umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

GHG projections and assessment of policies and measures in Austria 2025

Reporting under Regulation (EU) 2018/1999

Submission: 15 March 2025

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PREAMBLE

This report presents Austria's greenhouse gas (GHG) emission projections up to 2050, considering two scenarios: 'with existing measures' (WEM) and 'with additional measures' (WAM). The WEM scenario includes mitigation measures implemented by 30 June 2024, while the WAM scenario incorporates the planned policies and measures outlined in Austria's Integrated National Energy and Climate Plan (NECP) submitted on 3 December 2024.

The emission projections are based on economic scenarios extending to 2050 and utilise various models. The energy scenario is derived from analyses of total energy demand and production, conducted using an econometric input-output model (MIO-ES). Sector-specific calculations were provided for the building sector by Zentrum für Energiewirtschaft und Umwelt (E-THINK 2025) and for the transport sector by the University of Graz (Hausberger & Schwingshackl 2025). Additional models address the agriculture and waste sectors.

The sectoral structure of the emission scenarios aligns with the reporting format of the United Nations Framework Convention on Climate Change (UNFCCC). The report complies with the requirements for reporting specified in the EU Governance Regulation[1] and the Paris Agreement[2].

[1] Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, http://data.europa.eu/eli/reg/2018/1999/oj.

[2] Chapter II of the Annex to Decision 18/CMA.1, https://unfccc.int/documents/193408 and Decision 5/CMA.3, https://unfccc.int/documents/460951.

CONTENTS

SUMMARY

This summary provides an overview of the projections for the scenario 'with existing measures' (WEM) and the scenario 'with additional measures' (WAM).

The main results for the five CRT sectors (without LULUCF) and for all greenhouse gases are presented in CO_2 equivalent units. Trend graphs include GHG totals by category and by gas.

Total GHG emissions

Emissions (without LULUCF) decreased by 13.7% from 1990 to 2023, falling from 79.6 Mt of CO_2 equivalent in 1990 to 68.7 Mt in 2023. The 'with existing measures' (WEM) scenario shows a 48% decrease from 1990 to 2050, i.e. from 79.6 Mt of CO_2 equivalent in 1990 to 41.6 Mt in 2050. The 'with additional measures' (WAM) scenario shows a 68% decrease over the same period, reaching 25.1 Mt of CO_2 equivalent.

Figure 1: Past trend and scenario (2024–2050): total GHG emissions (without LULUCF).

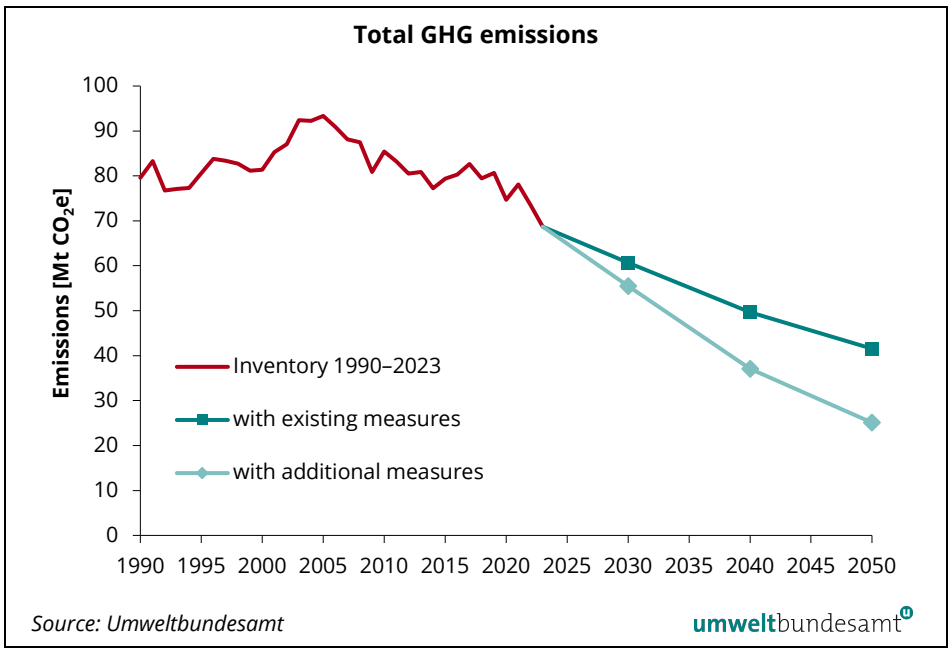


Table 1: Historical trends and projections (2024–2050): greenhouse gas emissions (without LULUCF) – scenario "with existing measures" (WEM). (Umweltbundesamt)

	Inventory trend [kt CO_2 eq]				Emissions 'with existing measures' [kt CO_2 eq]				
	1990	**2005**	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	79 621	93 341	74 679	68 696	69 201	60 688	54 811	49 655	41 551
1 Energy	52 835	66 889	50 142	44 451	45 542	40 739	35 485	30 795	24 460
2 Industrial Processes	13 641	15 651	15 524	15 472	15 092	12 057	11 509	11 091	9 702
3 Agriculture	8 581	7 578	7 568	7 477	7 357	6 840	6 854	6 864	6 555
5 Waste	4 565	3 223	1 445	1 295	1 210	1 053	963	904	834

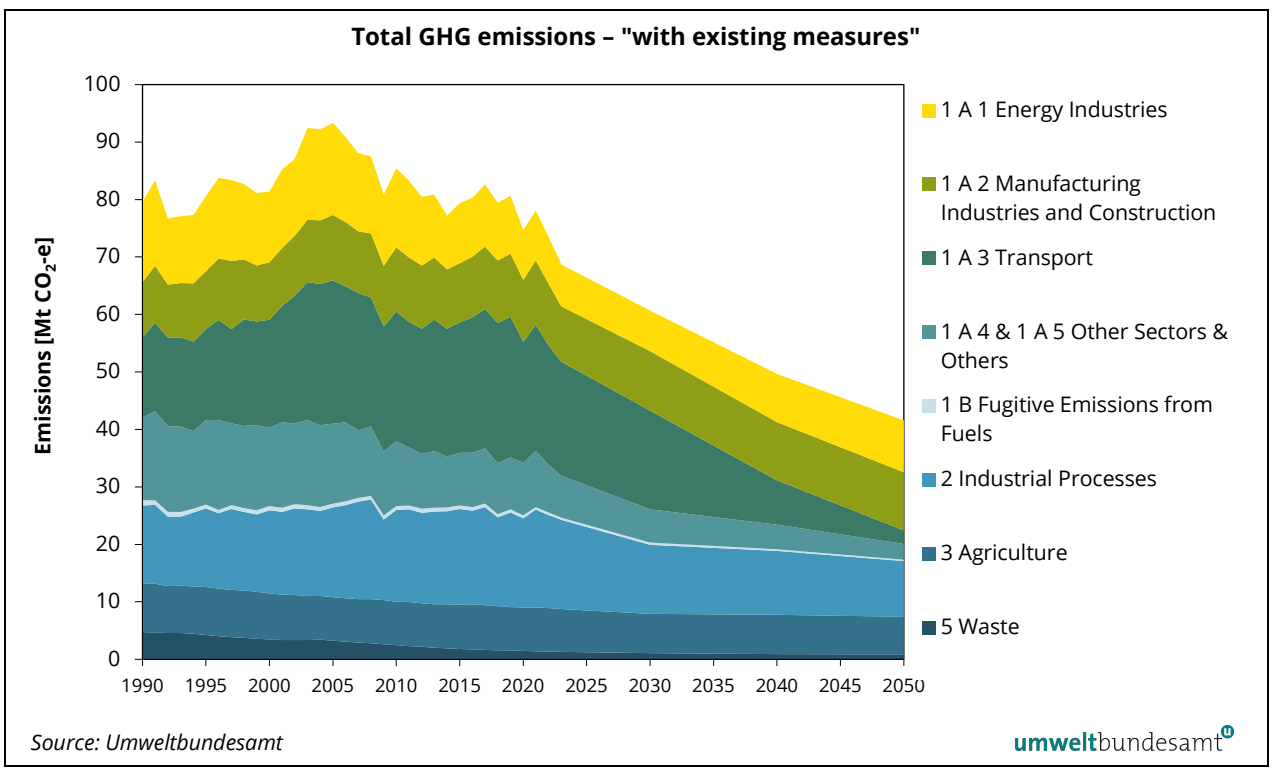
Table 2: Historical trends and projections (2024–2050): greenhouse gas emissions (without LULUCF) – scenario "with additional measures" (WAM). (Umweltbundesamt)

	Inventory trend [kt CO_2 eq]				Emissions 'with additional measures' [kt CO_2 eq]				
	1990	**2005**	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	79 621	93 341	74 679	68 696	70 750	55 451	46 323	37 037	25 094
1 Energy	52 835	66 889	50 142	44 451	46 393	35 824	27 551	21 674	14 953
2 Industrial Processes	13 641	15 651	15 524	15 472	15 829	12 313	11 631	8 377	3 649
3 Agriculture	8 581	7 578	7 568	7 477	7 319	6 262	6 178	6 082	5 659
5 Waste	4 565	3 223	1 445	1 295	1 210	1 053	963	904	834

The WEM scenario predicts a decrease in total GHG emissions of 40%, or 27.1 Mt of CO_2 equivalent, between 2023 and 2050.

This change is mainly driven by a decrease in the energy sector (minus 45%, or 20.0 Mt of CO_2 equivalent) and the industrial processes sector (minus 37%, or 5.8 Mt of CO_2 equivalent). Emissions from the agricultural sector are predicted to decrease by 12%, or 0.9 Mt of CO_2 equivalent. Emissions in the waste sector are projected to fall by 36%, or 0.5 Mt of CO_2 equivalent. In the energy sector, emissions from sub-sector 1.A.1 Energy industries are projected to increase by 24%, or 1.7 Mt of CO_2 equivalent, and emissions from sub-sector 1.A.2 Manufacturing industries and construction are projected to increase by 5%, or 0.5 Mt of CO_2 equivalent. Emissions from sub-sector 1.A.3 Transport are predicted to decrease by 88%, or 17.5 Mt of CO_2 equivalent, while emissions from sub-sectors 1.A.4 and 1.A.5 'Other sectors & Others' are projected to decrease by 62%, or 4.5 Mt of CO_2 equivalent, between 2023 and 2050.

Figure 2: Past trend and scenario (2024–2050): total GHG emissions by sector) – scenario "with existing measures".



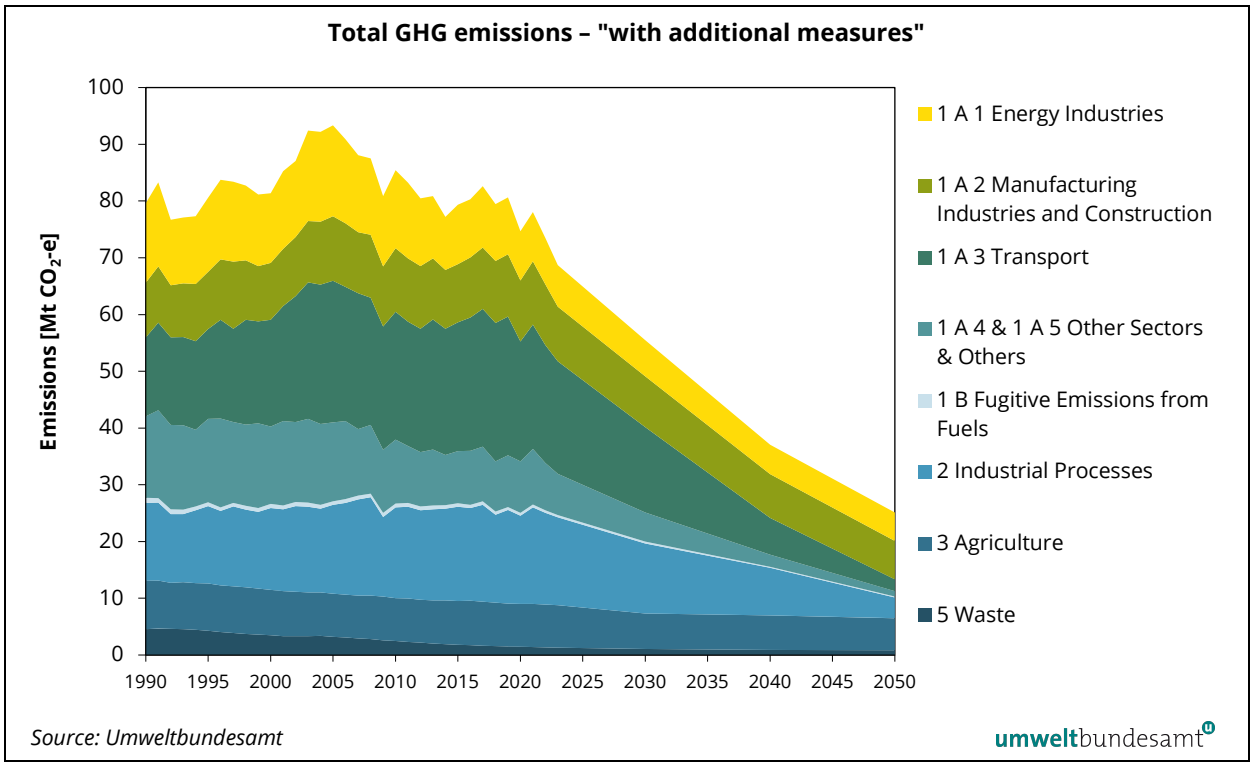
Source: Umweltbundesamt

umweltbundesamt

In the "with additional measures" scenario, total GHG emissions are predicted to decrease by 63%, or 43.6 Mt of CO_2 equivalent, between 2023 and 2050. This is mainly driven by an expected decrease in emissions from the energy sector (minus 66%, or 29.5 Mt of CO_2 equivalent) and the industrial processes sector (minus 76%, or 11.8 Mt CO_2 equivalent). Emissions are projected to decrease by 24%, or 1.8 Mt of CO_2 equivalent, in the agriculture sector, and by 36%, or 0.5 Mt of CO_2 equivalent, in the waste sector.

