel production;
- pulp and paper production;
- process emissions from the chemical industry;
- wood processing industry;
- food industry;
- production of non-ferrous metals;
- other sectors of the manufacturing industries.

Projected emissions were calculated on the basis of trends observed in energy scenarios (UMWELTBUNDESAMT, 2025a) and by incorporating recent data from environmental impact statements on facility expansions and the opening and closing of facilities. Emission factors from the latest inventory and plant-specific data, where available, were used to produce emission projections.

For the WAM scenario, the same methodology was used. Only the energy input is different in the WAM scenario.

#### NMVOC and $NH_3$

NMVOC and $NH_3$ emissions from stationary sources are assumed to remain constant at 2023 levels (UMWELTBUNDESAMT, 2025b). This simple approach was chosen because these emissions account for less than 1% of the total emissions for each source.

#### $PM_{2.5}$

Projected emissions were calculated on the basis of trends observed in energy scenarios (UMWELTBUNDESAMT, 2025a) and by incorporating recent data from environmental impact statements on facility expansions and the opening and closing of facilities.

Projections for process emissions from quarries, construction activities and the wood industry are based on an extrapolation of past trends.

For the WAM scenario, the same methodology was used. Only the energy input is different in the WAM scenario.

### 4.1.3 Other sectors (NFR 1.A.4)

This chapter describes the methodology used in the WEM scenario and the WAM scenario for emission projections for stationary fuel combustion in the small combustion sector (1.A.4.a Commercial/Institutional, 1.A.4.b Residential (households) and 1.A.4.c Agriculture/Forestry/Fishing). A methodological description of the emission projections for mobile sources in NFR 1.A.4 is given in Chapter 4.2.

#### Activities

A comprehensive model for buildings (INVERT/EE-Lab) was used to calculate energy consumption for stationary sources separately for the residential and commercial sub-sectors (E-THINK, 2024, 2025). Inputs for mobile sources in agriculture were derived using the econometric input-output model MIO-ES. A detailed description of these models can be found in UMWELTBUNDESAMT, 2023b and UMWELTBUNDESAMT, 2025a.

#### Emissions

$SO_2$, $NO_x$, NMVOC, $NH_3$ and $PM_{2.5}$ emissions were calculated based on the energy demand for stationary sources in sub-sectors 1.A.4.a, 1.A.4.b and 1.A.4.c. A description of the methods and emission factors used for these calculations can be found in Austria's Informative Inventory Report (UMWELTBUNDESAMT, 2025b).

There are twenty-two technology- and fuel-dependent main sub-categories (heating types) for stationary fuel consumption in 1.A.4 Other Sectors, as shown in the table below.

*Table 11: Heating types of category 1.A.4 Other Sectors – stationary sources (source: Umweltbundesamt).*

| No. | Heating type | Fuel |
|---|---|---|
| #1 | Fuel oil boilers | Light fuel oil, medium fuel oil, heavy fuel oil, diesel, petroleum, other petroleum products |
| #2 | Gas oil stoves | Gas oil |
| #3 | Vaporising burners | Gas oil |
| #4 | Yellow burners | Gas oil |
| #5 | Blue burners with conventional technology | Gas oil |
| #6 | Blue burners with low temperature or condensing technology | Gas oil |
| #7 | Natural gas convectors | Natural gas |

| No. | Heating type | Fuel |
|---|---|---|
| #8 | Atmospheric burners | Natural gas, biogas, sewage sludge gas and landfill gas |
| #9 | Forced-draught natural gas burners | Natural gas, biogas, sewage sludge gas and landfill gas |
| #10 | LPG stoves | Liquefied petroleum gases |
| #11 | LPG boilers | Liquefied petroleum gases |
| #12 | Wood stoves and cooking stoves | Fuel wood |
| #13 | Tiled wood stoves and masonry heaters | Fuel wood |
| #14 | Mixed-fuel wood boilers | Fuel wood |
| #15 | Natural-draught wood boilers | Fuel wood |
| #16 | Forced-draught wood boilers | Fuel wood |
| #17 | Wood chips boilers with conventional technology | Wood waste |
| #18 | Wood chips boilers with oxygen sensor emission control | Wood waste |
| #19 | Pellet stoves | Wood waste |
| #20 | Pellet boilers | Wood waste |
| #21 | Coal stoves | Hard coal and hard coal briquettes, lignite and brown coal, brown coal briquettes, coke, peat |
| #22 | Coal boilers | Hard coal and hard coal briquettes, lignite and brown coal, brown coal briquettes, coke, peat, industrial waste |

In addition, the whole fuel consumption of charcoal is based on combustion in devices similar to *#12 Wood stoves and cooking stoves* and is calculated separately. A fuel-dependent emission factor is applied for each technology.

National energy projections show the final energy demand for space heaters and combination heaters, water heaters, solid fuel local space heaters, local space heaters and solid fuel boilers by year of installation.

The share of new installations is expected to gradually shift towards low-emission technologies for the WEM and WAM scenarios.

*Table 12: Share of 1.A.4 heating type in the different fuel categories for new installations in 2023, 2025 and 2030 (source: Umweltbundesamt).*

| Fuel category | No. | Heating type | Share of heating type [% TJ] | | |
|---|---|---|---|---|---|
| | | | 1.A.4.a and 1.A.4.b | | |
| | | | 2023 | 2025 | 2030 |
| Fuel oil | #1 | Fuel oil boilers | 100 | 100 | 100 |
| Gas oil | #2 | Gas oil stoves | 2.0 | 1.7 | 0.9 |
| | #3 | Vaporising burners | 1.0 | 0.9 | 0.4 |
| | #4 | Yellow burners | 5.0 | 4.7 | 3.6 |
| | #5 | Blue burners with conventional technology | 5.0 | 4.7 | 3.6 |
| | #6 | Blue burners with low temperature or condensing technology | 87 | 88 | 92 |
| Gas | #7 | Natural gas convectors | 5.0 | 4.5 | 3.0 |
| | #8 | Atmospheric burners | 45 | 44 | 39 |
| | #9 | Forced-draught natural gas burners | 50 | 52 | 58 |
| LPG | #10 | LPG stoves | 5.0 | 4.4 | 2.2 |
| | #11 | LPG boilers | 95 | 96 | 98 |
| Fuel wood | #12 | Wood stoves and cooking stoves | 10 | 9.4 | 7.2 |
| | #13 | Tiled wood stoves and masonry heaters | 15 | 14 | 12 |
| | #14 | Mixed-fuel wood boilers | 5.0 | 4.7 | 3.6 |
| | #15 | Natural-draught wood boilers | 15 | 15 | 14 |
| | #16 | Forced-draught wood boilers | 55 | 57 | 63 |
| Wood chips | #17 | Wood chips boilers with conventional technology | 5.0 | 4.7 | 3.6 |
| | #18 | Wood chips boilers with oxygen sensor emission control | 95 | 95 | 96 |
| Wood pellets | #19 | Pellet stoves | 10 | 9.7 | 8.6 |
| | #20 | Pellet boilers | 90 | 90 | 91 |
| Coal | #21 | Coal stoves | 2.0 | 1.7 | 0.9 |
| | #22 | Coal boilers | 98 | 98 | 99 |

It is assumed that new installations with lower emission factors will replace existing installations with average 2023 emission characteristics, or increase the overall stock.

**Emission factors**

It is assumed that $NO_x$ emission factors will decrease for natural gas, biogas, sewage sludge gas and landfill gas as well as for gas oil (due to the increased use of blue burners and forced-draught burners with condensing boiler technology). Blended hydrogen is assumed to have the same emission factors as natural gas.

The overall effects on $NO_x$ emissions highly depend on the projected installation rates for new heating systems by heating type and the actual fuels used. Table 13 lists the implied $NO_x$ emission factors for the projections in the WEM scenario.

*Table 13: Implied $NO_x$ emission factors in the WEM scenario for coal, oil, natural gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2023 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 100 | 100 | 100 |
| Oil | 33 | 33 | 33 |
| Natural gas | 37 | 37 | 37 |
| Fuel wood | 80 | 80 | 80 |
| Wood chips | 82 | 82 | 82 |
| Wood pellets | 60 | 60 | 60 |
| **1.A.4.b.1** | | | |
| Coal | 102 | 102 | 102 |
| Oil | 34 | 34 | 34 |
| Natural gas | 33 | 33 | 33 |
| Fuel wood | 101 | 100 | 100 |
| Wood chips | 82 | 82 | 82 |
| Wood pellets | 60 | 60 | 60 |

Table 14 lists the implied $NO_x$ emission factors for the projections in the WAM scenario.

*Table 14: Implied $NO_x$ emission factors in the WAM scenario for coal, oil, natural gas, biogas, sewage sludge gas and landfill gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2023 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 100 | 100 | 100 |
| Oil | 33 | 33 | 33 |
| Natural gas | 37 | 38 | 37 |
| Biogas, sewage sludge gas and landfill gas | 150 | 150 | 150 |
| Hydrogen | NO | NO | 37 |
| Fuel wood | 81 | 81 | 82 |
| Wood chips | 82 | 82 | 81 |
| Wood pellets | 60 | 60 | 60 |

| In kg/TJ | 2023 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.b.1** | | | |
| Coal | 102 | 100 | 100 |
| Oil | 34 | 34 | 34 |
| Natural gas | 33 | 35 | 35 |
| Biogas, sewage sludge gas and landfill gas | NO | 150 | 150 |
| Hydrogen | NO | NO | 35 |
| Fuel wood | 101 | 100 | 99 |
| Wood chips | 82 | 82 | 82 |
| Wood pellets | 60 | 60 | 60 |

A decrease in the NMVOC emission factors for solid biomass and coal is assumed from 2023, as a shift towards low-emission technologies can be observed in newly installed heating systems. Blended hydrogen is assumed to cause no NMVOC emissions.

The overall effects on NMVOC emissions highly depend on the projected installation rates for new heating systems by heating type and the actual fuels used. Table 15 lists the implied NMVOC emission factors for the projections in the WEM scenario.