In the energy sector, emissions from sub-sector 1.A.1 Energy industries are predicted to decrease by 32%, or 2.3 Mt of CO_2 equivalent, between 2023 and 2050, and emissions from sub-sector 1.A.2 Manufacturing industries and construction are projected to decrease by 30%, or 2.9 Mt of CO_2 equivalent, over the same period. Emissions are also predicted to decrease in sub-sectors 1.A.3 Transport (by 90%, or 17.8 Mt of CO_2 equivalent) and in sub-sector 1.A.4 and 1.A.5 'Other sectors & Others' (by 87%, or 6.3 Mt of CO_2 equivalent) between 2023 and 2050.

Figure 3: Past trend and scenario (2024–2050): total GHG emissions by sector – scenario "with additional measures" (WAM).



In the WEM scenario, CO_2 will remain the dominant greenhouse gas (GHG) emitted in Austria, with a slight decrease from 82.8% in 2023 to 80.1% in 2050. Between 2023 and 2050, Austria's total share of CH_4 and N_2O emissions (in CO_2 equivalent) is projected to increase from 14.5% to 19.5%, while the percentage of fluorinated gas emissions (HFC, PFC, SF_6 and NF_3) is expected to decrease from 2.6% in 2023 to 0.5% in 2050.

Table 3: Past trend and scenario (2024–2050): GHG emissions by gas (without LULUCF) – scenario "with existing measures" (WEM). (Umweltbundesamt)

	Emission trend [kt CO_2 eq]				Emissions 'with existing measures' [kt CO_2 eq]				
	1990	**2005**	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
CO_2	62 191	79 095	62 180	56 909	57 892	50 460	45 224	40 611	33 273
CH_4	11 763	8 961	7 082	6 892	6 675	6 003	5 871	5 764	5 415
N_2O	4 117	3 502	3 223	3 077	3 101	3 004	2 943	2 875	2 669
F gases	1 550	1 782	2 194	1 818	1 532	1 222	772	405	194
Total	**79 621**	**93 341**	**74 679**	**68 696**	**69 201**	**60 688**	**54 811**	**49 655**	**41 551**

In the WAM scenario, CO_2 will also be the most important GHG emitted in Austria in 2050, with a declining share in national total emissions (from 82.8% in 2023 to 70.7% in 2050). Between 2023 and 2050, the total proportion of CH_4 and N_2O emissions is projected to increase from 14.5% to 28.6%. Emissions of fluorinated gases (HFC, PFC, SF_6 and NF_3) are predicted to decrease from 2.6% in 2023 to 0.8% in 2050.

Table 4: Past trend and scenario (2024–2050): GHG emissions by gas (without LULUCF) – scenario "with additional measures" (WAM). (Umweltbundesamt)

	Emission trend [kt CO_2 eq]				Emissions 'with additional measures' [kt CO_2 eq]				
	1990	**2005**	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
CO_2	62 191	79 095	62 180	56 909	59 462	45 771	37 444	28 806	17 730
CH_4	11 763	8 961	7 082	6 892	6 658	5 675	5 380	5 178	4 739
N_2O	4 117	3 502	3 223	3 077	3 097	2 784	2 727	2 648	2 432
F gases	1 550	1 782	2 194	1 818	1 532	1 222	772	405	194
Total	**79 621**	**93 341**	**74 679**	**68 696**	**70 750**	**55 451**	**46 323**	**37 037**	**25 094**

An analysis of past trends and scenarios by sector is presented in Chapter 2 'Sectoral Scenario Results'. The Annex includes tables with detailed emissions by sub-sector and gas. Specific sectoral assumptions and activities are provided in sub-chapters 3.1 to 3.5.

EU ETS/EU ESR emissions

GHG emissions covered by the EU's Emissions Trading Scheme (ETS) show a downward trend in the "with existing measures" scenario until 2050. This is driven by the industrial processes sector, which is projected to decrease by 31% from 2023 to 2050. Meanwhile, an increase of 17% is projected for the energy sector.

The EU's total GHG emissions under the Effort Sharing Regulation (ESR) are expected to decrease by 56% over the same period.

Table 5: EU ETS and EU ESR GHG emissions – scenario "with existing measures" (WEM). (Umweltbundesamt)

	with existing measures [kt CO_2 eq]						
EU ETS GHG emissions	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	**27 034**	**24 414**	**25 757**	**22 013**	**22 202**	**22 857**	**22 245**
1. Energy	14 158	11 173	12 544	11 524	11 796	12 494	13 059
2. Industrial Processes	12 876	13 240	13 213	10 489	10 406	10 362	9 186
EU ESR GHG emissions	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	**47 621**	**44 252**	**43 409**	**38 642**	**32 579**	**26 772**	**19 291**
1. Energy	35 961	33 248	32 963	29 181	23 659	18 275	11 385
2. Industrial Processes	2 648	2 232	1 879	1 568	1 103	729	517
3. Agriculture	7 568	7 477	7 357	6 840	6 854	6 864	6 555
5. Waste	1 445	1 295	1 210	1 053	963	904	834

Due to additional measures, the decrease in EU ETS emissions from 2023 to 2050 is expected to be more substantial in the WAM scenario (about 56%) than in the WEM scenario (9%). More specifically, the projected decrease in EU ETS GHG emissions is assumed to be about 77% in the industrial processes sector and 32% in the energy sector. The total EU ESR GHG emissions in the WAM scenario are expected to decrease by 68% over the same period.

Table 6: EU ETS and EU ESR GHG emissions – scenario "with additional measures" (WAM). (Umweltbundesamt)

	with additional measures [kt CO_2 eq]						
EU ETS GHG emissions	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	**27 034**	**24 414**	**27 546**	**21 194**	**19 619**	**15 919**	**10 710**
1. Energy	14 158	11 173	13 665	10 508	9 150	8 332	7 635
2. Industrial Processes	12 876	13 240	13 881	10 686	10 470	7 586	3 075
EU ESR GHG emissions	**2020**	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total (without LULUCF)	**47 621**	**44 252**	**43 169**	**34 223**	**26 674**	**21 093**	**14 369**
1. Energy	35 961	33 248	32 693	25 282	18 371	13 316	7 303
2. Industrial Processes	2 648	2 232	1 948	1 626	1 162	791	573
3. Agriculture	7 568	7 477	7 319	6 262	6 178	6 082	5 659
5. Waste	1 445	1 295	1 210	1 053	963	904	834

1 GENERAL APPROACH

1.1 Guidelines and Provisions

The following regulations and guidelines have been taken into account:

- **Regulation (EU) 2018/1999** of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action
  - Article 18 – Integrated reporting on greenhouse gas policies and measures and on projections
- **Commission Implementing Regulation (EU) 2020/1208** of 7 August 2020 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council
  - Article 36 – Reporting on national systems for policies and measures and projections
  - Article 37 – Reporting on national policies and measures
  - Article 38 – Reporting on national projections

The structure for reporting information on projected GHG data and policies and measures follows the structure of the templates provided in the Annex to the Regulation.

- Paris Agreement 2015 (Decision 1/CP.21)
  - Article 13 – Establishes the Enhanced Transparency Framework (ETF) for action and support. Requires all Parties to submit Biennial Transparency Reports (BTRs) with information on their Nationally Determined Contributions (NDCs) and progress.
- Katowice Climate Package 2018 (Decision 18/CMA.1)

  Provides the **Modalities, Procedures, and Guidelines (MPGs)** for the Enhanced Transparency Framework (ETF).
- Commission guidance for reporting on GHG projections in 2025 under Art. 18 of the Regulation on the Governance of the Energy Union and Climate Action (European Commission, Version 5.2, 06.02.2025)
- Recommended parameters for reporting on GHG projections in 2025 (European Commission, March 2024)

1.2 Quality Assurance & Control

A comprehensive QA/QC strategy has been implemented to ensure the integrity and reliability of emission data across all sectors. This strategy involves both input and output data verification processes that align with established data quality standards.

Input data verification involves the use of structured questionnaires to assess compliance with key quality standards, ensuring systematic validation across all

sectors. Meticulous documentation of data inputs and tracking of modifications to calculation files enhances transparency and traceability. Standardised data input forms are used across sectors, promoting consistency in data collection and minimising discrepancies. Output data verification includes detailed comparisons of emission results across sectors to identify anomalies and ensure data coherence. Emission trends are critically evaluated for plausibility, considering historical data and known sectoral activities. This is crucial for validating the accuracy of reported emissions and identifying inconsistencies. The QA/QC measures closely follow the procedures applied in the Austrian Air Emission Inventory, ensuring methodological consistency. Sectoral emission calculations are based on verified inventory methods to enhance data reliability. Those responsible for sectoral emissions often oversee data quality checks as well as inventory and projection compilation, leveraging their expertise to maintain data accuracy. The QA/QC process undergoes regular reviews to incorporate best practices and address potential quality issues, fostering continuous improvement.

Implementing these measures as part of the strategy ensures that sectoral emission data adhere to the highest standards of accuracy, completeness, consistency, comparability and transparency.

The specific responsibilities for this report are as follows:

Coordination & general chapters	Andreas Zechmeister, Michaela Stiefmann
Energy Industries & Manufacturing Industries	Michael Gössl, Thomas Krutzler, Herbert Wiesenberger
Transport	Gudrun Stranner, Margarethe Staudner
Other Energy Sectors	Wolfgang Schieder
Fugitive Emissions	Stephan Poupa
Industrial Processes & Product Use	Herbert Wiesenberger Maria Purzner, Manuela Wieser
Agriculture	Simone Mayer, Michael Anderl, Lisa Makoschitz
Waste	Katja Pazdernik, Michael Roll Stephan Poupa
LULUCF	Carmen Schmid, Peter Weiss

1.3 Description of General Methodology

1.3.1 Database and Historical Emission Data

The projections for greenhouse gases provided in this report are consistent with the historical GHG emission data from the Austrian Emission Inventory (submission March 2025) up to the year 2023.

1.3.2 Emission Projections Framework

The activity scenarios are structured in alignment with Austria's National Greenhouse Gas (GHG) Inventory to ensure consistency and coherence in data management and reporting. The data framework encompasses activities, input data, emission factors and emission calculations, all of which are organised according to the Selected Nomenclature for sources of Air Pollution (SNAP) categories. This standardised approach facilitates systematic data collection and analysis across various sectors. For reporting and aggregation of GHG output data, the Common Reporting Tables (CRT) format of the United Nations Framework Convention on Climate Change (UNFCCC) is used.

The methodologies applied in calculating emission projections are consistent with those used in the national GHG Inventory. These methodologies are comprehensively detailed in Austria's National Inventory Document 2025 (Umweltbundesamt 2025a).

Sub-chapter 3 of the aforementioned report provides detailed information on the emission factors and the underlying parameters employed in the projections. This section offers an in-depth explanation of the data sources, calculation methods and assumptions used, ensuring transparency and facilitating a thorough understanding of the projection process. By adhering to these structured methodologies and reporting formats, Austria maintains a high standard of accuracy and reliability in its GHG emission projections, contributing effectively to international climate change mitigation efforts.

1.3.3 Underlying Models and Measures

Emission projections are based on the following sectoral forecasts:

- The energy forecast (fuel combustion) is based on the National Energy Balance (Statistik Austria 2024a) and an econometric input-output model (MIO-ES), supported by calculations carried out using the 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 (including off-road, excluding aviation).
- The forecasts of emissions from industrial processes and solvent emissions are based on Umweltbundesamt expert judgements and projections for the respective gross value added (NACE code).
- The forecast of aviation emissions is based on the scenario developed as part of the SAF Roadmap (BMK 2024b).
- For estimations of emissions of fluorinated gases, the results of the Austrian model are extrapolated in accordance with EU legislation in force.
- In the agriculture sector, the following models were used:
  - To calculate activity data (animal livestock, crop yields, mineral fertilisers, agriculture area), the PASMA model of the Austrian Institute of Economic Research (WIFO & BOKU 2023) was used.

- To determine the economic impact on the overall economy, the PASMA results were transferred to ADAGIO, WIFO's Input-Output-Model.
- To calculate emissions, the agriculture model from the Austrian GHG inventory was used. Existing measures of agricultural practice projected for Austria were taken into account.

Projections for waste (expert judgements on waste amounts and a waste treatment World Model with econometrically estimated behavioural equations) were prepared by Umweltbundesamt.

Several models have been used for the different LULUCF sub-sectors:

- The CALDIS model has been used for forest growth and the YASSO 15 model for soil organic carbon.
- The PASMA model from the Austrian Institute of EconomicResearch has been used for cropland and grassland.
- Expert judgements have been used for wetlands, settlements and other land.
- The forest sector model FOHOW2 has been used for projections of harvested wood products.

Austria has developed two distinct scenarios to project future emissions:

- With Existing Measures (WEM): This scenario encompasses all policies and measures that were fully implemented by 30 June 2024.
- With Additional Measures (WAM): This scenario includes the planned policies and measures set out in Austria's National Air Pollution Control Programme and the Integrated National Energy and Climate Plan (NECP)

The implementation status of these measures has been assessed through expert consultations with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK). Chapter 4 provides detailed information on the national policies and measures incorporated into these scenarios.

1.3.4 Key Underlying Assumptions

The key factors used for the “with existing measures” and “with additional measures” scenarios are as follows:

Table 7: Key input parameters for emission projections for WEM

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

Table 8: Key input parameters for emission projections for WAM

Year	Scenario	2022	2030	2040	2050
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

Other underlying assumptions are included in Chapter 3 (Sectoral Methodology) and in the Annex.

1.4 Sensitivity Analysis

Scenarios are typically based on specific assumptions that set the direction for future developments. Key drivers (e.g. GDP) can be varied to verify the robustness or sensitivity of the models and projections.

This chapter presents sensitivity assessments for specific areas, analysing increases and decreases in key parameters (or a combination of key parameters). The sensitivity assessment in the energy sector is based on the influence of eco-

nomic growth on GHG emissions from transport, energy industries and manufacturing industries and construction. It is important to note that, in general, emission results and changes in one input factor are not linearly dependent. This is the reason why the presented sensitivity data cannot be seen as a functional dependency with varied parameters. The emission effect can only be seen in the specific values of the given parameters.

For the energy sector, two sensitivities have been calculated (based on different assumptions about economic growth):

- WEM sensitivity 1: high GDP growth (+0.5 pps per year)
- WEM sensitivity 2: low GDP growth (-0.5 pps per year)

The main input variables are summarised in Table 9.

Table 9: Basic parameters for sensitivity analysis modelling (Umweltbundesamt)

Parameter WEM sensitivity 1	**2023**	**2030**	**2040**	**2050**
GDP real growth rate [%]	-0.6%	1.9%	1.8%	1.8%
GDP [billion € 2023]	473	517	620	743
Parameter WEM sensitivity 2	**2023**	**2030**	**2040**	**2050**
GDP real growth rate [%]	-0.6%	0.9%	0.9%	0.8%
GDP [billion € 2023]	473	489	531	577

The following charts show an analysis of the trends in Austria's total GHG emissions and the results of the two sensitivity analyses. These results are also presented separately for ETS (Directive 2003/87/EC) and ESR (Regulation (EU) 2018/842).

Figure 4: Trend and projections (2025–2050): total GHG emissions for different sensitivities.

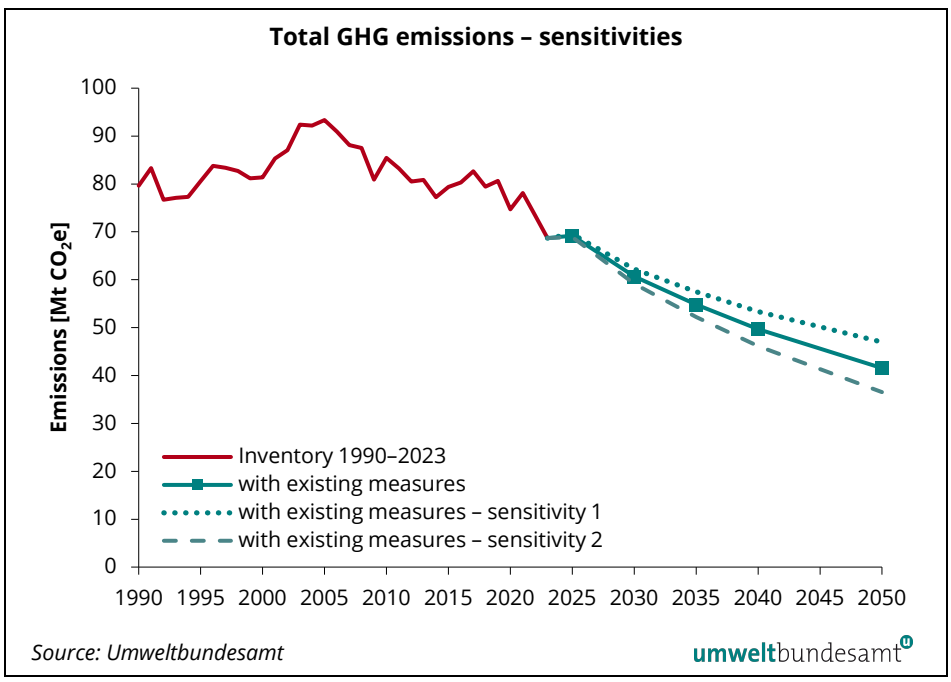


Figure 5: Trend and projections (2025–2050): total ETS GHG emissions for the different sensitivities.

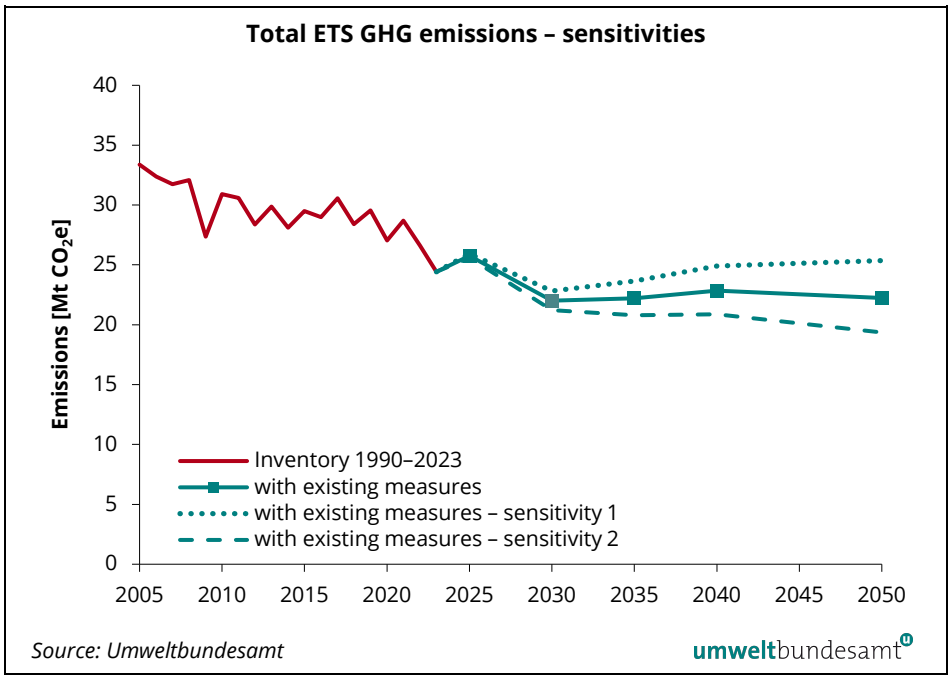
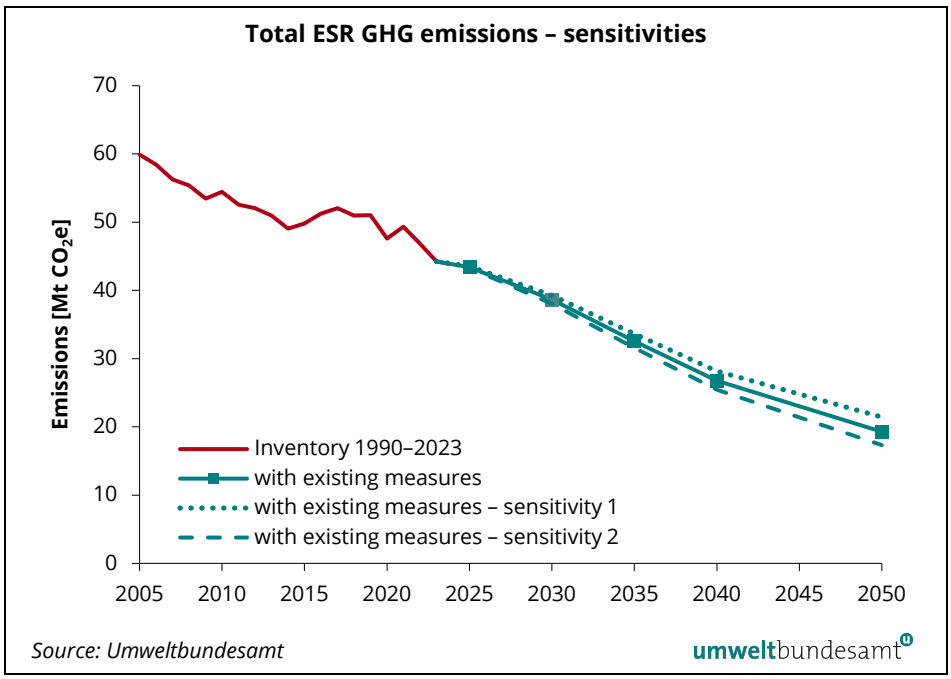


Figure 6: Trend and projections (2025–2050): total ESR GHG emissions for the different sensitivities.



The sectoral conclusions and the results of the sensitivity analysis can be summarised as follows:

The sensitivity analysis for the **energy and industry** sectors (Heat and Power Generation (1.A.1) and Manufacturing Industries and Construction (1.A.2)) shows a relatively strong dependence on GDP growth. A significant increase/decrease in emissions (+14%/-13% in 2050 compared to WEM) is expected as a higher/lower GDP growth rate is assumed.

The **Transport sector (1.A.3)** is one of the most sensitive to variations in GDP. A higher annual GDP growth rate leads to an increase in total GHG emissions (+11% by 2050). This is mainly due to intensified economic activity between

Austria and its neighbouring countries, as well as increased export quotas, which leads to an increase in road freight transport by heavy-duty diesel vehicles. GHG emissions are expected to rise accordingly. The results of the sensitivity scenario 2 show that a lower annual GDP growth rate leads to a decrease in the total GHG emissions from this sector (-10% by 2050).

GDP and price variations do not have a huge effect on emissions in **Other Sectors (1.A.4)**, as the variation in GHG emissions is below ±3% for all sensitivities in 2050. Increased economic growth leads to an increased demand for fossil energy compared to the WEM scenario. In the WEM sensitivity with higher GDP, the total fuel demand for heating is also higher than in the WEM scenario due to smaller investments in renovation measures.

The sensitivity analysis for the **Agriculture sector (3)** focuses 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 cost increase assumptions were determined through stakeholder dialogue, with higher construction costs than observed in the past being assumed. 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, Austria's milk production development deviates from that generally expected due to Austria's comparative advantage in dairy production compared to other countries.

1.5 Uncertainty in Projections

A complete uncertainty assessment was performed for the most recent inventory submissions (see UMWELTBUNDESAMT 2025). The uncertainty of the GHG totals in Austria's GHG Inventory is estimated to be below 5 per cent for the most recent inventory year. As fuel combustion is a major source of emissions, this sector (with a relatively small uncertainty) also determines the overall uncertainty. Uncertainties tend to be higher for some sources and can vary significantly between individual sources.

The development of GHG scenarios adds another layer of uncertainty. In general, the uncertainty associated with projected activity data is considerably higher, while the uncertainty in the emission factors may be similar to the levels of uncertainty in the inventory.

Overall, several key sources of uncertainty can be identified in emission projections:

- Inaccuracy in the base data, including uncertainties in the GHG inventory, energy balance and key statistics/surveys.
- Assumptions about economic activities and key drivers, such as GDP growth, energy prices and population trends.

- Impacts of policies and measures, which may vary in terms of their effectiveness and implementation.
- Weather conditions, particularly in specific years that experience extreme variations.
- Global developments, including unforeseen events such as pandemics and geopolitical conflicts. The main uncertainty factors are described for each sector in the following.

Energy Industries (1.A.1), Manufacturing Industries and Construction (1.A.2) and Industrial Processes & Product Use (CRT Source Categories 2)

Economic development (gross value added) directly influences energy demand and has been identified as the most important parameter. As can be seen in the sensitivity analysis, a decrease in GDP growth significantly reduces energy demand.

Another very important parameter is the global oil price along with developments in energy prices.

The third important parameter is the number of existing and prospective heat and power plants in Austria. Any long-term decisions on whether or not to build new gas-fired power plants in Austria depend heavily on the construction of renewable power sources and the development of the hydrogen industry.

For the wood and pulp and paper industries, the availability of biomass and the costs involved are also key parameters.

There is less uncertainty regarding population growth in Austria.

For halocarbons and SF6

Projections are mainly based on the pre-set quotas for the EU HFC phase-out. However, while Regulation (EU) 2024/573 specifies rules for the quotas of F-gases that may be placed on the European market, Austria has not been allocated an individual quota. In recent years, the decrease in use in Austria has been slower than at the EU level. As no distinct reduction path has been defined, expert judgement has been applied. This introduces an inherent uncertainty into the emission estimates.

For 2.D solvent use

Projections of CO_2 emissions in sub-sector 2.D 'Non-Energy Products from Fuels and Solvent Use' are mainly based on economic growth data for sectors that use solvents. However, a possible decoupling of solvent use from economic growth through continuous technical improvement has not been fully considered.

Transport (CRT Source Category 1.A.3)

Projections are influenced by numerous exogenous factors, such as population growth, the level of motorisation, fuel price trends, fuel export trends (fuel purchased in Austria and consumed abroad because of lower fuel prices in Austria

compared to neighbouring countries), fuel efficiency in newly registered vehicles, as well as yearly trends in new registrations of electric vehicles and the share of battery electric vehicles (BEVs) and plug-in electric vehicles (PHEVs).

Other Sectors (CRT Source Category 1.A.4 & 1.A.5)

The sensitivity analysis shows that variations in assumptions for GDP have a slight impact on emission projections (see the previous chapter).

Some uncertainty is associated with the implementation and acceptance of measures that influence overall heating demand, such as renovation and boiler exchange rates.

Economic development (gross value added), especially in the commercial sector, has a direct impact on energy demand. Furthermore, specific economic conditions may inhibit or postpone the implementation of renovation measures, which may result in smaller reductions in greenhouse gas emissions.

There is less uncertainty regarding population growth in Austria, as well as permanently occupied dwellings and the number of buildings.

Fugitive Emissions from Fuels (1.B)

The uncertainty in the fugitive emissions projections is closely linked to that in the energy industries sector. A higher level of uncertainty has to be expected when predicting CO_2 emissions from natural gas refineries, since these depend on the composition of the explored natural gas.

Agriculture (CRT Source Category 3)

Future projections are fraught with a range of uncertainties, which need 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 based on exogenous assumptions (prices, costs, technical coefficients) and model-endogenous coefficients (marginal costs), which are derived from 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, however, such adaptations may be overly optimistic, as farmers may not be able or willing to adjust in the way the model suggests.

Market uncertainty: A comparison of different OECD-FAO projections suggests that there is a considerable difference between them. The range of such uncertainties is discussed in more detail in the relevant 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, while urban planning regimes impact decisions about developments in residential and commercial areas, affecting the availability of agricultural land.

Land Use, Land-Use Change and Forestry (CRT Source Category 4)

The forest sub-category (including harvested wood products) has the highest impact on LULUCF projection results. Consequently, uncertainties in this sub-category are expected to account for most of the uncertainty in the total LULUCF trends. A particularly high level of uncertainty is associated with the simulated changes in forest soil C stock.

Waste (CRT Source Category 5)

Several assumptions have been made about the future volume of waste to be treated. As these are largely based on historical activity data and population trends, the level of uncertainty is moderate. Due to the availability of high-quality, country-specific data on an annual basis (EDM – Electronic Data Management, EMREG**-OW** – Austrian Emission register for surface water bodies) or on a regular basis (studies on landfill gas recovery at Austrian landfill sites, with the most recent one conducted in 2023[3]), the level of uncertainty associated with the projected activity data is relatively low.