*Table 15: Implied NMVOC emission factors in the WEM scenario for coal, oil, natural gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2023 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 0.54 | 0.54 | 0.54 |
| Oil | 0.41 | 0.41 | 0.41 |
| Natural gas | 0.48 | 0.48 | 0.47 |
| Fuel wood | 338 | 338 | 338 |
| Wood chips | 105 | 101 | 98 |
| Wood pellets | 33 | 33 | 33 |
| **1.A.4.b.1** | | | |
| Coal | 306 | 306 | 306 |
| Oil | 0.42 | 0.42 | 0.42 |
| Natural gas | 0.34 | 0.34 | 0.34 |
| Fuel wood | 384 | 383 | 381 |
| Wood chips | 108 | 105 | 103 |
| Wood pellets | 33 | 33 | 33 |

Table 16 lists the implied NMVOC emission factors for the projections in the WAM scenario.

*Table 16: Implied NMVOC emission factors in the WAM scenario for coal, oil, natural gas, biogas, sewage sludge gas and landfill gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2023 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 0.54 | 0.54 | 0.54 |
| Oil | 0.43 | 0.43 | 0.43 |
| Natural gas | 0.48 | 0.55 | 0.54 |
| Biogas, sewage sludge gas and landfill gas | 0.48 | 0.55 | 0.54 |
| Hydrogen | NO | NO | 0 |
| Fuel wood | 338 | 346 | 354 |
| Wood chips | 105 | 101 | 97 |
| Wood pellets | 33 | 33 | 33 |
| **1.A.4.b.1** | | | |
| Coal | 306 | 305 | 305 |
| Oil | 0.42 | 0.44 | 0.44 |
| Natural gas | 0.34 | 0.49 | 0.48 |
| Biogas, sewage sludge gas and landfill gas | NO | 0.49 | 0.48 |
| Hydrogen | NO | NO | 0 |
| Fuel wood | 384 | 384 | 380 |
| Wood chips | 108 | 106 | 102 |
| Wood pellets | 33 | 33 | 33 |

It is assumed that $PM_{2.5}$ emission factors will decrease as there is an evident shift towards low-emission technologies in new installations of heating systems for both fossil fuels and biomass. Blended hydrogen is assumed to cause no $PM_{2.5}$ emissions.

The overall effects on $PM_{2.5}$ emissions highly depend on the projected installation rates for new heating systems by heating type and the actual fuels used. Table 17 lists the implied $PM_{2.5}$ emission factors for projections in the WEM scenario.

*Table 17: Implied $PM_{2.5}$ emission factors in the WEM scenario for coal, oil, natural gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2021 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 44 | 44 | 44 |
| Oil | 1.6 | 1.6 | 1.6 |
| Natural gas | 0.39 | 0.39 | 0.39 |
| Fuel wood | 80 | 80 | 80 |
| Wood chips | 47 | 46 | 46 |
| Wood pellets | 16 | 16 | 16 |
| **1.A.4.b.1** | | | |

| In kg/TJ | 2021 | 2025 | 2030 |
|---|---|---|---|
| Coal | 96 | 96 | 96 |
| Oil | 1.7 | 1.7 | 1.7 |
| Natural gas | 0.27 | 0.27 | 0.27 |
| Fuel wood | 81 | 81 | 80 |
| Wood chips | 47 | 47 | 47 |
| Wood pellets | 16 | 16 | 16 |

Table 18 lists the implied $PM_{2.5}$ emission factors for the projections in the WAM scenario.

*Table 18: Implied $PM_{2.5}$ emission factors in the WAM scenario for coal, oil, natural gas, biogas, sewage sludge gas and landfill gas, fuel wood, wood chips and wood pellets (source: Umweltbundesamt).*

| In kg/TJ | 2021 | 2025 | 2030 |
|---|---|---|---|
| **1.A.4.a.1** | | | |
| Coal | 44 | 44 | 44 |
| Oil | 1.6 | 1.7 | 1.7 |
| Natural gas | 0.39 | 0.45 | 0.44 |
| Biogas, sewage sludge gas and landfill gas | 0.28 | 0.45 | 0.44 |
| Hydrogen | NO | NO | 0 |
| Fuel wood | 80 | 82 | 83 |
| Wood chips | 47 | 46 | 46 |
| Wood pellets | 16 | 16 | 16 |
| **1.A.4.b.1** | | | |
| Coal | 96 | 95 | 95 |
| Oil | 1.7 | 1.7 | 1.7 |
| Natural gas | 0.27 | 0.40 | 0.40 |
| Biogas, sewage sludge gas and landfill gas | NO | 0.40 | 0.40 |
| Hydrogen | NO | NO | 0 |
| Fuel wood | 81 | 80 | 77 |
| Wood chips | 47 | 47 | 46 |
| Wood pellets | 16 | 16 | 16 |

All emission factors dependent on heating type for 1.A.4.c Agriculture/Forestry/Fishing were set constant at the level of the latest national emission inventory (UMWELTBUNDESAMT, 2025b).

**NFR 1.A.4.a.1 bonfires & open fire pits, 1.A.4.b.1 barbecues**

In addition to emissions from boilers and stoves, this sector includes emissions from bonfires and open fire pits and barbecues. Projected $PM_{2.5}$ emissions were

estimated by extrapolating from 2023 emissions using projected population statistics (STATISTICS AUSTRIA, 2024b).

## 4.2 Mobile fuel combustion activities (NFR 1.A)

This chapter describes the methodology for estimating emissions from NFR 1.A.3 Transport and from mobile sources under NFR 1.A.2.g, 1.A.4 and 1.A.5.

The scenario includes different approaches for each NFR source category.

### 1.A.3.a - Aviation

The share of aviation in Austria's total GHG emissions from *1.A.3 Transport* is very small at 0.2%. According to international reporting guidelines, only GHG emissions from domestic aviation (domestic LTO and cruise traffic) need to be included in the national total.

Projections for energy consumption in the aviation sector are based on expert judgement. The energy demand for aviation fuels (kerosene and different types of sustainable aviation fuels (SAF)) has been estimated, taking into account national long-term GDP forecasts, fleet turnover with more energy-efficient planes and higher load capacities as well as assessments of the capacities on the ground and in the air by national airport and airline experts.

### 1.A.3.b - Road transport

The calculation of transport emissions is based on two models:

- **NEMO - Emission model for road transport**
  From the 2015 submission onwards, projections for the time series up to 2050 have been based on NEMO (Network Emission Model, DIPPOLD et al. 2012, HAUSBERGER et al. 2015a, b; SCHWINGSHACKL/HAUSBERGER 2025). NEMO combines a detailed calculation of the fleet composition with the simulation of energy consumption and emission output at vehicle level. It is fully capable of depicting the upcoming variety of possible combinations of propulsion systems (internal combustion engine, hybrid, plug-in-hybrid, electric propulsion, fuel cell …) and alternative fuels (CNG, biogas, FAME, ethanol, GTL, BTL, $H_2$ …).
  In addition, NEMO has been designed to be suitable for all main applications of **simulating energy consumption and emission output on a road-section based model approach**. As a complete road network at a high spatial resolution level is not yet available for Austria, NEMO currently uses the old methodology based on a categorisation of the traffic activity into "urban", "rural" and "motorway". The model calculates vehicle mileages, passenger-km, tonne-km, fuel consumption, all exhaust gas emissions, evaporative emissions and suspended TSP, $PM_{10}$, $PM_{2.5}$, $PM_1$ and $PM_{0.1}$ exhaust and non-exhaust emissions of road traffic.

For more details, see the chapter on methodology in 3.2.12.2. Road Transport of Austria's Inventory Reports 2025 (Umweltbundesamt, 2025b/c).

- **KEX tool**
  While the NEMO model calculates domestic fuel consumption, the KEX tool estimates the amount of fuel purchased in Austria and used abroad. The KEX tool is used in projections to map the future development of domestic fuel demand in road transport as a function of GDP, population and fuel prices, and to calculate the quantities of fuel exported in motor vehicles abroad in the future. The KEX tool has been developed to estimate the change in domestic fuel demand and the export of fuels in motor vehicles (MOLITOR et al. 2004, MOLITOR et al. 2009).

  As independent variables, GDP, population, export quotas and domestic and foreign petrol and diesel prices are used in a very simplified statistical tool, while NEMO includes predefined technologies for new vehicle registrations, their market penetration and the effects on consumption and emissions.

**1.A.2.f, 1.A.3.c, 1.A.3.d, 1.A.4.b, 1.A.4.c, 1.A.5—Mobile sources**

The calculation of transport emissions is based on a model:

- **GEORG—Emission model for off-road**

  Energy consumption and emissions of non-road mobile machinery (off-road) in Austria are calculated using the GEORG model (Grazer Emissionsmodell für Off-Road-Geräte) (HAUSBERGER 2000). GEORG has a component for fleet models that simulates the actual age and size distribution of non-road mobile machinery (NRMM) stock via age- and size-dependent drop-out rates (i.e. the probability that a vehicle will have been scrapped by the following year). Using this approach, the number of vehicles in each mobile source category is calculated according to the year of the first registration of the vehicles and their propulsion systems (4-stroke petrol, 2-stroke petrol, diesel > 80 kW, diesel < 80 kW).

  For more details, see the chapter on methodology in 3.2.13.2 Other Sectors—Mobile Combustion of Austria's National Inventory Report 2025 (UMWELTBUNDESAMT, 2025b).

**Special considerations for $PM_{2.5}$**

**NFR.1.A.3.b.vii Road transport—automobile road abrasion**

Projected $PM_{2.5}$ emissions from road abrasion and tyre and brake wear have been modelled with NEMO according to the trend in total mileage per vehicle category per year (SCHWINGSHACKL/REXEIS, 2022).

**NFR 1.A.3.c Railways—abrasion and brake wear**

$PM_{2.5}$ emissions from rail abrasion and rail brake wear have been extrapolated from 2023 emissions.

**NFR 1.A.5.b Military mobile machinery**

Ground operations: $PM_{2.5}$ emissions from ground operations of military vehicles have been extrapolated from 2023 emissions and projected fuel consumption.

Aviation operations: $PM_{2.5}$ emissions from military aviation operations have been extrapolated from 2023 emissions.

### 4.2.1 Emission factors (WEM)

**$NO_x$ emission factors**

As $NO_x$ is the most significant air pollutant in the transport sector, the underlying emission factors for $NO_x$ used for the projections across the different EURO classifications are described in more detail below. The test cycles used for calculating the emission factors for the Handbook of Emission Factors in Road Transport (HBEFA) always represent real-world driving conditions.

**PCs, LDVs, HDVs according to HBEFA Version V4.2**

With the WEM25 scenario, the new Regulation (EU) 2024/1257 on EURO 7 for LDVs (M1 passenger cars (PCs), N1 light commercial vehicles (LCVs) and HDVs was implemented in the NEMO emission model. The scope of EURO 7 comprises newly registered PCs, LCVs, trucks, buses, and trailers (vehicle categories: M1, M2, M3, N1, N2, N3, O3, O4). The EURO 7 proposal merges the successor regulations of EURO 6 for PCs and LDVs (Regulation (EC) No. 715/2007) and EURO VI for HDVs (Regulation (EC) No. 595/2009) into a single legal act. EURO 7 is part of the European Green Deal and aims to contribute to the "zero pollution" goal.

The share of EURO 7 vehicles in new registrations will exceed 50% from 2027 (for PCs and LCVs) and from 2029 (for trucks and buses). The following assumptions were made in NEMO:

- 100% of new registrations of EURO 7 for LDVs will not be reached until 2028.
- 50% of new registrations of EURO 7 for HDVs will be reached by 2029.

Since the Euro 6d-TEMP stage, vehicle emissions must be tested on the road in addition to laboratory testing. The RDE test is performed during vehicle operation using a portable emissions monitoring system (PEMS). A detailed analysis can be found in INFRAS (2022).

The following tables show the assumed phase-in periods for each emission standard and vehicle category for all new vehicle registrations.

*Table 19: Phase-in periods for EURO classes for new registrations (passenger cars and light-duty vehicles) (source: Umweltbundesamt).*

| PCs/LDVs | WEM | |
|---|---|---|
| | from | until |
| EURO 4 | 2005 | 2008 |
| EURO 5 | 2009 | 2013 |
| EURO 6a/b | 2014 | 2018 |
| EURO 6d_temp | 2018 | 2020 |
| EURO 6d | 2020 | 2027 |
| EURO 7 | 2026/2027[5] | |

*Table 20: Phase-in periods for EURO classes for new registrations (heavy-duty vehicles) (source: Umweltbundesamt).*

| HDVs | WEM | |
|---|---|---|
| | from | until |
| EURO 4 | 2006 | 2008 |
| EURO 5 | 2009 | 2013 |
| EURO 6 | 2014 | 2027/2028 |
| EURO 7 | 2027/2028[6] | |

#### 4.2.1.1 Details of $NO_x$ emission factors

The tables below show the emission factors used for Austria's 2025 emission projections, by vehicle category (HBEFA Version V4.2).

*Table 21: Comparison of $NO_x$ emission factors for petrol passenger cars (PCs) (source: Umweltbundesamt).*

| $NO_x$ Passenger Cars Petrol | NEMO HBEFA V4.2 |
|---|---|
| PRE ECE | 1.89 |
| G-Kat 87-90 | 1.24 |
| EURO 1 | 1.21 |
| EURO 2 | 0.56 |
| EURO 3 | 0.20 |
| EURO 4 | 0.13 |
| EURO 5 | 0.06 |
| EURO 6a/b | 0.06 |
| EURO 6c | 0.03 |
| EURO 6d_temp | 0.04 |
| EURO 6d | 0.04 |
| EURO 7 | 0.01 |

[5] 2026 for new types of vehicles, 2027 for all new vehicles

[6] 2027 for new types of vehicles, 2028 for all new vehicles

*Table 22: Comparison of $NO_x$ emission factors for diesel passenger cars (PCs) (source: Umweltbundesamt).*

| **$NO_x$ Passenger Cars Diesel** | **NEMO HBEFA V4.2** |
|---|---|
| EURO 1 | 0.81 |
| EURO 2 | 1.07 |
| EURO 3 | 1.39 |
| EURO 4 | 0.99 |
| EURO 5 | 0.96 |
| EURO 6a/b | 0.57 |
| EURO 6c | 0.29 |
| EURO 6d_temp | 0.07 |
| EURO 6d | 0.06 |
| EURO 7 | 0.01 |

*Table 23: Comparison of $NO_x$ emission factors for diesel light-duty vehicles (LDVs) (source: Umweltbundesamt).*

| **$NO_x$ Light-Duty Vehicles Diesel** | **NEMO HBEFA V4.2** |
|---|---|
| EURO 1 | 1.65 |
| EURO 2 | 1.42 |
| EURO 3 | 2.09 |
| EURO 4 | 1.86 |
| EURO 5 | 1.66 |
| EURO 6a/b | 0.71 |
| EURO 6c | 0.51 |
| EURO 6d_temp | 0.12 |
| EURO 6d | 0.10 |
| EURO 7 | 0.02 |

*Table 24: Comparison of $NO_x$ emission factors for diesel heavy-duty vehicles (HDVs) (source: Umweltbundesamt).*

| **$NO_x$ Heavy-Duty Vehicles Diesel** | **NEMO HBEFA V4.2** |
|---|---|
| Pre EURO | 16.19 |
| Euro-I | 10.80 |
| Euro-II | 10.57 |
| Euro-III | 8.58 |
| Euro-IV EGR | 6.75 |
| Euro-IV SCR | 3.56 |
| Euro-V EGR | 7.90 |
| Euro-V SCR | 3.56 |
| Euro-VI-ABC | 0.83 |
| Euro-VI-DE | 0.34 |
| EURO 7 | 0.02 |

### 4.2.2 Emission factors (WAM)

The emission factors used in the WEM and WAM scenarios are the same. In both scenarios, they are taken from HBEFA V4.2 (INFRAS 2022).

### 4.2.3 Other transportation—pipeline compressors (NFR 1.A.3.e)

The projected energy demand for pipeline transport up to 2030 is based on expert judgement and historical trends. No changes to emission factors have been assumed for transport in pipelines.

## 4.3 Fugitive emissions (NFR 1.B)

**$SO_2$ and NMVOC**

$SO_2$ and NMVOC emission projections are based on average emission/activity data ratios for the period 2019-2023 and on projected activity data such as natural gas exploration, natural gas consumption and petrol consumption according to the energy scenario (UMWELTBUNDESAMT, 2025a). A reduction in the length of the gas distribution network was calculated by assuming that it corresponds to 2/3 of the decrease in natural gas consumption.

Emission reduction measures such as vapour recovery units at fuel depots and service stations had already been implemented in 2003, and no further reductions are expected from additional measures. However, NMVOC emissions from petrol evaporation will decrease due to lower petrol consumption/fueling.

Emissions from solid fuel transformation (coke ovens) are included in 1.A.2.a.

Coal production ended in 2005.

A detailed description of the methodology used for emission estimates can be found in Austria's Informative Inventory Report (UMWELTBUNDESAMT, 2025b).

**$NO_x$ and $NH_3$**

$NH_3$ emissions are not relevant for this category. According to the Austrian Air Emission Inventory, $NO_x$ emissions from flaring in oil refineries are included in category 1.A.1.b.

**$PM_{2.5}$**

$PM_{2.5}$ emissions from coal handling and storage (1.B.1.a) were calculated based on coal consumption projections (UMWELTBUNDESAMT, 2025a) using the same emission factors as in the Austrian National Air Emission Inventory.

## 4.4 Industrial processes (NFR 2)

### 4.4.1 Industrial processes (NFR 2.A/B/C/I)

The forecast for developments in the industrial processes sector is based on macro-economic data for the individual sub-sectors, taking into account known forecasts for expansions, commissioning of new facilities and decommissioning of old facilities.

#### $SO_2$, $NO_x$ and $PM_{2.5}$

$SO_2$, $NO_x$ and $PM_{2.5}$ emissions not listed below are reported together with energy-related emissions under 1.A.2.g Other.

$PM_{2.5}$ emissions from quarries and similar activities are based on the latest national inventory and are assumed to remain constant over time. Emissions from the chemical industry are based on the development of sulphuric acid production ($SO_2$), nitric acid and ammonia production ($NO_x$) and fertiliser production ($NO_x$ and $PM_{2.5}$). Emissions from metal production are based on the national inventory and environmental reports of Austrian enterprises. Emissions are expected to remain constant. $PM_{2.5}$ emissions from wood processing are assumed to remain constant at the level specified in the national inventory.

For the WEM and WAM scenarios, the same assumptions apply.

#### NMVOC and $NH_3$

$NH_3$ emissions in most sub-sectors are assumed to remain constant at 2023 levels (UMWELTBUNDESAMT, 2025b). This simple approach has been chosen because the share of $NH_3$ emissions in the total emissions is very small.

### 4.4.2 Solvent and other product use (NFR 2.D/G)

#### NFR 2.D / NMVOC

Emission projections are calculated with the same level of detail as the inventory: for every sub-category considered in the inventory, activity data are set constant in the future (e.g. where technological innovation offsets an increase in use), correlated with economic growth (particularly where it correlated in previous years) or correlated with population growth (particularly for the domestic sector), and expert judgement was applied for some sub-sectors.