With regard to solid waste disposal, the largest sub-category in the waste sector, it is important to note that historical depositions are the main factor influencing future emissions due to the application of the First Order Decay method (IPCC).

[3] Umweltbundesamt 2023c

2 SECTORAL SCENARIO RESULTS

2.1 Energy (CRT Category 1)

2.1.1 Energy industries (1.A.1)

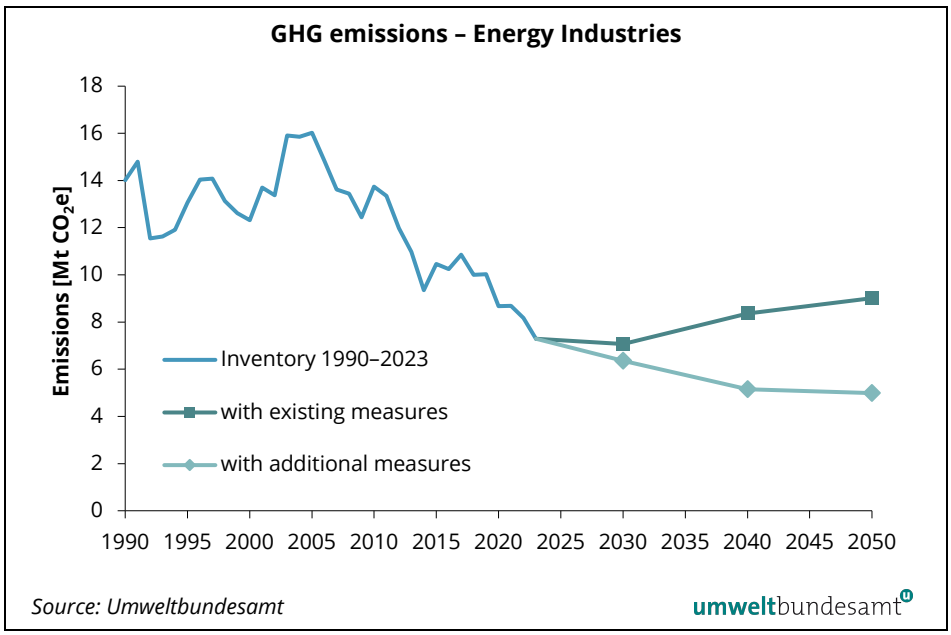


Figure 7: Past trend and scenarios (2024–2050): GHG emissions from 1.A.1 – Energy Industries.

In 2023, the emissions from sub-category *1.A.1 Energy Industries* were 48% below the 1990 level. GHG emissions from thermal power plants have generally decreased since 2005, mainly because of the growing contribution of renewable energy sources, the substitution of solid and liquid fuels with natural gas and biomass as well as improvements in efficiency. In 2020, the last Austrian coal-fired power plant was shut down.

The share of biomass used as a fuel in this sector increased from 1.5% in 1990 to 33% in 2023. The contribution of hydro, wind and photovoltaic power plants to total public electricity production rose from 69% in 1990 to 86% in 2023. Since 1990, electricity consumption has increased by 44%. Since 2002, this increase in consumption has largely been covered by electricity imports, except in 2023 when there was a small net export of electricity.

In the energy industries sector, GHG emissions are expected to remain stable until 2030. They are then predicted to increase again to meet the increasing demand for power and district heating from gas plants. The installed capacity of hydropower and especially of solar and wind plants is expected to increase significantly until 2030 but not beyond that year. The capacity of biomass CHP plants is expected to increase only up to 2030 – unless more subsidies than those planned in the WEM scenario are granted.

Growing electricity demand is expected to be the main driver of emissions in this sector. Demand is expected to rise by more than 1% each year. The demand for district heating is expected to increase steadily until 2050.

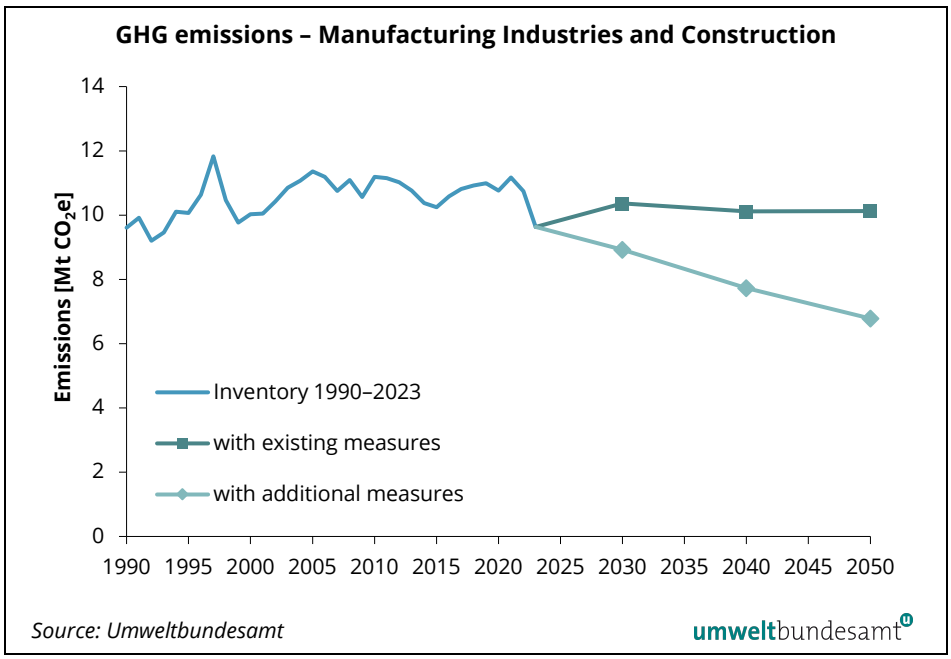
In the WAM scenario, the use of electric vehicles, heat pumps and electric appliances in industry is expected to further raise electricity demand. This additional demand will be met by creating additional renewable energy capacities (mostly wind and photovoltaics). District heating demand is projected to increase by another 15% (compared to the WEM scenario) until 2030. This demand will be met by installing additional biomass and waste boilers. Consequently, emissions in the WAM scenario are expected to be slightly higher than in the WEM scenario.

Emissions from petroleum refining are projected to slowly decrease by approximately 10% (WEM) and 20% (WAM) by 2050 compared to 2023 due to the dwindling demand for diesel and gasoline in the transport sector.

Emissions from oil and gas exploration and storage are expected to decline considerably due to a decline in gas exploration activities expected over the next decade.

2.1.2 Manufacturing Industries and Construction (1.A.2)

Figure 8: Past trend and scenarios (2024–2050): GHG emissions from 1.A.2 – Manufacturing Industries and Construction.



The Industry sector is one of the main sources of greenhouse gas emissions in Austria, mainly due to its CO_2 emissions. The main sub-groups contributing to these emissions are energy-related emissions from iron and steel production, the production of non-metallic minerals, the pulp and paper industry and the chemicals industry. A large proportion of emissions from iron and steel production are also included under process emissions (Sector 2C).

From 1990 to 2023, energy-related GHG emissions from 1.A.2 Manufacturing industries and construction increased by 0.2%. Emissions from Off-road vehicles and other machinery (1.A.2.g.7), Chemicals Industry (1.A.2.c) and Non-Ferrous Metals (1.A.2.b) increased, while emissions from Pulp, Paper and Print (1.A.2.d), Other Manufacturing Industries (1.A.2.g.8) and Non-Metallic Minerals (1.A.2.f) decreased since 1990. Fuel consumption increased by 35% over this period,

mainly due to increased use of natural gas and biomass. As natural gas has a lower carbon content and CO_2 emissions from biomass combustion are not accounted for under the UNFCCC reporting framework, the increase in GHG emissions from this category is significantly smaller (only 0.2%) compared to the increase in fuel consumption.

For the period 2023–2050, an increase in GHG emissions is expected as a result of higher sectoral GDP projections. These sectoral emission trends are mainly the result of different sectoral economic growth rates, which are, in turn, outcomes of the macroeconomic model.

Between 2023 and 2050, emissions are expected to increase in several industrial sectors: the pulp and paper industry (1.A.2.d; +4.4%), the non-metallic minerals industry (1.A.2.f; +31.8%) and other stationary manufacturing industry (1.A.2.g.8; + 13.8%).

However, emissions are expected to decrease in other industrial sectors: the non-ferrous metal industry (1.A.2.b; -2.3%), the chemical industry (1.A.2.c; -25.0%) and food processing (1.A.2.e; -1.3%).

A decrease is expected in the iron and steel industry (1.A.2.a; -9.9%). The mobile sources in this sector (CRT 1.A.2.g.7) accounted for 1.4 Mt of CO_2 equivalent in 2023, a figure expected to rise by 21.6% by 2050.

In the WAM scenario, the Energy Efficiency Act generally leads to greater efficiency increases across all industrial sectors. Additional subsidies for efficiency measures result in higher energy efficiency and lower final energy consumption in non-ETS sectors. Furthermore, the new Renewable Energy Expansion Act (Erneuerbaren-Ausbau-Gesetz) is expected to increase the supply of biomethane and hydrogen. It is assumed that biomethane will be distributed in the ESR sectors in proportion to their use of natural gas, whereas hydrogen is assumed to be integrated into the natural gas network and thus to be used in the ETS. In the iron and steel production sector, these measures affect not only sector 1A2a, but also sector 2C1.

2.1.3 Transport (1.A.3)

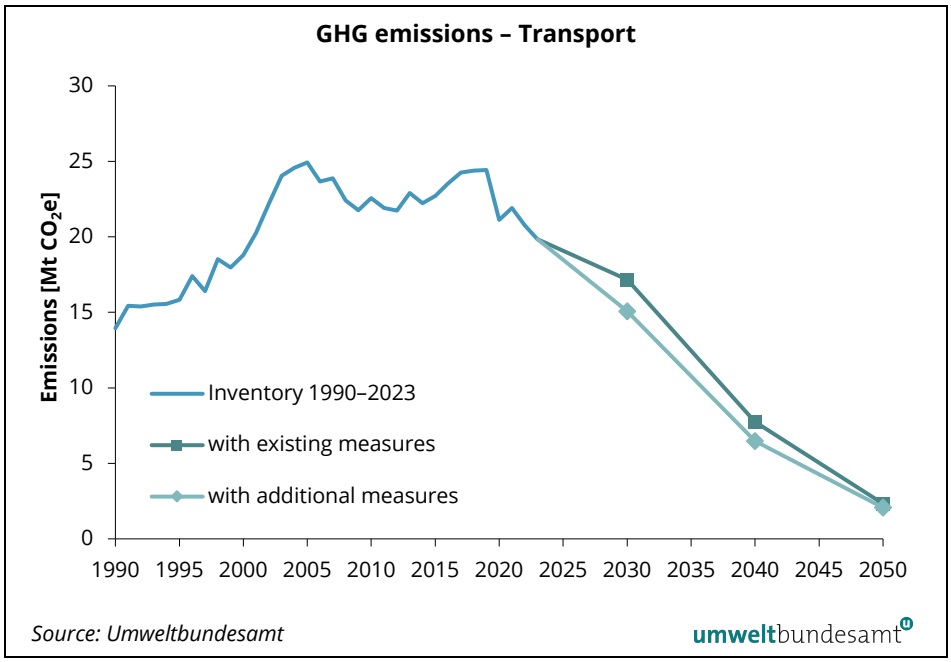


Figure 9: Past trend and scenarios (2024–2050): GHG emissions from 1.A.3 – Transport.

Since 1990, the sector 1.A.3 Transport has seen an increase in GHG emissions (+42%), mainly due to an increase in road performance (mileage) of diesel cars and freight transport. In addition to this increase in road performance in Austria, the amount of fuel sold in Austria but used elsewhere has increased considerably since 1990. This effect is known as fuel export and is mainly caused by lower fuel taxes in Austria compared to its neighbouring countries. GHG emissions reached a peak in 2005. Between 2005 and 2012, total GHG emissions decreased. This was due to lower amounts of fuel sales and an increased use of biofuels for blending as well as the gradual replacement of fleets with newer vehicles with lower specific fuel consumption. Since then, GHG emissions from transport have gradually increased in line with rising traffic volumes. In the pandemic year 2020, a sharp decrease in emissions was observed, followed by an increase in 2021 due to a slight economic recovery. Since then, GHG emissions have shown a decreasing trend. From 2022 to 2023, emissions from sub-category 1.A.3.b Road Transportation declined by 3.9% due to a drop in total diesel sales resulting from reduced mileage of heavy-duty vehicles on inland roads and abroad using Austrian fuel (fuel exports).

The transport sector is, and will continue to be, one of the main sources of greenhouse gases in Austria. GHG emissions are assumed to decrease until 2050 (-88.0%), mainly due to the increased share of electric vehicles in road transport and the quite stable use of biofuels with higher fuel efficiency standards.

By 2030, diesel PCs will account for around 39% of the total car fleet, while gasoline PCs will account for around 46%. BEVs will have a share of 15%. By 2050, BEVs will make up the majority, with a share of 84% (compared to 12% for diesel cars and 5% for gasoline cars).

The WAM scenario is based on the same assumptions for PCs, LDVs and HDVs. In the WAM scenario, however, the RED III Directive is implemented, resulting in an accelerated increase in the use of renewable energy sources in transport.