Correlated with economic growth in the relevant economic sector (correlated either fully or 'partially': only a share obtained by expert judgement is correlated, the rest is set constant):

- Car repairing
- Construction and building (partially)
- Wood coating

- Other industrial paint application (partially)
- Electronic components manufacturing
- Pharmaceutical products manufacturing
- Fat, edible and non-edible oil extraction

Set constant:

- Manufacture of automobiles
- Coil coating
- Metal degreasing
- Other industrial cleaning
- Rubber processing
- Paints manufacture
- Inks manufacture
- Adhesives
- Other manufacturing
- Printing industry
- Preservation of woods

Correlated with population growth:

- Dry cleaning
- Domestic solvent use
- Domestic use of pharmaceutical products

Expert judgement:

- Textile finishing
- Other (deicing and cement industry VOC use)

As the emission factors have decreased over the last decade (due to measures under the VOC Directive), it has been assumed that the Directive has been fully implemented and no further emission reductions driven by it are to be expected, so the emission factors are set to the most recent value.

#### NFR 2.G / $NO_x$, $SO_2$, $NH_3$ and $PM_{2.5}$

Emissions result from the use of products, namely tobacco smoke and fireworks. Emissions from fireworks were assumed to be constant at the mean activity of the last 5 years. For tobacco use, it was assumed that the downward trend in emissions of recent years would continue until 2031, after which emissions would remain constant.

## 4.5 Agriculture (NFR 3)

This chapter gives an overview of the European and Austrian agricultural policies, provides information on the basic economic and technological assumptions and describes the methodologies used for the sectoral scenarios up to 2040.

Emission projections are provided for the sources of ammonia ($NH_3$), nitrogen oxides ($NO_x$), non-methane volatile organic compounds (NMVOC), sulphur dioxide ($SO_2$) and particulate matter ($PM_{2.5}$).

Emissions calculations are based on the methodologies used in the Austrian Air Emission Inventory. Austria's Informative Inventory Report 2025 (UMWELTBUNDESAMT, 2025b) includes a comprehensive description of the methodologies used. The methodologies used in the projections are fully consistent with those described in (UMWELTBUNDESAMT, 2025b).

**The EU CAP Strategic Plan**

The Common Agricultural Policy (CAP) is a long-standing policy of the European Union, embedded in the EU's framework for action, which includes the goal of a climate-neutral Europe by 2050.

At the end of 2021, Austria submitted its CAP Strategic Plan (CAP-SP) 2023-2027. The plan was approved in September 2022. It includes interventions enabling participants to receive direct payments (former 1st pillar of the CAP) and measures financed by the EAFRD (former 2nd pillar of the CAP). In addition, sectoral programmes (fruit and vegetables, bees, wine, hops) were implemented. As the CAP period started with a delay of three years, we assume that the programme will continue until 2030. In the Austrian CAP-SP (BML, 2022), a total of 98 interventions, based on 45 needs, are jointly programmed and implemented. According to the intervention logic, the climate-relevant interventions are assigned to Objective 4 (climate) by corresponding relevant outcome indicators. Compared to the previous CAP period (2014-2020, which was extended to 2022), both climate mitigation and climate change adaptation measures have gained more weight compared to other measures. However, the volume of funds has not changed significantly.

**Scenario 'with existing measures' (WEM)**

The scenario is based on OECD/FAO price projections (OECD-FAO, 2022) for the EU, existing agricultural policies and the regulatory framework (see Chapter 3). It also takes into account the measures regulated by the Austrian Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022), as last amended (Federal Law Gazette II No. 172/2024).

**Scenario 'with additional measures' (WAM)**

The WAM scenario takes into account the additional agricultural policy measures provided for in the National Air Pollution Control Programme (NAPCP) and the Integrated National Energy and Climate Plan (NECP) (BMK, 2023a, 2024a).

For the PASMA modelling of the WAM scenario, it was assumed that the regulations in force by 2023 and those expected to come into force by 2030 will increase the cost of agricultural production by making investments more expensive. This assumption was discussed at a stakeholder workshop, and there was a consensus of opinion among agricultural experts. Higher investment costs are reflected in a higher present value for leasing stable capacity. This makes livestock production more expensive, and, as a result, other activities (such as crop production) become more profitable for farmers. The factor of higher costs in the WAM scenario compared to WEM is 10%. This increase seems reasonable to finance new investments in construction such as slurry tank covers, slurry separators and improved air conditioning.

**Main results**

*Cattle numbers:* WEM projections indicate that cattle numbers will decrease by 11% between 2023 and 2030. In its agricultural outlook for markets 2022-2032, the European Commission also anticipates lower beef production and a decline in the number of dairy cows at EU level.

In the WAM projections, cattle numbers decrease slightly more than in the WEM scenario (-14% between 2023 and 2030), as rising investment costs make milk and meat production less profitable.

*Pig numbers:* The number of pigs falls by 7.6% in the WEM scenario and by 9.3% in the WAM scenario between 2023 and 2030. In the WAM scenario, the decline is slightly higher than in the WEM scenario, because higher investment costs to reduce emissions make pork production less favourable. After 2030, the pig numbers decrease at a much higher rate in both scenarios, as the relationship between output price and input cost becomes less favourable. In its agricultural outlook for markets 2022-2032, the European Commission also expects lower production of pork at EU level.

*Poultry numbers:* Poultry numbers decrease by 2030 at a similar rate in both the WEM and WAM scenarios. The modelled development of the poultry population is in contrast to the observed trends. The reason lies in the international competition for poultry meat and eggs and the comparatively high production costs in Austria.

*Fertiliser application:* The results of the PASMA model for 2030 and beyond indicate that the use of mineral fertilisers on agricultural land will increase compared to 2023. The reason for this is the nutrient deficit due to the decline in livestock numbers. The lower amount of organic fertiliser will be compensated by higher sales of mineral fertilisers.

### Activity data

As part of the preparation of national scenarios for the agricultural sector, the Umweltbundesamt commissioned the Austrian Institute of Economic Research (WIFO) and the University of Natural Resources and Life Sciences (BOKU) to prepare a modelling of the domestic agricultural sector. The results of the PASMA model (WIFO & BOKU, 2023) provide the basic activity data for 2030 and beyond for both scenarios. The data for horses and deer have been adjusted to the revised 2023 inventory data. For rabbits, which were reported for the first time in the 2025 submission, the projected number of animals was kept constant.

### The PASMA model

The Positive Agricultural Sector Model Austria (PASMA), developed by the Austrian Institute of Economic Research (WIFO), maximises sectoral farm welfare and is calibrated on the basis of historical activities in arable farming, forestry, livestock breeding and agro-tourism. The method of Positive Mathematical Programming (PMP) assumes a profit-maximising equilibrium (e.g. marginal revenue equals marginal cost) in the base run and derives the coefficients of a non-linear objective function based on observed levels of production activities (WIFO & BOKU, 2023).

### Assumptions about prices, yields and production

PASMA price projections are based on assumptions about the development of key indicators on global agricultural commodity and food markets (OECD-FAO, 2022). Forecasts for key economic indicators are based on KANIOVSKI ET AL. (2021), and energy prices are consistent with those assumed for the energy sector.

Several sources of market data are available that can be used as a basis for price projections. All prices but energy prices were derived from the OECD-FAO forecasts for agricultural markets (OECD-FAO, 2022). A comparison of these OECD forecasts with the projections of the European Commission (EUROPEAN COMMISSION, 2022) shows that international bodies have very similar assumptions about the future development of key economic indicators. Due to the type of farm sector model used in this analysis, assumptions for the Austrian economic context (e.g. GDP growth, population dynamics) are not directly required. However, they are included in the exogenous price assumptions (mainly the consumer price index). Other driving forces (prices, technology, constraints) are referenced in the following sections.

When projecting the activity data in 2022, no OECD-FAO forecasts were available for the period after 2031. It was therefore assumed that prices for most activities would follow the previous trend from that year onwards. Price estimates for farm outputs are specific to the Austrian market situation. The observed price wedge between the Austrian and EU markets was assumed to prevail in the future.

Within this project, a detailed set of assumptions for technical coefficients, yields and productivity was developed in a stakeholder process, which included the expertise of farm production experts from the Austrian Chamber of Agriculture, the Austrian Agency for Health and Food Safety (AGES) and participants at three meetings of the project board established for this study.

The results can be summarised as follows: productivity in livestock farming, particularly in milk production, will increase in the coming years, but at a slower pace than in the past. With regard to crop yields, the consensus was that climate change is likely to lower country averages after 2030. One outcome of the discussions was that the expected yields of crops were lower after 2030 and that stables for livestock would be significantly more expensive than in 2020. The assumption of higher prices is justified by the fact that compliance with environmental legislation will make investments more expensive. For more information, please refer to WIFO & BOKU (2023).

**Additional Assumptions for the WAM scenario**

Projected activity data for 2030 and beyond were mainly taken from the PASMA model (WIFO & BOKU, 2023), with milk yield data based on exogenous technology assumptions (UMWELTBUNDESAMT, 2023c). For mineral fertiliser use, a reduction of 25% was assumed compared to the WEM scenario in 2030, which corresponds to the target included in the current draft report of the Austrian NECP (see Chapter 3).

### 4.5.1 Manure management (NFR 3.B)

This source category includes emissions occurring during the housing and storage of livestock manure.

**WEM scenario**

**Feed intake and N excretion**

Feed intake parameters and N excretion values match those applied in the Austrian Air Emission Inventory (UMWELTBUNDESAMT, 2025b) for all livestock categories. Austria-specific N excretion values for dairy cows were calculated on the basis of national feed intake estimates in line with projected milk yields (+10% from 2023 to 2030).

**Animal waste management systems (AWMS)**

Data on AWMS distribution are based on an up-to-date and comprehensive survey of agricultural practices in Austria (PÖLLINGER ET AL., 2025).

*Cattle and swine*

In the distribution of animal waste management systems, a continued trend towards loose housing systems has been assumed for cattle. The trend towards liquid manure systems has also been taken into account. For pigs, the AWMS

distributions have been kept constant from 2023 according to (PÖLLINGER et al., 2025).

Based on information from the CAP Strategic Plan, the share of dairy and suckling cows kept on pasture will increase slightly by 10% by 2030 compared to 2023 and remain constant thereafter.

Most of the other assumptions for agricultural practice, such as for the storage of solid farm manure or the share of farm manure treated in biogas plants, are in line with those of the Austrian Air Emission Inventory (OLI).

For the storage of liquid manure, covering is regulated by the Austrian Ammonia Reduction Ordinance. Specifically, from 1 January 2025, new facilities with a total manure capacity of at least 240m$^3$ will have to be covered with a solid cover. Existing facilities with a total manure capacity of at least 240m$^3$ have to be covered with a flexible artificial cover. However, there are exceptions for farms that have a natural crust (maximum mix up only 2 times a year). Therefore, it has been assumed that from 2028 onwards all uncovered manure storages of farms with more than 20 livestock units (about 78% of cattle farms and 98% of pig farms) will be covered at least with a natural crust (CF of -40%), which is a rather conservative approach.

*Other livestock (sheep, goats, deer, horses, poultry and rabbits)*

For these livestock categories, the AWMS distributions from 2023 according to (PÖLLINGER et al., 2025) have been used for all projected years.

For laying hens, the share of air scrubbers and systems with manure belt and covered storage has been kept constant for the projected years at the 2023 values according to (PÖLLINGER ET AL., 2025).

**WAM scenario**

**Feed intake and N excretion**

The WAM scenario includes additional measures for animal feeding (implementation of N-reduced feeding strategies), resulting in a slight decrease of nitrogen excretion for cattle (dairy cows and fattening heifers) and pigs in 2025 and 2030 compared to the WEM scenario.

Assumptions for lowering the crude protein surpluses were derived from the contents of typical rations according to national studies, feeding recommendations and the crude protein requirements of the animals based on their productivity.

Based on the additional measures defined in the national programmes (NECP, NAPCP) and the analyses described above, the crude protein content in feed was reduced by 2% for dairy cows and fattening heifers, by 3% for breeding sows and by 5% for fattening pigs in 2030.

**Animal waste management systems (AWMS)**

The WAM scenario includes the following additional measures:

- Additional measures for low-emission barn design and manure storage, as listed in the Austrian NAPCP and further specified as recommended by the NEC Projections Review 2023 (EUROPEAN COMMISSION 2023):
  - Increased share of grooved floor systems for cattle by 2030
  - Increased share of partly slatted floor for pigs by 2030
  - Slightly increased share of air scrubbers for laying hens by 2030
  - Slightly increased share of systems with manure belt and covered storage for laying hens by 2030

For all other livestock categories, the AWMS distributions of 2023 according to (PÖLLINGER et al., 2025) have been kept constant for the projected years in the WAM scenario.

- Increasing the grazing of dairy and suckling cows by 30% in 2030 compared to 2023;
- Increasing the share of manure treated in biogas plants to 30% of the total manure volume for the relevant livestock categories of cattle, pigs and poultry in Austria by 2030, according to the Austrian NECP and NAPCP.

### 4.5.2 Agricultural soils (NFR 3.D)

This source category includes emissions from anthropogenic N inputs to agricultural soils.

**WEM scenario**

*Inorganic N fertilisers*

Projected data for mineral fertiliser application have been taken from WIFO & BOKU (2023) for the years 2030 and beyond. In order to increase transparency, the activity data for the respective fertiliser categories are included as recommended in the NEC Projections Review 2023 (EUROPEAN COMMISSION 2023).

*Table 25: N usage of different types of mineral fertilisers (arithmetic average of two years) in Austria for the latest inventory year and projected years until 2030*

| Year | Nitrogen (N) consumption total | Calcium ammonium nitrate (CAN) | N solutions (Urea AN) | Ammonium sulphate (AS) | N-stabilised fertilizers* | Calcium nitrate (CN) | NPK mixtures | Other | Urea |
|---|---|---|---|---|---|---|---|---|---|
| | [tonnes N/year] | | | | | | | | |
| 2023 | 93 853 | 57 087 | 999 | 3 717 | 3 026 | 50 | 12 234 | 628 | 16 112 |
| 2024 | 101 952 | 64 702 | 861 | 5 996 | 3 125 | 88 | 12 984 | 1 066 | 13 131 |
| 2025 | 103 490 | 65 043 | 883 | 5 878 | 3 438 | 81 | 14 084 | 987 | 13 096 |
| 2026 | 105 029 | 65 384 | 906 | 5 760 | 3 752 | 74 | 15 184 | 908 | 13 061 |
| 2027 | 106 568 | 65 725 | 928 | 5 642 | 4 065 | 67 | 16 283 | 830 | 13 027 |
| 2028 | 108 106 | 66 066 | 951 | 5 525 | 4 379 | 60 | 17 383 | 751 | 12 992 |
| 2029 | 109 645 | 66 407 | 973 | 5 407 | 4 692 | 53 | 18 483 | 672 | 12 957 |
| 2030 | 111 184 | 66 748 | 996 | 5 289 | 5 006 | 46 | 19 583 | 593 | 12 923 |

*Data sources:*

*2023 & 2024: Annual fertiliser statistics compiled by AMA (Agrarmarkt Austria,* http://www.ama.at*)*

*2025-2029: interpolated values*

*2030: N amounts of inorganic fertilisers for the WEM scenario according to WIFO & BOKU (2023)*

*Animal manure applied to soils*

Based on the projections of the Austrian CAP Strategic Plan, the share of low-emission spreading techniques has been increased to 33.1% for the application of cattle manure and to 80.4% for the application of pig manure until 2027. The values have been kept constant until 2030. As recommended in the NEC Projections Review 2023 (EUROPEAN COMMISSION 2023), additional information is included to increase transparency.

*Table 26: Share of band spreading for cattle and swine for the last inventory year 2023 and projected years until 2027 according to the Austrian CAP Strategic Plan*

| Share of band spreading | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|---|---|---|---|---|
| | [%] | | | | |
| Cattle | 23.5 | 28.2 | 29.8 | 31.5 | 33.1 |
| Swine | 66.6 | 68.4 | 72.6 | 76.5 | 80.4 |

For solid-liquid separation, new data according to (PÖLLINGER et al., 2025) were implemented in the inventory for the reporting year 2023. The WEM scenario was derived from ÖPUL data according to the CAP Strategic Plan (e.g. 13% for dairy cows in 2027) and kept constant for the years after 2027.

Furthermore, the mandatory measures for the rapid incorporation of N fertilisers (inorganic and organic) as regulated by the Ammonia Reduction Ordinance have been taken into account:

- Rapid incorporation of liquid manure (< 4h): mandatory from 1 January 2023
- Rapid incorporation of solid manure (< 4h): mandatory from 1 January 2026
- Rapid incorporation of urea fertilisers (< 4h) or addition of urease inhibitors: mandatory from 30 June 2023

As a conservative approach, the full potential of these measures has not been taken into account before 2030.

**WAM scenario**

The WAM scenario includes the following additional measures:

- Reduced use of mineral fertilisers by 25% by 2030 (compared to the 'with existing measures' scenario) in line with the target set in the Austrian draft NECP as a result of efficiency improvements and precision farming techniques, etc.

The measures 'increased use of low-emission application techniques for cattle and pig slurry' and 'solid-liquid separation' according to the Austrian CAP-SP are considered in the WEM scenario according to the scenario definitions provided in Chapter 3.

### 4.5.3 Field burning of agricultural residues (NFR 3.F)

In Austria, a federal law restricts the burning of agricultural residues in open fields. Residue burning is only permitted occasionally and on a very small scale. In the last inventory year, 2023, there was no field burning at all in Austria ('NO'). Our assumption is that there will be no burning in the projected years either.

### 4.5.4 PM emissions from agriculture

*Particle emissions from animal husbandry*

Particle emissions from this source are primarily associated with dietary manipulation of forage; with a minor contribution from dispersed excrement and litter. Estimates are based on Austrian livestock projections. To ensure consistency with the Austrian Air Emission Inventory (UMWELTBUNDESAMT, 2025b), emission factors from the RAINS model (LÜKEWILLE ET AL., 2001) were used.

*Particle emissions from field operations*

Emissions of particulate matter from field operations are associated with the use of machinery on agricultural soils. They are considered in connection with

the farmed area. For the projections, the same methodology (EMEP/EEA, 2023, Tier 1) as in the Austrian Annual Air Emission Inventory (UMWELTBUNDESAMT, 2025b) was used. Activity data for the projected cropland and grassland area were obtained from PASMA (WIFO & BOKU, 2023).

*Particle emissions from bulk material handling*

Since this source is of minor importance, $PM_{2.5}$ emissions have been extrapolated from the inventory values from 2023 onwards.

### 4.5.5 Uncertainties

Emission projections are fraught with a range of uncertainties. These uncertainties have to be kept in mind when considering the results of this analysis:

- **Model uncertainty:** The first uncertainty factor is related to the type of model. The PASMA model (WIFO & BOKU, 2023) is static by design, and adjustments to future situations are calculated in discrete steps using exogenous assumptions (prices, costs, technical coefficients) and endogenous coefficients (marginal costs) based on observations in the reference period. Investment costs are not considered in the model as it is based on gross margin calculations. The model assumes a swift adaptation of land use and management and an efficient use of resources. In practice, such adaptations may be over-optimistic because farmers may not be able or willing to adjust in the way the model suggests.
- **Market uncertainty:** A comparison of past OECD-FAO projections and observed outcomes suggests that there is a considerable difference between them. The range of such uncertainties is discussed in more detail in the OECD-FAO report (2022).
- **Policy uncertainty:** Policies affect the decisions of farmers and other market participants in various ways. The range of policies is not limited to agricultural policies alone: energy policies affect energy prices and thus input costs; urban planning regimes affect decisions about developments in residential and commercial areas, which in turn have an impact on the availability of agricultural land.

### 4.5.6 Sensitivity analysis

The sensitivity analysis focused on investment costs as these are subject to a high degree of uncertainty. Several variants of investment costs were used and compared in the PASMA model. The final assumptions for the cost increase were determined on the basis of the stakeholder dialogue, assuming higher construction costs than observed in the past. As a result, animal husbandry became more expensive, while other activities such as plant production became more profitable for farmers.