2.1.4 Other Sectors & Other (1.A.4 & 1.A.5)

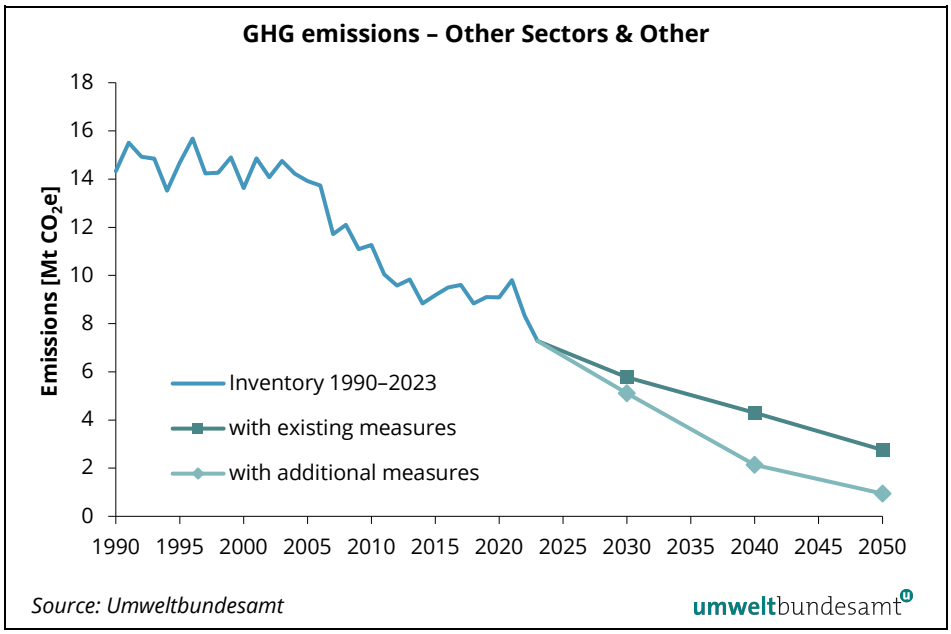


Figure 10: Past trend and scenarios (2024–2050): GHG emissions from 1.A.4 – Other Sectors (including Residential, Commercial/Institutional and Agriculture/ Forestry/Fishing) and 1.A.5 – Other (military).

The variation in demand for heating and hot water generation due to climatic circumstances and the shift in the fuel mix are important drivers of emissions from category 1.A.4 Other Sectors. Emissions in 2023 were 49% lower than in 1990. This reduction is mainly attributable to the replacement of coal-fired heating systems and the progressive shift of heating oil towards natural gas, biomass, district heating and heat pumps, as well as the long-term decrease in the number of heating degree-days. This development is supported by the increased energy performance of buildings (thermal renovation, energy-efficient new buildings). The total fuel consumption of this sub-category has decreased by 24% since 1990.

In 2023, categories *1.A.4 Other Sectors* and *1.A.5 Other* accounted for a considerable proportion of Austria's total greenhouse gas emissions. Despite an increase in the number of households and in occupied living space and commercial useful floor area, the total GHG emissions in these sectors are expected to see substantial reductions by 2050 in both scenarios.

The driving force behind these reductions is the expected shift away from fossil fuels to renewables like biomass, solar heat and ambient heat, combined with an increasing share of district heating and electricity for heat pumps. This means that more emissions will potentially occur in category *1.A.1 Energy Industries*.

In the WEM scenario, the prohibition of all heating systems suitable for fossil fuels in newly constructed buildings, thermal renovation and the installation of more efficient heating systems in buildings lead to a reduction in fuel energy consumption in category *1.A.4 Other sectors: Stationary combustion* by about

56% by 2050. A considerable reduction in GHG emissions is expected between 2023 and 2050.

In the WAM scenario, the reduction in GHG emissions is more significant. Thermal renovation and the replacement of fossil fuels in the building stock are both accelerated by a couple of measures, including extended funding programmes. By 2050, all existing building stock will have been converted into zero-emission buildings, which are more efficient and have zero on-site carbon emissions from fossil fuels. As exceptions may apply, for example to historic buildings, renewable gaseous fuels are allocated to buildings that will still be using the corresponding heating systems in 2050. This will lead to a reduction in fuel energy consumption in category *1.A.4 Other sectors: Stationary combustion* by about 67% by 2050. The combined additional measures will result in a considerably higher reduction in GHG emissions between 2023 and 2050 than in the WEM scenario.

Mobile sources in this sector (mainly from category *1.A.4.c.2 Agriculture/Forestry/Fishing: Mobile combustion*) accounted for 0.8 Mt of CO_2 equivalent in 2023 and are expected to decrease (-3.4% until 2050) in the WEM scenario. In the WAM scenario, it is estimated that they will decline by 34.0% by 2050 due to an optimistic electrification rate in new registrations of NRMM.

2.1.5 Fugitive Emissions (1.B)

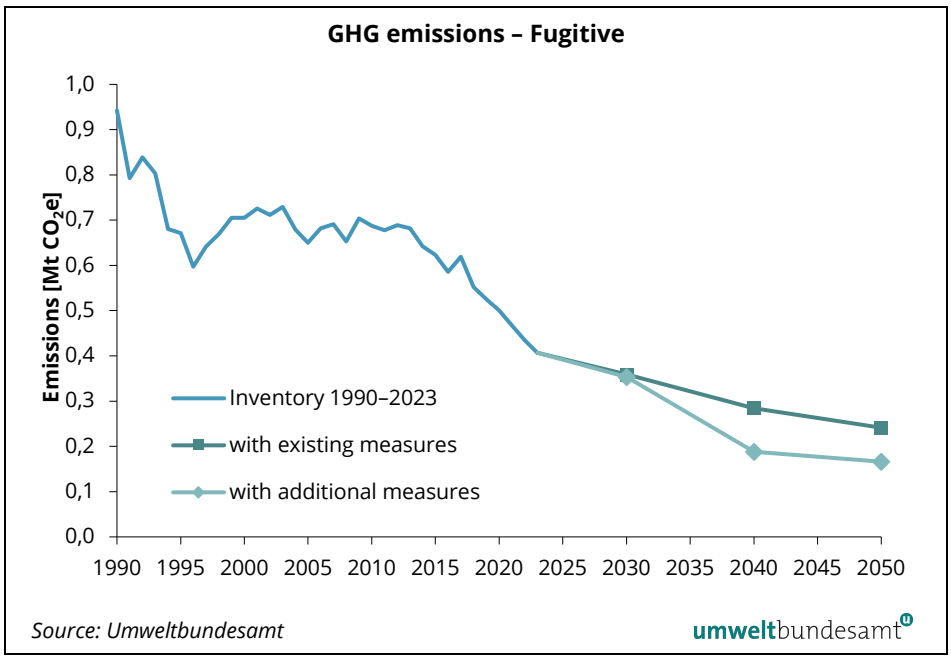


Figure 11: Past trend and scenarios (2024–2050): GHG emissions from 1.B – Fugitive Emissions.

Between 1990 and 2023, fugitive emissions from coal mining, fossil fuel exploration, refining, transport, production and distribution decreased by 57%. This is mainly due to the progressive closure of coal mines until 2006. There have been no coal-mining activities in Austria since 2007 (1.B.1 Coal Mining and Handling). Fugitive Emissions from 1.B.2 Oil and Natural gas are also below the 1990 level (-28%), mainly because the volumes of crude oil and crude gas produced have declined in recent years.

Austria's total fugitive emissions are expected to decrease due to a continuous decline in natural gas exploration and consumption, which is also accompanied by a reduction in the size of the natural gas distribution network.

2.2 Industrial Processes & Product Use (CRT Category 2)

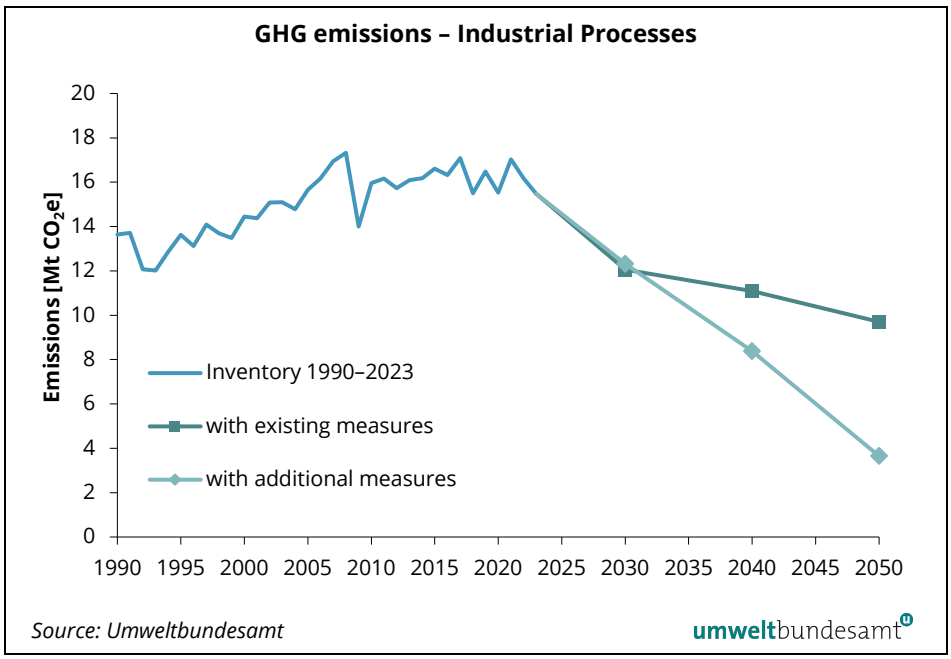


Figure 12: Past trend and scenarios (2024–2050): GHG emissions from 2 – Industrial Processes & Product Use.

In 2023, greenhouse gas emissions from *Industrial Processes and Product Use* amounted to 15 472 kt CO_2 equivalent, which corresponds to 23% of total national emissions.

The *metal industry* and *mineral industry* are the most important categories in this sector, generating 66% and 17% of total sectoral emissions, respectively. The most important greenhouse gas in this sector is CO_2, accounting for 87% of total sectoral emissions, followed by HFCs with 9.1% and SF_6 with 2.4%. The other GHGs contribute less than 0.4% each.

From 2022 to 2023, overall emissions from this sector decreased by 4.3%. This was mainly due to a decrease in cement production (-16% of emissions) and iron and steel production (-2.2% of emissions).

The overall trend in GHG emissions from *Industrial Processes and Product Use* shows an increase of 13% from 1990 to 2023. During this period, emissions were at their lowest level in 1993, after which they increased until peaking in 2008, followed by a significant dip in 2009. Since then, emissions have fluctuated just around the mean of these two years. The main drivers of the trend in emissions from this sector were (i) the termination of primary aluminium production in 1993, (ii) the introduction of N_2O abatement technologies in the chemical industry in 2004 and in 2009 (which became fully operational in 2010), (iii) the impact of the 2007-2008 financial crisis, (iv) increasing iron and steel production, resulting in 50% higher GHG emissions in 2022 compared to 1990 and

(iv) a strong increase in HFC emissions between 1990 and 2018, from 2 to 1 847 kt CO_2 equivalent.

Trend of projected emissions

Emissions from industrial processes are expected to continue to decrease until 2050, with the majority of overall reductions taking place until 2030. The main reductions are expected to be achieved in *Consumption of Halocarbons and SF6*, as well as in the main sub-category *Metal industries*, which shows a decrease by more than 40% due to the use of imported direct reduced iron in the blast furnace. There will also be a remarkable decrease in emissions from *Other product manufacture and use*.

Trend of the main sub categories

Between 1990 and 2023, the largest increase in GHG emissions can be observed in the metal industry (+23%) due to increased GHG emissions from iron and steel production. Emissions are expected to decrease by 43% by 2050 due to the increased use of imported direct reduced iron in the blast furnace.

In sub-category *mineral industry*, GHG emissions also peaked in 2008, showing an overall decrease of 18% from 1990 to 2023. Emissions are expected to remain rather constant in the coming years.

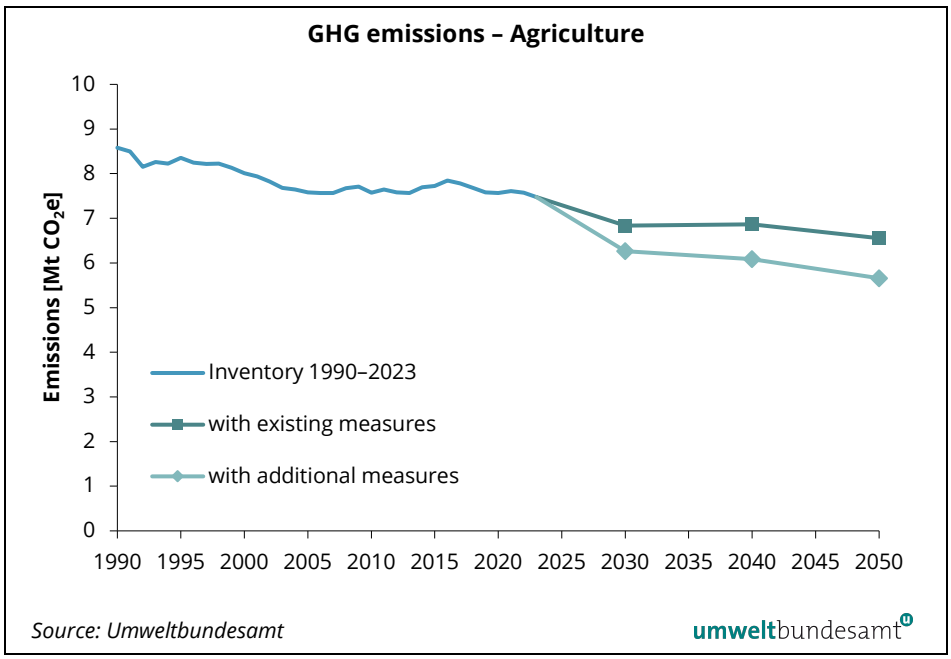
In sub-category *chemical industry*, GHG emissions declined by 54% over the same period due to abatement measures taken in nitric acid production. Emissions are expected to remain rather constant in the coming years.

Compared to 1990, emissions of *fluorinated gases* have increased by 17%, driven by an increase in HFCs (+327% since 1995), which have replaced Ozone Depleting Substances (ODSs) as cooling agents. The peak was reached in 2018, when the EU F-gas Regulation (Regulation (EU) No. 517/2014), which aims to limit the consumption of fluorinated greenhouse gases, started to take effect on emissions. Since then, emissions have been decreasing. Due to the limits and bans introduced by the new F-gas Regulation 2024/573 and the increased availability of low GWP alternatives, emissions are expected to continue decreasing until 2050. This will result in a reduction of over 90% compared to the 2018 peak.