Overall, the PASMA results for Austria in 2030 are in line with the expectations of the OECD (OECD-FAO, 2022) and the European Union (EC, 2022). However, the trend for milk production in Austria deviates from the generally expected trends due to the comparative advantage of dairy production in Austria compared to other countries.

## 4.6 Waste (NFR 5)

### 4.6.1 Waste disposal on land (NFR 5.A)

NMVOC and $NH_3$ emissions from solid waste disposal are derived from the emitted landfill gas (taking into account gas recovery) calculated for GHG reporting under the UNFCCC. For NMVOC, a concentration of 300 mg/m³ and for $NH_3$ a concentration of 10 mg/m³ in the landfill gas is considered.

For the calculation of landfill gas (mainly methane ($CH_4$)) arising from solid waste disposal on land, the IPCC Tier 2 (First Order Decay) method is applied, taking into account historical data on deposited waste and considering the decay of the degradable organic component (DOC) of waste over a few decades (IPCC, 2006). The Tier 2 method is recommended for the calculation of landfill emissions at national level. It consists of two equations: one for calculating the amount of methane generated based on the amount of degradable organic carbon accumulated in landfills in a particular year, and one for calculating the methane actually emitted after subtracting the recovered and the oxidised methane.

Activity data are largely taken from the Electronic Data Management ('EMREG'[7]), an electronic database managed by the BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology), which delivers data as input to the national Federal Waste Management Plan (BMK 2023b).

More detailed information on the methodology (as well as on the parameters applied) can be found in Austria's Informative Inventory Report (UMWELTBUNDESAMT, 2025b).

Projections for landfill gas emissions are calculated based on predictable future trends in waste management as a result of the implementation of legal provisions at federal government level. As stipulated in the Landfill Ordinance (*Deponieverordnung*), since 2009 only pre-treated waste has been allowed to be deposited in landfills. Consequently, only residues and stabilised waste from me-

[7] BGBl. II No. 2017/207: Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über ein elektronisches Register zur Erfassung aller wesentlichen Belastungen von Oberflächenwasserkörpern durch Emissionen von Stoffen aus Punktquellen (EmRegV-OW)

chanical and/or biological treatment, some sludges and minor amounts of construction waste are relevant fractions deposited annually. Historical waste volumes were used as activity data for future years. The assumption for residues from mechanically-biologically treated waste is consistent with the assumptions made for projected emissions from mechanical-biological treatment (MBT) plants reported under NFR 5.B.1.

*Table 27: Past trend (1990-2020) and scenarios (2025-2050) for 'residual waste' and 'non-residual waste' activity data (source: Umweltbundesamt).*

| Year | Residual Waste [kt/a] | Non-Residual Waste [kt/a] | Total Waste [kt/a] |
|---|---|---|---|
| 1990 | 1 996 | 649 | 2 644 |
| 2000 | 1 052 | 827 | 1 879 |
| 2005 | 242 | 390 | 631 |
| 2010 | 0.0 | 245 | 245 |
| 2015 | 0.0 | 132 | 132 |
| 2020 | 0.0 | 166 | 166 |
| 2025-2050 | 0.0 | 178 | 178 |

It should be noted that although residual waste has not been landfilled since 2009, it still has a significant impact on current and future landfill gas generation (2023: 43%, 2030: 30%, 2040: 16%).

**$PM_{2.5}$ from waste disposal on land (NFR 5.A)**

Emissions in this category result from the handling of dusty waste at landfill sites.

When calculating $PM_{2.5}$ emissions, only specific types of waste are taken into account. The largest fraction is mineral waste (excavated soil in particular), contributing 96% (2023) of the total waste used for $PM_{2.5}$ calculations. In addition, slags, dust and ashes from thermal waste treatment and combustion plants, residues from iron and steel production (slags, dust, rubble) and some construction waste are taken into account. Solidified or stabilised waste is not considered.

Emissions are calculated by multiplying the waste amount by an emission factor (the same as used for the Austrian Air Emission Inventory; see (UMWELTBUNDESAMT, 2025b).

*Table 28: Past trend (1998-2020) and scenarios (2030-2050) for dusty waste activity data in kt (source: Umweltbundesamt).*

| | 1998 | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|---|
| Total dusty waste amount | 4 381 | 5 028 | 10 782 | 28 833 | 24 304 | 26 576 | 28 847 |

For the projections of activity data, it has been assumed that the amount of the landfilled waste types considered will increase annually by 1% of the amount landfilled in 2023.

### 4.6.2 Biological treatment of waste—composting (NFR 5.B.1)

$NH_3$ emissions are calculated separately for

- waste treated in mechanical-biological treatment (MBT) plants and
- waste treated in composting plants as well as home-composted biogenic waste,

by multiplying the respective emission factors by the waste amounts.

The emission factors used for the projections are the same as those described in Austria's Informative Inventory Report (UMWELTBUNDESAMT, 2025b).

#### Composting plants, home composting

The amount of home composted waste is assumed to increase as the population grows (STATISTIK AUSTRIA, 2024b). 50% of the amount of the waste treated in composting plants is expected to remain constant at the 2023 level (tree loppings and wood used as structural material in the composting process), while the other 50% is expected to increase with the population growth (related to organic waste collected separately from households).

$NH_3$ emissions from composting are determined by multiplying the amount of waste by an emission factor of 0.4 kg $NH_3$/t of waste composted.

#### Mechanical-biological treatment plants

The amount of waste undergoing mechanical-biological treatment (MBT) in Austria is assumed to remain at the mean level for 2009-2023.

$NH_3$ emissions from mechanical-biological treatment plants are determined by multiplying the amount of waste by an emission factor of 0.6 kg $NH_3$/t of waste treated.

*Table 29: Past trend and scenario for composting activity data.*

| [kt waste treated] | 1990 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Composted organic waste | 418 | 1 467 | 1 689 | 1 834 | 2 019 | 2 227 | 2 257 | 2 285 | 2 311 | 2 333 | 2 350 | 2 366 |
| Mechanically-biologically treated waste | 345 | 254 | 623 | 551 | 439 | 462 | 459 | 459 | 459 | 459 | 459 | 459 |

### 4.6.3 Anaerobic treatment of agricultural feedstock (NFR 5.B.2)

$NH_3$ emissions from anaerobic digestion (manure and energy crops) are reported under category NFR 5.B.2.

For further information on the methodology used, see Chapter 4.5 on the agricultural sector.

### 4.6.4 Waste incineration (NFR 5.C)

Due to the low contribution of pollutants from this source ($NO_x$, $SO_2$, NMVOC, $NH_3$) to the total national emissions (less than 1%), the 2023 emission levels have been used for the forecast. A detailed description of the methodology for estimating the emissions of these pollutants can be found in Austria's Informative Inventory Report 2025 (UMWELTBUNDESAMT, 2025b).

### 4.6.5 Wastewater treatment (NFR 5.D)

This category includes NMVOC emissions from wastewater treatment. Category 5.D.1 covers wastewater of domestic origin as well as commercial and industrial wastewater treated together with domestic wastewater in municipal centralised wastewater treatment plants. NMVOC from industrial on-site treatment is reported under NFR 5.D.2 (UMWELTBUNDESAMT 2025b).

Emissions were calculated following a Tier 1 approach by multiplying the wastewater volumes by the emission factor taken from the EMEP/EEA 2023 Guidebook (15 mg/$m^3$ of wastewater). Historical and current data on the volumes of wastewater treated were largely taken from the Electronic Emission Register of Surface Water Bodies (*Emissionsregister – Oberflächenwasserkörper*, EMREG-OW[8]), an electronic register of material emissions to surface water from point sources managed by the Federal Ministry of Agriculture, Forestry, Regions and Water Management (UMWELTBUNDESAMT 2024). For projections, wastewater volumes are expected to increase with population growth (STATISTIK AUSTRIA 2024b). The volume of industrial wastewater treated on site is expected to remain at the 2023 level. The emission factor remains the same for the whole time series.

[8] BGBl II No. 207/2017: Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über ein elektronisches Register zur Erfassung aller wesentlichen Belastungen von Oberflächenwasserkörpern durch Emissionen von Stoffen aus Punktquellen (Austrian Emissions Register Ordinance, EmRegV-OW).

*Table 30: Past trend (1990-2020) and scenarios (2025-2050) for wastewater volumes treated in million m³.*

| [kt waste treated] | 1990 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domestic wastewater | 640 | 996 | 1 038 | 1 112 | 1 039 | 1 077 | 1 148 | 1 169 | 1 189 | 1 206 | 1 218 | 1 231 |
| Industrial wastewater ('on site') | 340 | 382 | 421 | 446 | 385 | 434 | 412 | 412 | 412 | 412 | 412 | 412 |

### 4.6.6 Other waste handling (NFR 5.E)

This category covers $PM_{2.5}$ emissions from vehicle fires and fires in detached houses, apartment buildings and industrial buildings.

Emissions were calculated following a Tier 2 approach, multiplying the number of fires per category by the respective emission factors taken from the EMEP/EEA 2023 Guidebook.

*Emissions = AD * EF*

*AD …….. activity data (number of fires)*
*EF …… emission factor*

The projection of car fires and apartment fires was extrapolated using population growth (STATISTIK AUSTRIA, 2024b). For detached houses and industrial buildings, a mean value of the number of fires reported for 2004-2023 was used to project the number of future fires. The emission factor remains the same for the whole time series.

*Table 31: Number of fires: past trend (1990-2020) and scenarios (2030-2050).*

| [no of fires] | 1990 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Car fires | 1 586 | 1 682 | 1 759 | 1 727 | 1 584 | 1 696 | 2 532 | 2 576 | 2 619 | 2 654 | 2 681 | 2 707 |
| Accidental fires in buildings | 2 995 | 3 066 | 2 617 | 3 545 | 3 674 | 3 306 | 3 362 | 3 378 | 3 393 | 3 406 | 3 416 | 3 425 |

## 4.7 Other Sources (NFR 6.A)

The EMEP/EEA GB 2023 provides a Tier 1 methodology to calculate $NH_3$ emissions from pets. In the current submission, Austria reports ammonia emissions from dogs and cats for the first time using the default Tier 1 methodology according to the EMEP/EEA GB 2023.