The differences in process emissions between this scenario and the WEM scenario are due to different assumptions in the iron and steel production sector (2C1). The additional measures described in sector 1A2 also result in emission reductions in sector 2C1.

2.3 Agriculture (CRT Category 3)

Figure 13: Past trend and scenarios (2024–2050): GHG emissions from 3 – Agriculture.



In 2023, greenhouse gas emissions from agriculture amounted to 7 592 kt CO_2 equivalent, which correspond to 11% of total national emissions.

The most important categories of this sector are enteric fermentation (57%) and agricultural soils (23%). Agriculture is the largest source of national N_2O and CH_4 emissions, with 74% (8.9 kt N_2O) of total N_2O emissions and 76% (182 kt CH_4) of total CH_4 emissions coming from this sector in 2023.

Total GHG emissions from the agricultural sector are dominated by CH_4, accounting for 67% of emissions, and N_2O, accounting for 31%. CO_2 emissions account for 1.9% of the emissions from this sector.

The overall trend in GHG emissions from agriculture shows a 12% decrease from 1990 to 2023. This trend is mainly driven by the decline in the livestock numbers of cattle and swine as well as the reduced application of N-fertilizers to agricultural soils.

For the WEM scenario, the emission projections show a 12.3% decrease between 2023 and 2050. This trend is strongly influenced by projected figures of activity data such as livestock numbers, milk yields, mineral fertiliser quantities and crop yields. In addition, existing emission-reducing measures in the areas of feeding, animal husbandry, slurry storage and application of farm and mineral fertilisers were taken into account. These assumptions are based on existing measures as implemented in Austria, including those within the framework of the CAP strategic plan, and existing climate policy measures as well as the Ammonia Reduction Ordinance.

The WAM scenario shows that GHG emissions from the agricultural sector will decline by 24.3% between 2023 and 2050. This trend is influenced by additional measures, including animal feeding (climate-friendly and N-reduced feeding of cattle and pigs, increased grazing for cows), improved N management along the

entire manure chain. This results in decreased emissions from housing, storage and application of manure to soils. Furthermore, a significantly increased use of manure in biogas plants and a decreased use of mineral fertilisers are assumed.

Activity data scenarios were calculated using the agricultural sector model PASMA (WIFO & BOKU 2023). The results are briefly explained below:

Cattle numbers: WEM projections indicate that cattle numbers will decrease by 11% between 2023 and 2030. After 2030, the number will continue to decline until 2050, but at a lower rate. This is because only the output and input prices and technical coefficients will change. No further increment in investment costs was assumed. In its Agricultural Outlook for Markets, 2022–2032, the European Commission also anticipates a decline in beef production and a decrease in the number of dairy cows at the EU level. In the WAM projections, a slightly stronger decline in cattle numbers than in the WEM scenario is expected (-14% between 2023 and 2030) due to rising investment costs making milk and meat production less profitable.

Pig numbers: In the WEM scenario, the number of pigs decreases by 7.6% between 2023 and 2030, and by 9.3% in the WAM scenario. After 2030, the pig numbers decrease at a much higher rate in both scenarios because the relationship between output price and input cost is less favourable. In its Agricultural Outlook for Markets, 2022–2032, the European Commission also anticipates lower pork production at the EU level. In the WAM scenario, the decline in the number of pigs is slightly faster than in the WEM scenario. This is because higher investment costs to reduce emissions make pork production less favourable.

Poultry numbers: The number of poultry declines at a similar rate to the number of pigs until 2030. After 2030, the number of poultry decreases at a lower rate. The modelled development of the poultry population is in contrast to the observed trends. This is due to international competition for poultry meat and eggs and the comparatively high production costs in Austria.

Fertilizer application: PASMA model results for 2030 and beyond indicate that mineral fertilizer application to agricultural land will increase compared to 2023. The reason for this is the nutrient deficit due to declining livestock numbers. The lower amount of organic fertiliser will be offset by higher sales of mineral fertilisers.

Cropland and grassland: Total cropland and grassland areas are decreasing steadily.

Crop yields: According to the model results, crop yields are falling. Crop yields per hectare decrease slightly more compared to the corresponding cropping areas.

Organic soils: It is assumed that areas will stabilise at the observed level throughout the period.

2.4 LULUCF (CRT Category 4)

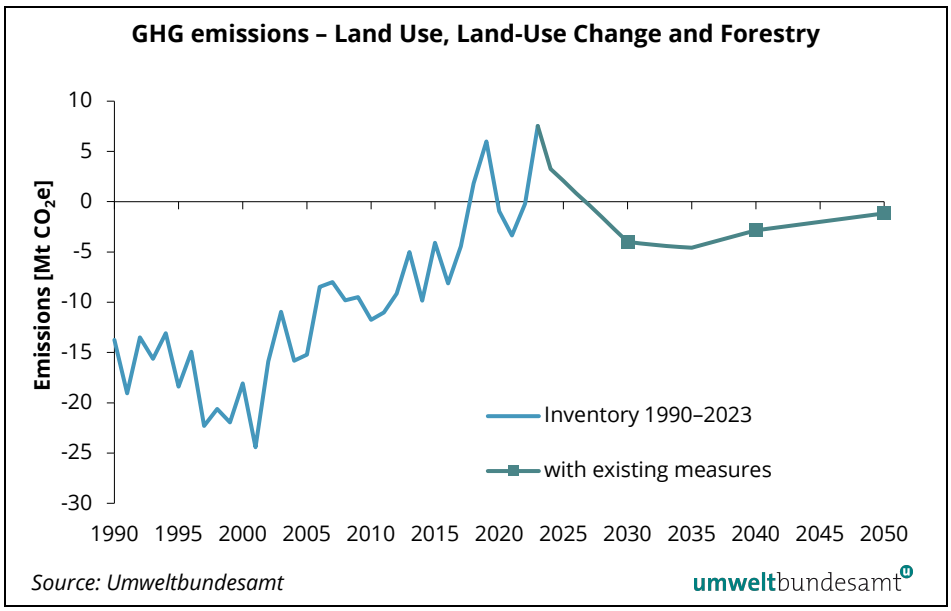


Figure 14: Past trend and scenarios (2023–2050): GHG emissions from 4 – Land Use, Land-Use Change and Forestry[4].

In 2023, net emissions from the LULUCF sector amounted to 7 530 kt CO_2 equivalent, which corresponds to 11% of the total national GHG emissions (without LULUCF) in 2023, compared to 17% in 1990.

With regard to the overall trend of net removals from LULUCF, removals decrease by 91% over the observed period (1990-2050). The main driver of this trend is the change in biomass carbon stock in forest land. Fluctuations, in particular the net emissions reported in recent years, are mainly due to the increasing impact of heat waves and drought seasons which affect growth rates (e.g. very low increments in 2015, 2018 and 2019) as well as windthrow and other natural disturbances (e.g. in 2018, 2019 and 2023).

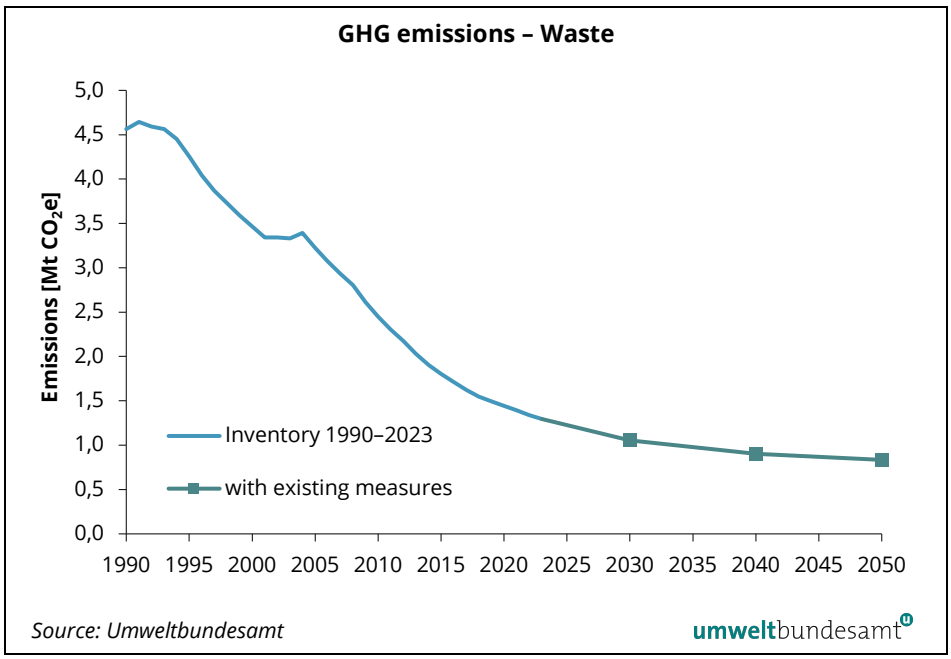
The LULUCF sector has been a net sink in most years in the past (except in 2018, 2019 and 2023), and it is projected to remain a small net sink in the period until 2050. However, the current projections do not fully reflect recent historic trends. Therefore, the results for the period between 2023 and 2030 are associated with high uncertainties. After 2035, the projections show that the net removals are expected to decrease towards zero. This will be strongly influenced by the decrease in removals from forest land due to the downward trend in biomass growth. Biomass use also shows a decreasing trend, but at a slower rate. In this context, it should be noted that natural disturbances are underrepresented in the current WEM scenario, as it is very difficult to model such randomly occurring events. The second largest category, harvested wood products (HWP), is projected to remain a net sink at a stable level (about −1.9 Mt CO_2 on average) during the period 2023−2050.

[4] The historical values of category 4.A.1 (which has the main impact on the LULUCF totals) for the years 2009 and 2010 are based on the averages of the NFI observation periods 2002 and 2008 and will be revised on the basis of the results of the next NFI.

However, the non-forest sectors (cropland, grassland, wetlands and settlements) are sources of emissions in the projected time series, amounting to approximately 2.7 Mt of CO_2 equivalent per year.

2.5 Waste (CRT Category 5)

Figure 15: Past trend and scenarios (2024–2050): GHG emissions from 5 – Waste.



In 2023, greenhouse gas emissions from the waste sector amounted to 1 295 kt CO_2 equivalent, which corresponds to 1.9% of total national emissions.

The most important category of waste is solid waste disposal, which caused 62% of the emissions from this sector in 2023, followed by wastewater treatment and discharge (27%) and the biological treatment of solid waste (12%). The most important greenhouse gas is CH_4, accounting for 82% of emissions, mainly arising from solid waste disposal. N_2O accounts for 18% of GHG emissions from this sector.

Overall, there has been a downward trend in GHG emissions from waste, with a decrease of 72% from 1990 to 2023. The main driver of this trend is the implementation of waste management policies. Since 1990, waste separation, reuse and recycling activities have increased and the amount of disposed waste has decreased correspondingly, especially since 2004, when the pre-treatment of waste became obligatory (although certain exceptions were granted to some Austrian provinces). The Landfill Ordinance provides the legal basis for reduced waste disposal and landfill gas recovery. Since 2009, all waste with a high organic content has to be pre-treated before deposition (without exceptions). Furthermore, methane recovery from landfills has been in place since the 1990s. The main reason for the decline in CH_4 emissions from wastewater treatment is that a growing proportion of the population is connected to the

municipal sewage system, which has led to a decline in the use of cesspools for wastewater disposal.

The scenario shows a further decline in emissions from waste disposal, which is in line with the historical downward trend due to decreasing deposited volumes and the decreasing carbon content of historically landfilled waste. In addition, landfill gas recovery contributes to decreasing emissions. Emissions from wastewater treatment and discharge are also falling slightly, due to expected ongoing plant modernisation and the resulting lower emissions from the anaerobic treatment of sludge. However, emissions from biological treatment are expected to increase slightly in line with the growing population.

3 SECTORAL METHODOLOGY

3.1 Energy (CRT Source Category 1)

Total energy demand and production was evaluated on the basis of an energy scenario developed by a consortium comprising 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 include energy prices, population and household income. This model was also used to calculate the energy sector.

The INVERT/EE-Lab (E-THINK 2025) software package was used to model 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 of minimising costs. The basic algorithm is based on the principle of the INVERT model. It allows for the calculation of energy demand for heating (space heating and hot water) in residential buildings and buildings of the public or private service sector by factoring in 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 during several modelling cycles. Umweltbundesamt experts combined the data produced by these 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.

3.1.1 Energy Industries (1.A.1)

3.1.1.1 Methodology of the sectoral emission scenarios

The output of the model based on MIO-ES (see Chapter 3.1) provides fuel-specific activity data for the energy industries, i.e. electricity and heat production including waste incineration. These were then multiplied by established and fuel-specific emission factors used in the Austrian Inventory. Emission factors for waste (e.g. municipal solid waste and hazardous waste) were derived from plant-specific data. The methodology used to create the emission factors is described in the Austrian Inventory Document (UMWELTBUNDESAMT 2025A).

As regards the only refinery in Austria, no major changes to production capacities or technologies used are expected at this time. Restructuring programmes and new production units have been introduced in the past. The most recent one was completed in 2008. Projections are based on the output of the MIO-ES model. A slight decrease in production has been calculated due to declining demand in the transport sector, using a refinery-specific emission factor calculated on the basis of average emissions of the years 2020–2021.

The exploration of oil and gas is expected to decline considerably over the next decade. Emissions from oil and gas exploration and storage are calculated by multiplying the energy input by a fuel-specific emission factor.

3.1.1.2 Assumptions

The assumptions on which the scenario is based (total inputs to power and heat plants, split by fuel type) can be found in the Annex. Energy demand is shown by sector and split by fuel type (final energy consumption). The assumption on which the basic weather parameter is based (heating degree days) is explained in Chapter 1.3.4.

Energy efficiency measures (see Chapter 4) are expected to have been fully implemented, leading to a decrease in electricity demand.

EU ETS/non-ETS

In 'Public Electricity and Heat Production' (1A1a), none of the non-ETS installations uses coal. Municipal waste is burned exclusively in non-ETS installations. Regarding natural gas and liquid fuels, it is assumed that the current ETS/non-ETS share will remain stable throughout the reporting period. 'Petroleum Refining' (1A1b) is fully covered by the ETS, except for non-CO_2 greenhouse gas emissions. In the sector 'Manufacture of Solid Fuels and Other Energy Industries' (1A1c), it is assumed that the current ETS/non-ETS share will remain stable throughout the reporting period.

Scenario "with existing measures"

Price per tonne of CO2 under the Emissions Trading Scheme

It is assumed that the European ETS will continue beyond 2030 and that the price will not be influenced by decisions of Austrian plant operators. The prices recommended by the European Commission have been used as follows:

€95 per tonne in 2030 and €100 per tonne in 2040, based on 2023 prices.

Renewables Expansion Act

The 'with existing measures' scenario assumes that the goals set out in the Renewables Expansion Act (Federal Law Gazette I No. 150/2021) for hydropower, photovoltaics and wind power will be met, while the goals for electricity from biomass and renewable gases will not be met. The Act aims to generate an additional 27 TWh of green electricity (11 TWh from PV, 10 TWh from wind, 5 TWh from hydropower and 1 TWh from biomass) and 5 TWh of renewable gases by 2030. The total electricity demand in 2030 is to be met by renewable electricity on an annual basis. However, this will not be achieved in the 'with existing measures' scenario.

Green Electricity Act

The 'with existing measures' scenario assumes that the goals of the Green Electricity Act 2012 (Federal Law Gazette I No. 75/2011) will be met with regard to hydropower and exceeded with regard to photovoltaics and wind power, while the goals for biomass will not be met. The Act aims to construct hydroelectric power plants with a capacity of 1 000 MW, as well as to install 2 000 MW of wind power and 1 200 MW of photovoltaic capacity and build biomass plants of 200 MW by 2020. The Green Electricity Act stipulates no specific goals beyond the year 2020.

Petroleum refining

See Chapter 3.1.1.1 for the assumptions made about this sector.

Manufacture of solid fuels and other energy industries

See Chapter 3.1.1.1 for the assumptions made about this sector.

Scenario "with additional measures"

In addition to the target set out in the Renewable Energy Expansion Act, draft legislation sets out an additional target of generating 8 TWh (thus a total of 35 TWh) from wind energy and photovoltaics.

3.1.1.3 Activities

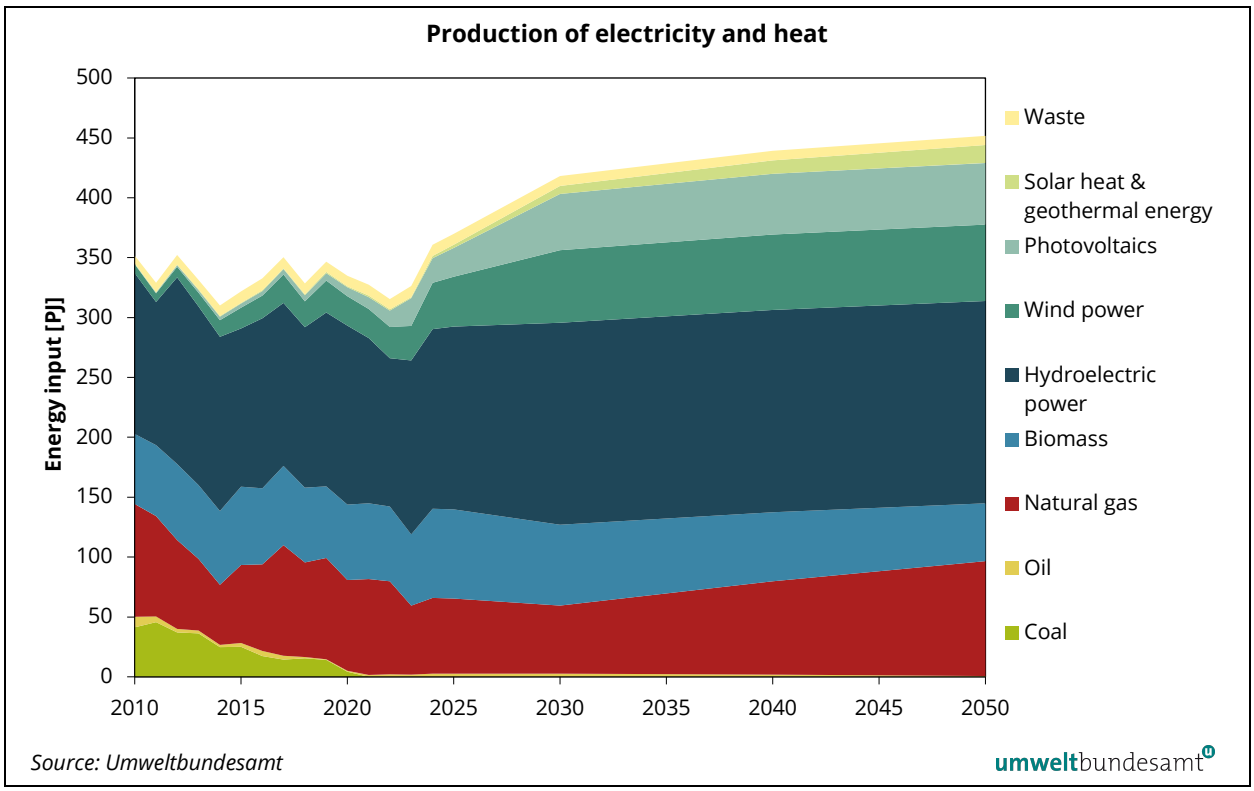
Scenario "with existing measures"

The energy input to Austrian heat and power plants is shown in Figure 16. Input to coal and oil plants is expected to decline (input to coal plants has ended in 2020) for economic reasons and because of the age of the plants, whereas input to gas plants is expected to remain stable until 2030 and then increase due to rising power demand. The decline in fossil fuel power plants will be driven by a significant increase in the production of hydro-electric, wind and photovoltaic energy with lower marginal costs. Input to biogas plants is expected to decline as subsidy schemes expire, while biomass heat and power plants are assumed to remain stable.

GHG emissions (and thus energy inputs) from the only refinery in Austria are expected to decrease slightly until 2050 due to declining demand in the transport sector as indicated in Chapter 3.1.1.1.

As regards oil and gas exploration and storage, natural gas is the only fuel source. Input is expected to shrink steadily due to limited reserves.

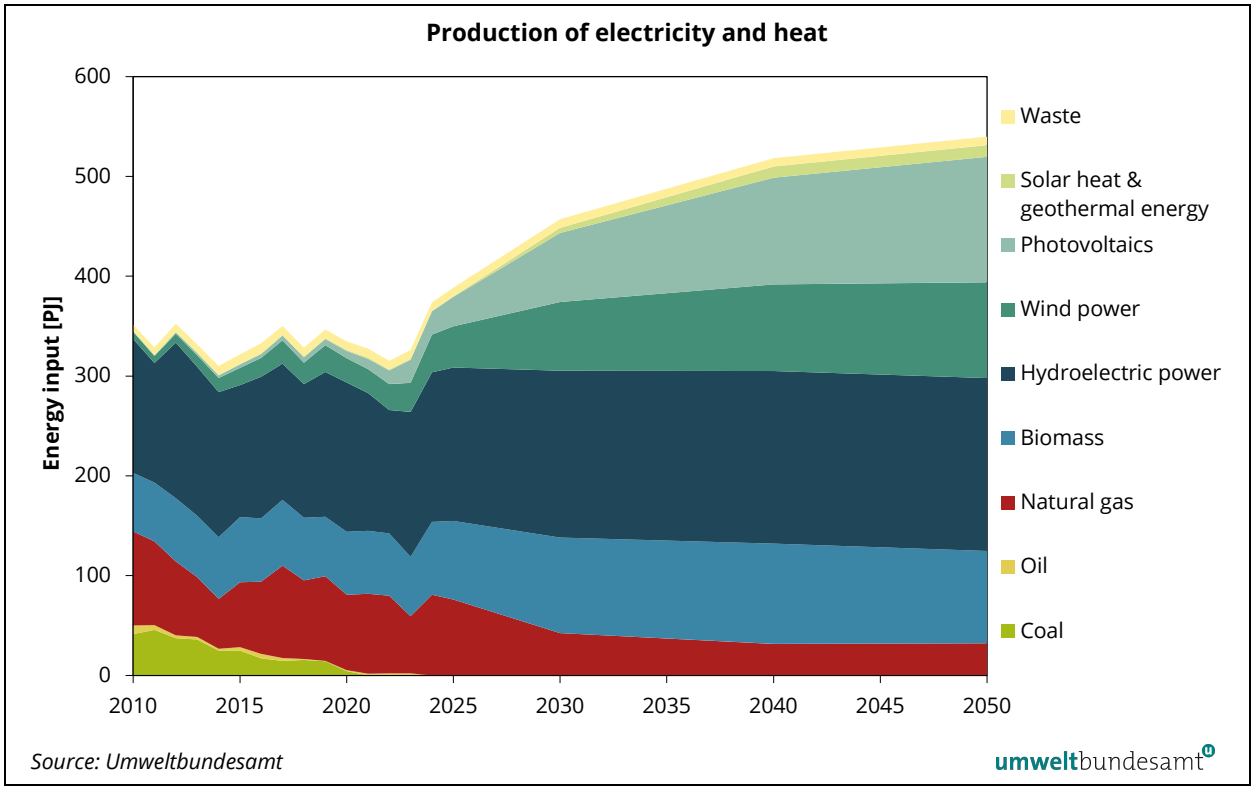
Figure 16: Energy input for electricity and heat production (1.A.1.a) – with existing measures.



Scenario "with additional measures"

According to the targets of the draft legislation for renewable energies, electricity generation from photovoltaics, wind power, and hydropower is set to increase significantly. Although the use of coal and oil in electricity production has already been largely phased out, the WAM scenario assumes that the remaining fossil-based electricity generation will be further reduced and fully replaced by renewables by 2025.

Figure 17: Energy input for electricity and heat production (1.A.1.a) – with additional measures.



3.1.2 Manufacturing Industries and Construction (1.A.2)

3.1.2.1 Methodology used for the sectoral emission scenarios

The methodology used here is the same as the methodology used in the Austrian Inventory. The emission factors and methodology are discussed in detail in the Austrian Inventory Document (UMWELTBUNDESAMT 2025a).

The models are described in Chapter 3.1 (Energy).

3.1.2.2 Assumptions

The assumptions for the global oil price are given in Euro 2023. After the COVID crisis, there was a sharp increase in prices. From 2020 to 2040, the price is expected to remain relatively stable. GDP growth is expected to average 1.3% per year until 2040 (see Chapter 1.3.4).

EU ETS/non-ETS

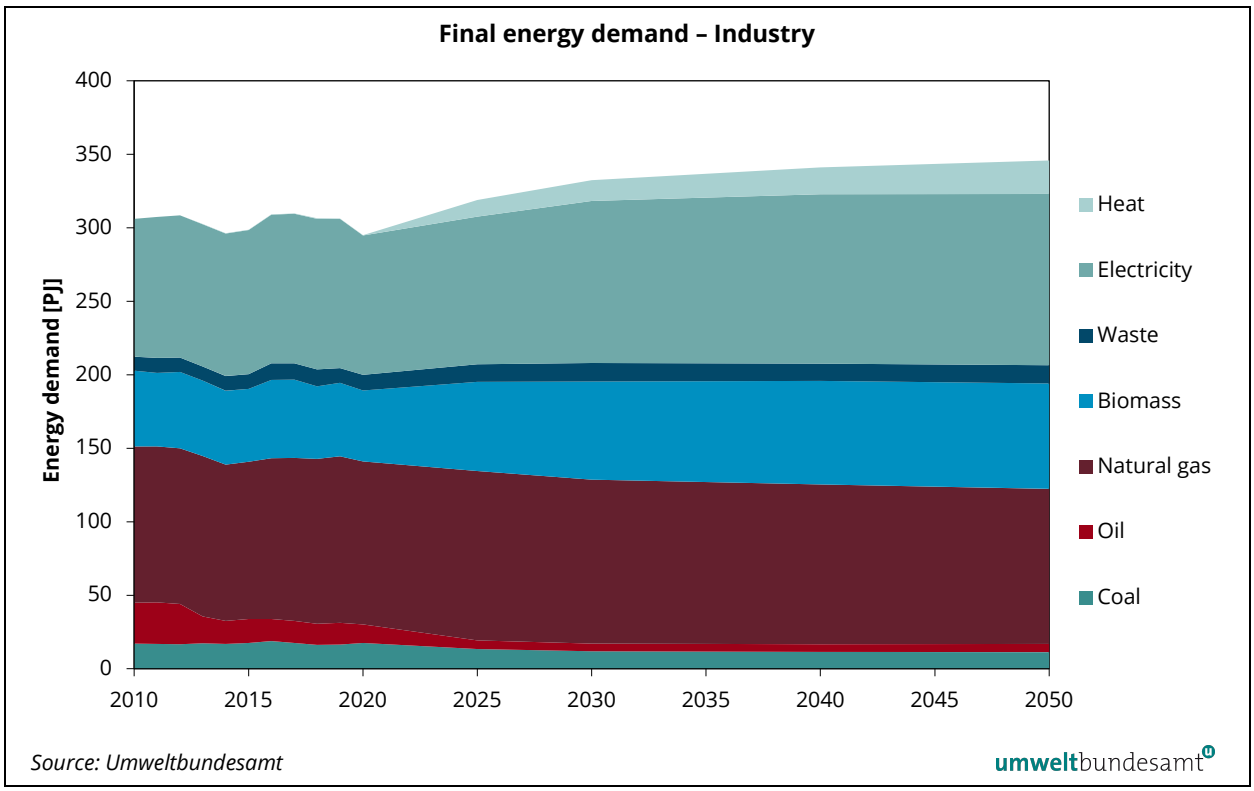
EU ETS/non-ETS emissions were split on the basis of sectoral fuel input. The ETS share of each fuel (averaged over the most recent years) was used to determine the fuel input for the EU ETS/non-ETS sectors until 2040.

3.1.2.3 Activities

Scenario "with existing measures"

Based on sectoral gross value added, energy demand in the industrial sector is expected to increase steadily from 2015 to 2040 (see Figure 18). More detailed figures can be found in Annex 2.