Projected activity data (number of cats and dogs) have been determined by using projected data for the number of private households taken from (Statistics Austria 2024c). The number of pets is assumed to increase in correlation with the number of private households.

Due to the lack of measures, the WEM scenario is the same as the WAM scenario.

*Table 32: Past trend and scenario for the number of cats and dogs.*

| [livestock numbers] | 1990 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|---|
| Cats | 1 401 996 | 1 557 908 | 1 672 574 | 1 744 000 | 1 787 500 | 2 034 000 | 2 006 183 | 2 067 924 |
| Dogs | 491 985 | 546 697 | 586 935 | 612 000 | 626 500 | 827 000 | 845 932 | 871 966 |

# 5 RECALCULATIONS: CHANGES WITH RESPECT TO THE 2023 SUBMISSION

The changes made to the projections since the last submission of emission projections for air pollutants in 2023 (UMWELTBUNDESAMT, 2023a) are presented in this chapter. In general, there are five main factors influencing these changes:

1. Updates to the underlying data (e.g. GHG inventory, energy balance);
2. A transition to the new EMEP/EEA Guidebook 2023, which entailed methodological changes and some significant sectoral recalculations of the inventory and emission projections, as the methods had to be applied consistently to calculate past trends and emission scenarios;
3. Changes in assumptions for activity scenarios. These changes can be triggered by revised economic or technical scenarios, the inclusion of additional policies and measures, and revisions to policies or measures necessitated by amendments to legislation;
4. Revisions to emission factors and methodologies;
5. Changes in the models used for activity or emission scenarios.

The following tables show a comparison of past trends in the WEM scenario for national emission totals.

*Table 33: Comparison of 2023 and 2025 projections in the WEM scenario based on fuel sold—national totals (in kt) (source: Umweltbundesamt).*

| Total | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|
| **2023 Projections** | | | | | | |
| **$NO_x$** | 248 | 206 | 124 | 109 | 100 | 82 |
| **$SO_2$** | 26 | 16 | 10 | 11 | 11 | 11 |
| **NMVOC** | 157 | 138 | 111 | 105 | 103 | 99 |
| **$NH_3$** | 63 | 65 | 66 | 64 | 62 | 58 |
| **$PM_{2.5}$** | 23 | 20 | 13 | 13 | 13 | 12 |
| **2025 Projections** | | | | | | |
| **$NO_x$** | 248 | 206 | 124 | 109 | 100 | 79 |
| **$SO_2$** | 26 | 16 | 10 | 11 | 11 | 10 |
| **NMVOC** | 163 | 141 | 113 | 104 | 102 | 97 |
| **$NH_3$** | 79 | 80 | 77 | 74 | 72 | 66 |
| **$PM_{2.5}$** | 23 | 20 | 14 | 13 | 13 | 12 |
| **Difference 2025/2023** | | | | | | |
| **$NO_x$** | -0.1 | -0.2 | +0.0 | -0.6 | +0.2 | -3.4 |
| **$SO_2$** | +0.0 | +0.0 | +0.0 | -0.4 | -0.5 | -1.0 |
| **NMVOC** | +6,3 | +3,1 | +2,2 | -1,1 | -0,6 | -2,2 |
| **$NH_3$** | +16.0 | +14.8 | +11.7 | +10.2 | +9.5 | +8.2 |
| **$PM_{2.5}$** | +0.4 | +0.4 | +0.3 | +0.1 | +0.0 | -0.4 |

For further information on the inventory recalculations, see 'Sector-specific recalculations' in Austria's Informative Inventory Report 2025 and Austria's National Inventory Document 2025 (UMWELTBUNDESAMT, 2025b, 2025c).

The main changes per sector are discussed in detail in the following chapters.

## 5.1 Energy industries (NFR 1.A.1), manufacturing industries and construction (NFR 1.A.2) and industrial processes (NFR 2)

*Table 34: Major changes between the 2023 and 2025 projections for the NFR 1.A.1, NFR 1.A.2 and NFR 2 sectors (in kt) (source: Umweltbundesamt).*

| Pollutant | Sector (CRF) | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| **$NO_x$** | 1.A.1—Energy Industries | +0.0 | +0.0 | -0.4 | -1.9 | -1.9 | -2.7 |
| | 1.A.2—Manufacturing Industries and Construction | +0.0 | +0.0 | +0.2 | -0.8 | 0.2 | -0.2 |
| | 2—Industrial Processes | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| **$SO_2$** | 1.A.1—Energy Industries | +0.0 | +0.0 | +0.0 | -0.3 | -0.2 | -0.4 |
| | 1.A.2—Manufacturing Industries and Construction | +0.0 | +0.0 | +0.0 | -0.1 | -0.1 | -0.4 |
| | 2—Industrial Processes | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| **$PM_{2.5}$** | 1.A.1—Energy Industries | +0.0 | +0.0 | +0.0 | -0.2 | -0.2 | -0.4 |
| | 1.A.2—Manufacturing Industries and Construction | +0.0 | +0.0 | +0.0 | -0.1 | 0.0 | -0.1 |
| | 2—Industrial Processes | +0.0 | +0.0 | +0.0 | -0.1 | -0.1 | -0.1 |
| **NMVOC** | 1.A.1—Energy Industries | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 1.A.2—Manufacturing Industries and Construction | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 2—Industrial Processes | +3.3 | +1.1 | +2.1 | -1.1 | -1.6 | -1,8 |
| | 2.D—Solvents | +3.3 | +1.1 | +2.1 | -1.1 | -1.6 | -1,8 |

For energy industries, the revisions until 2023 are mainly due to different assumptions for power generation after 2030. Compared to the 2023 projections, the power demand is higher in the 2025 projections. The expansion of renewable energy is lower than in 2023, resulting in more power generation from gas-fired power plants, which increases emissions.

For manufacturing industries and construction, the changes compared to the 2023 report are mainly due to the fact that there have been recessions in recent

years, combined with the introduction of the carbon price for the non-ETS industry and additional funds enabling the transition of the ETS industry. All other changes are due to the use of the new energy balance (1990-2023).

Emission factors have been adapted, mainly to take account of the impact of measures but also partly to reflect the recalculations of the latest inventory.

**NFR 2.D—Solvent and other product use**

Market data on solvent containing products used domestically have been included in the inventory. In addition, data for 2000 for industrial and commercial use of solvents and solvent containing products were reviewed, which resulted in some revisions to ensure consistency with data for 2015 and beyond.

## 5.2 Transport (NFR 1.A.3)

*Table 35: Major changes between the 2023 and 2025 projections for the NFR 1.A.3 sector, in kt (fuel sold) (source: Umweltbundesamt).*

| Pollutant | Sector (NFR) | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| $NO_x$ | 1.A.3—Transport | +0.0 | -0.1 | +0.3 | +2.9 | +2.7 | +0.8 |
| | 1.A.3.a—Civil aviation | +0.0 | +0.0 | +0.0 | +0.4 | +0.4 | +0.1 |
| | 1.A.3.b.1—Passenger cars | +0.4 | +0.7 | +0.3 | +3.3 | +2.6 | +0.5 |
| | 1.A.3.b.2—Light-duty vehicles | +0.0 | +0.0 | +0.0 | +0.7 | +0.5 | +0.0 |
| | 1.A.3.b.3—Heavy-duty vehicles | -0.4 | -0.8 | +0.0 | -1.2 | -0.6 | +0.3 |
| | 1.A.3.b.4—Mopeds & motorcycles | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 1.A.3.c—Railways | +0.0 | +0.0 | +0.0 | -0.1 | -0.1 | +0.0 |
| | 1.A.3.d—Navigation | +0.0 | +0.0 | +0.0 | +0.1 | +0.1 | +0.1 |
| | 1.A.3.e—Pipeline compressors | +0.0 | +0.0 | +0.0 | -0.2 | -0.2 | -0.2 |
| NMVOC | 1.A.3—Transport | +0.6 | +0.3 | +0.0 | -0.1 | -0.1 | -0.2 |
| | 1.A.3.a—Civil aviation | +0.0 | +0.0 | +0.0 | +0.0 | +0.1 | +0.0 |
| | 1.A.3.b.1—Passenger cars | +0.1 | +0.2 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 1.A.3.b.2—Light-duty vehicles | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 1.A.3.b.3—Heavy-duty vehicles | +0.0 | +0.0 | +0.0 | -0.1 | -0.1 | -0.1 |
| | 1.A.3.b.4—Mopeds & motorcycles | +0.0 | +0.0 | +0.0 | -0.2 | -0.2 | -0.1 |
| | 1.A.3.c—Railways | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |
| | 1.A.3.d—Navigation | +0.0 | +0.0 | +0.0 | +0.1 | +0.1 | +0.1 |
| | 1.A.3.e—Pipeline compressors | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 |

The 2025 projections show no significant difference for 2020 compared to the 2023 projection. The differences in road transport up to 2030 are mainly due to a methodological update in the 2025 inventory submission regarding activity data. In short, the activity data for passenger cars on the inland road network have been underestimated, leading to an overestimation of fuel export activities. The revision resulted in a shift of fuel consumption from fuel export to inland road transport with overlapping effects as the fleet composition in these two areas is completely different, e.g. fuel export is dominated by heavy duty vehicles with different fuel consumption and emission factors than passenger cars (which dominate inland road transport). All details regarding the methodology change can be found in Austria's National Inventory Report 2025 (chapter *1.A.3.b Road Transport* under 'Methodology' and 'Recalculations'.

The recalculations between 2025 and 2030 in civil aviation reflect the recent post-pandemic growth, which has been stronger than expected in the last two years.

## 5.3 Other sectors (NFR 1.A.4)

*Table 36: Major changes between the 2023 and 2024 projections for the NFR 1.A.4 sector in kt (source: Umweltbundesamt).*

| Pollutant | Sector (NFR) | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| **$NO_x$** | 1.A.4—Other Sectors | +0.0 | -0.1 | +0.0 | -0.2 | -0.4 | -1.1 |
| | 1.A.4.a.1—Commercial/Institutional: Stationary | +0.0 | +0.0 | +0.0 | -0.2 | -0.2 | -0.3 |
| | 1.A.4.b.1—Residential: Stationary | +0.0 | -0.1 | +0.0 | +0.1 | -0.2 | -0.8 |
| | 1.A.4.c.1—Agriculture/Forestry/Fishing: Stationary | +0.0 | +0.0 | +0.0 | +0.1 | +0.0 | +0.0 |
| **NMVOC** | 1.A.4—Other Sectors | -0.2 | -0.2 | +0.0 | +0.5 | +1.6 | +1.3 |
| | 1.A.4.a.1—Commercial/Institutional: Stationary | +0.0 | +0.0 | +0.0 | -0.4 | -0.1 | +0.0 |
| | 1.A.4.b.1—Residential: Stationary | -0.2 | -0.2 | +0.0 | +0.8 | +1.8 | +1.6 |
| | 1.A.4.c.1—Agriculture/Forestry/Fishing: Stationary | +0.0 | +0.0 | +0.0 | +0.1 | -0.1 | -0.3 |
| **$PM_{2.5}$** | 1.A.4—Other Sectors | +0.0 | +0.0 | +0.1 | +0.2 | +0.3 | +0.2 |
| | 1.A.4.a.1—Commercial/Institutional: Stationary | +0.0 | +0.0 | +0.0 | -0.1 | +0.0 | +0.0 |
| | 1.A.4.b.1—Residential: Stationary | +0.0 | +0.0 | +0.1 | +0.3 | +0.4 | +0.3 |
| | 1.A.4.c.1—Agriculture/Forestry/Fishing: Stationary | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | -0.1 |

In the 2025 submission, NEC emissions are subject to significant changes, compared to the 2023 submission, both in the inventory and in the projected years from 2024 onwards. There are several reasons for this:

- For 1990 to 2022, there are minor changes in the air pollutant emissions of the Commercial/Institutional *(1.A.4.a)* and Residential *(1.A.4.b)* categories because of updated heating stock data and reallocated shares of combustion technologies per energy carrier (updated energy demand model for space heating).
- $PM_{2.5}$ emission factors for heating type *#15 Natural-draught wood boilers* were revised according to the EMEP 2023 Guidebook Tier 2 to include the condensable fraction (assuming that the condensable fraction contains only particles <2.5 µm and does not contain any BC).
- The INVERT/EE-Lab model for NFR 1.A.4.a.1 and NFR 1.4.A.b.1 was updated with recent statistical data on building stock and thermal building quality. The model was recalibrated against the new energy balance (E-THINK, 2025).
- Revision of the energy balance

  The federal statistics office "Statistics Austria" revised the energy balance (mainly for the year 2022) with the following main implications for energy consumption as used in the inventory:

  - Natural gas 2022: Gross inland consumption was not revised. The transformation input was revised downwards by 3.7 PJ and shifted to final energy consumption. Final energy consumption of *1.A.4.a* and *1.A.4.b* was revised downwards by 0.2 PJ and final energy consumption of manufacturing industries was revised upwards by +4.0 PJ.
  - Gas oil 2022: Gross inland consumption was not revised. Around 0.4 PJ were shifted from the commercial/institutional (*1.A.4.a*) and residential (*1.A.4.b*) categories to public power and district heating plants (*1.A.1.a*).
  - Liquefied natural gas 2022: Around 0.5 PJ were shifted from manufacturing industries to "non-energy consumption".
  - Solid biomass 2022: Final energy consumption was corrected by +5.0 PJ, most of which was allocated to *1.A.4.b*.
- The difference in 2023 is due to emerging trends in activity data (energy consumption) for the inventory data year, in particular higher biomass consumption due to a stronger switch from fossil fuels to biomass, heat pumps and district heating than projected in the 2023 submission.

## 5.4 Agriculture (NFR 3)

*Table 37: Major changes between the 2023 and 2025 projections for the NFR 3 sector (in kt) (source: Umweltbundesamt).*

| Pollutant | Sector (NFR) | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| $NH_3$ | 3—Agriculture | +15.2 | +14.0 | +10.9 | +9.4 | +8.8 | +7.6 |
| | 3.B.1.a | +2.0 | +1.9 | +1.5 | 1.9 | +1.9 | +1.5 |
| | 3.B.1.b | +3.3 | +3.4 | +2.5 | 1.8 | +2.0 | +2.1 |
| | 3.B.4.e | -0.5 | -0.6 | -0.6 | -0.5 | -0.6 | -0.4 |
| | 3.B.3 | +0.5 | +0.4 | +0.5 | 0.3 | +0.2 | +0.3 |
| | 3.B.4.g | +0.1 | +0.0 | -0.3 | -0.4 | -0.5 | -0.4 |
| | 3.D | +10.4 | +9.5 | +8.1 | 7.2 | +6.5 | +5.1 |
| $NO_x$ | 3—Agriculture | -0.1 | +0.0 | -0.2 | -0.6 | -0.4 | -0.1 |
| | 3.D | -0.4 | -0.3 | -0.3 | -0.6 | -0.4 | -0.2 |
| NMVOC | 3—Agriculture | +2.2 | +1.4 | -0.4 | -0.6 | -0.9 | -1.7 |
| | 3.B | -0.3 | -0.6 | -1.5 | -1.4 | -1.4 | -1.7 |

**Activity data projections**

Emission calculations are based on projected activity data obtained from the PASMA model (WIFO & BOKU, 2023) for 2030 and beyond. The years between 2023 (and partly 2024, where current values were available) and 2030 have been derived by interpolation.

In the 2025 inventory submission, Austria has substantially revised its agriculture inventory. The research project 'Animal husbandry and manure management systems in Austria' ('TIHALO I', AMON et al. 2007 and 'TIHALO II', PÖLLINGER et al. 2018) was followed by a new investigation ('TIHALO III', PÖLLINGER et al. 2025). Like its predecessors, this project carried out a comprehensive survey of the agricultural practices in Austria. The results of this study (data on livestock feeding, management systems and practices, application techniques for 2023) were used as a basis for the calculation of Austria's emission inventory in the 2025 submission, which resulted in revisions to all animal-related emission sources.

In addition, methodological improvements have been made in the calculation of ammonia emissions. The total ammonia nitrogen (TAN) values for liquid and solid manure from cattle and pigs from SCHECHTNER et al. (1991) used in previous submissions were among the lowest in European countries. The revised values were derived from the measurement data from PÖTSCH (2019) and adjusted with the N-losses provided in the German and Swiss inventories, which reflect the latest scientific knowledge. The update of the TAN values resulted in higher $NH_3$ emissions from *3.B Manure Management*. These improvements also had an impact on $NO_x$ and NMVOC.

In addition, recalculations were made for methane emissions in CRT sector *3.A Enteric fermentation* with implications for NMVOC emissions. For the first time, this category was calculated using the IPCC 2019 Tier 2 methodology for sheep,

goats, horses, poultry, deer and rabbits, resulting in new country-specific $CH_4$ EFs (equation 10.21, IPCC 2019).

New emission sources have also been introduced. The inclusion of rabbits in Austria's inventory under sectors *3.B.4.h Other animals* (together with deer) and *3.D.a.2.a Animal Manure Applied to Soils* resulted in slightly higher emissions for all relevant pollutants for the entire time series. Ammonia emissions from crop residues applied to soils are also reported for the first time in the current submission.

Detailed information on the inventory revision for the 2025 submission can be found in Austria's Informative Inventory Report 2025 (UMWELTBUNDESAMT, 2025b) and in Austria's National Inventory Document 2025 (UMWELTBUNDESAMT, 2025c).

The new WEM scenario includes the Ammonia Reduction Ordinance for the first time. In the previous submission, it was included in the WAM scenario.

## 5.5 Waste (NFR 5)

*Table 38: Major changes between the 2023 and 2025 projections for the NFR 5 sector (in kt) (source: Umweltbundesamt).*

| Pollutant | Sector (NFR) | 2005 | 2010 | 2020 | 2023 | 2025 | 2030 |
|---|---|---|---|---|---|---|---|
| $NH_3$ | 5—Waste | +0.00 | +0.00 | +0.00 | -0.02 | -0.03 | -0.03 |

Only minor revisions were reported for the w*aste* sector due to updated historical activity data from the annual air emission inventory regarding deposited and biologically treated waste amounts, wastewater volumes and the number of fires (UMWELTBUNDESAMT 2025b), which slightly changed the basis for extrapolation. In addition, slightly updated statistics on future population numbers (STATISTIK AUSTRIA 2024b) have become available.

## 5.6 Other sources (NFR 6.A)

The EMEP/EEA GB 2023 provides a Tier 1 methodology to calculate $NH_3$ emissions from pets. In the current submission, Austria reports ammonia emissions from dogs and cats for the first time using the default Tier 1 methodology according to the EMEP/EEA GB 2023. The inclusion of this new source category in the Austrian inventory resulted in higher $NH_3$ emissions between 0.6 and 0.9 kt $NH_3$.

Projected emissions data for this emission source have also been reported for the first time in the current submission.

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This report presents the results of projections for the air pollutants $SO_2$, NOx, non-methane volatile organic compounds (NMVOC), $NH_3$ and particulate matter ($PM_{2.5}$) under the "with existing measures" (WEM) and "with additional measures" (WAM) scenarios. It updates the previous air pollutant projections published in 2023 (REP-0877).

The WEM and WAM scenarios result in significant emission reductions from 2005 to 2030 for all pollutants. The most significant reductions, about 68% for WEM and about 69% for WAM, are projected for the pollutant NOx. The emission reductions for the other pollutants range from 16% to 60% in the WEM scenario and from 23% to 60% in the WAM scenario.

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