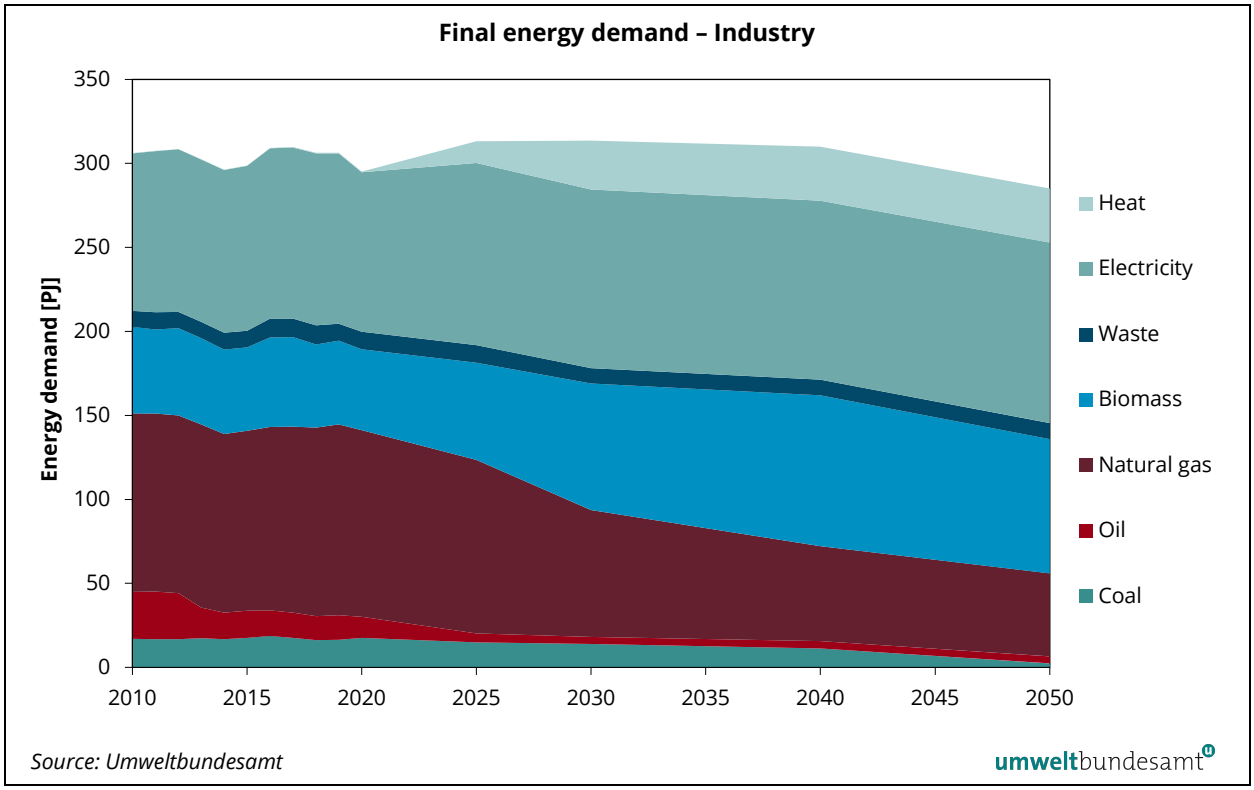
Figure 18: Energy demand in the industrial sector (incl. off-road) – with existing measures.



Scenario "with additional measures"

Due to energy efficiency measures and higher carbon prices, final demand in the WAM scenario is expected to be 14 PJ lower than in the WEM scenario in 2030. Despite an increase in GDP, there is still a decrease in final demand.

Figure 19: Energy demand in the industrial sector (incl. off-road) – with additional measures.



3.1.3 Transport (CRT Source Category 1.A.3)

3.1.3.1 Methodology used for the sectoral emission scenarios

The scenario comprises different approaches in each CRT 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 only 0.2%. According to international reporting guidelines, only GHG emissions from domestic aviation (i.e. 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. Energy demand for aviation fuels (kerosene and different types of sustainable aviation fuels (SAF)) has been estimated by taking into account national long-term GDP forecasts, fleet turnover with more energy-efficient planes and higher load capacities as well as assessments of national airport and airline experts regarding the capacities on the ground and in the air.

1 A 3 b - Road Transport

The calculation of transport emissions is based on two models:

NEMO – Emission model for Road Transport
Since the 2015 submission, the 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 can depict the upcoming variety of possible combinations of propulsion systems (e.g. internal combustion engine, hybrid, plug-in hybrid, electric propulsion and fuel cell) and alternative fuels (e.g. CNG, biogas, FAME, ethanol, GTL, BTL and H_2).

In addition, NEMO has been designed for use in all the main application fields for **simulating energy consumption and emission output, using a road-section based model approach**. As there is currently no complete road network for Austria on a highly resolved spatial level, NEMO uses an old methodology that categorises traffic activity as "urban", "rural" or "motorway". The model calculates vehicle mileages, passenger-kilometres, tonne-kilometres, 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 in Austria's National Inventory Document 2025 (UMWELTBUNDESAMT 2025a).

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. It is also used **to calculate the quantities of fuel exported in motor vehicles abroad** in the future. The KEX tool has been developed to estimate changes in domestic fuel demand and fuel exports in motor vehicles (Molitor et al. 2004, Molitor et al. 2009).

GDP, population, export quotas and domestic and foreign gasoline and diesel prices are used as independent variables in a very simplified statistical tool. In contrast, 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 b – Mobile sources

The calculation of transport emissions is based on the following model:

GEORG - Emission model for Off-Road Transport
The energy consumption and emissions of non-road mobile machinery (off-road) in Austria, including military off-road vehicles for ground operations, are calculated using the GEORG model (Grazer Emissionsmodell für Off-Road-Geräte) (HAUSBERGER 2000). The GEORG fleet model simulates the actual age and size distribution of non-road mobile machinery (NRMM) stock using 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 vehicles' first registration and their propulsion systems (gasoline 4-stroke, gasoline 2-stroke, diesel >80 kW, diesel <80 kW).

For more details, see the chapter on methodology in 3.2.13.2 Other sectors – mobile combustion in Austria's National Inventory Document 2025 (UMWELTBUNDESAMT 2025a).

1 A 3 e – Other transportation – pipeline compressors

Projections of energy demand in pipeline transport up to 2040 are based on expert judgements regarding European gas demand, gas and electricity prices, economic developments and a regression analysis of observed historical trends.

3.1.3.2 Assumptions

1 A 3 a – Aviation

The forecast of the future volume of air traffic depends on different European and geopolitical developments, such as economic trends, the European energy crisis or the CO_2 price development and is therefore subject to large fluctuations. The projection is based on the current 7-year forecast of the European Organisation for the Safety of Air Navigation (EUROCONTROL 2023), which shows possible growth in pan-European air traffic and depicts air traffic movements in three scenarios.[5]

In addition, a fourth scenario has been developed in coordination with the Austrian aviation industry in 2022 for the Austrian SAF Roadmap (BMK 2024b). The main assumptions regarding overall capacities at Austria's most important airport for international aviation and the minimum SAF quotas (differentiated into biofuel- and PTL-based) are still in place, with updates of the officially registered kerosene sales.

1 A 3 b – Road Transport

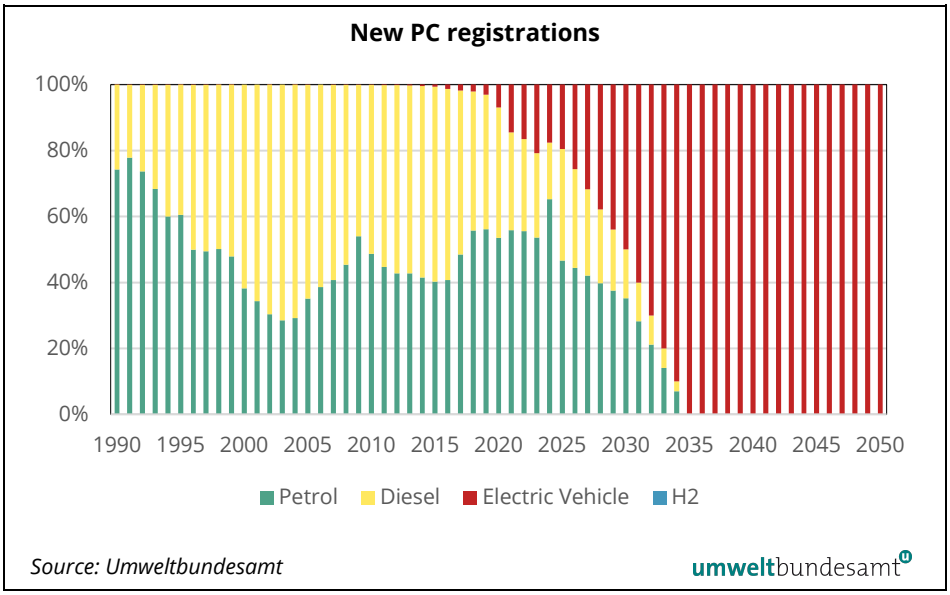
Development of the vehicle fleet

Diesel passenger car registrations have declined in recent years. Since 2018, petrol passenger cars have accounted for a higher proportion of new registrations than diesel cars. Given this trend and the associated problems with diesel cars and their emissions, it is assumed that over 100,000 new battery electric vehicles (BEVs) will be registered each year from 2028 onwards. Petrol car registrations will continue to rise until 2024. 2035 will be the first year with 100% BEV registrations.

The registration of new passenger cars and LDVs is in line with the targets set out in Regulation (EU) 2023/851. HDV registrations are governed by Regulation (EU) 2024/1610. For details, see Transport PaM N°10 Promotion of e-Mobility.

[5] https://www.eurocontrol.int/publication/eurocontrol-forecast-update-2022-2028

Figure 20: Shares per type of combustion in total new PC registrations.



Electric trucks of all size categories have been available for road freight transport for some time. However, consumer acceptance is not yet sufficient and many freight operators are only experimenting with electric vehicles in pilot projects. Therefore, it is not expected that electric heavy-duty vehicles will be purchased on a significant scale before the CO_2 emission reduction targets come into effect. Furthermore, rail transport provides an alternative to long-distance road transport. A shift away from road to rail should be aimed for in freight transport. Electric light-duty vehicles (LDVs) are already in use for urban collection and delivery services and are included in the current projections.

Figure 21: Shares per type of combustion in total new LDV registrations.

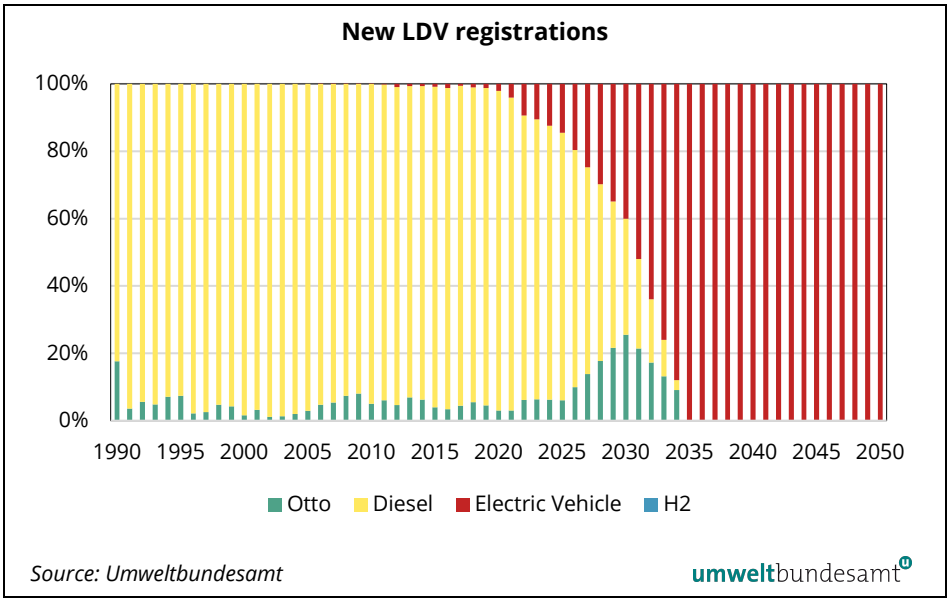
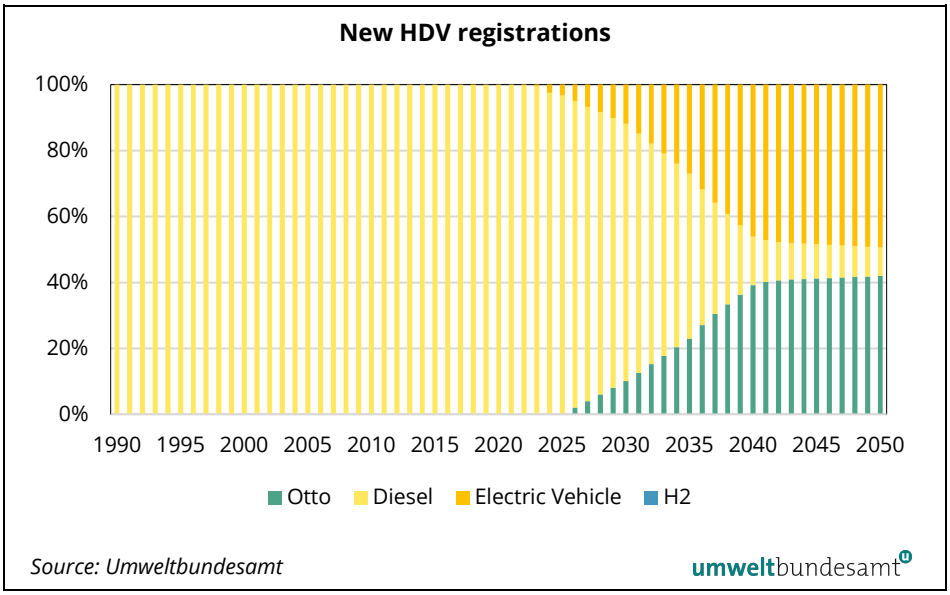


Figure 22: Shares per type of combustion in total new HDV registrations.



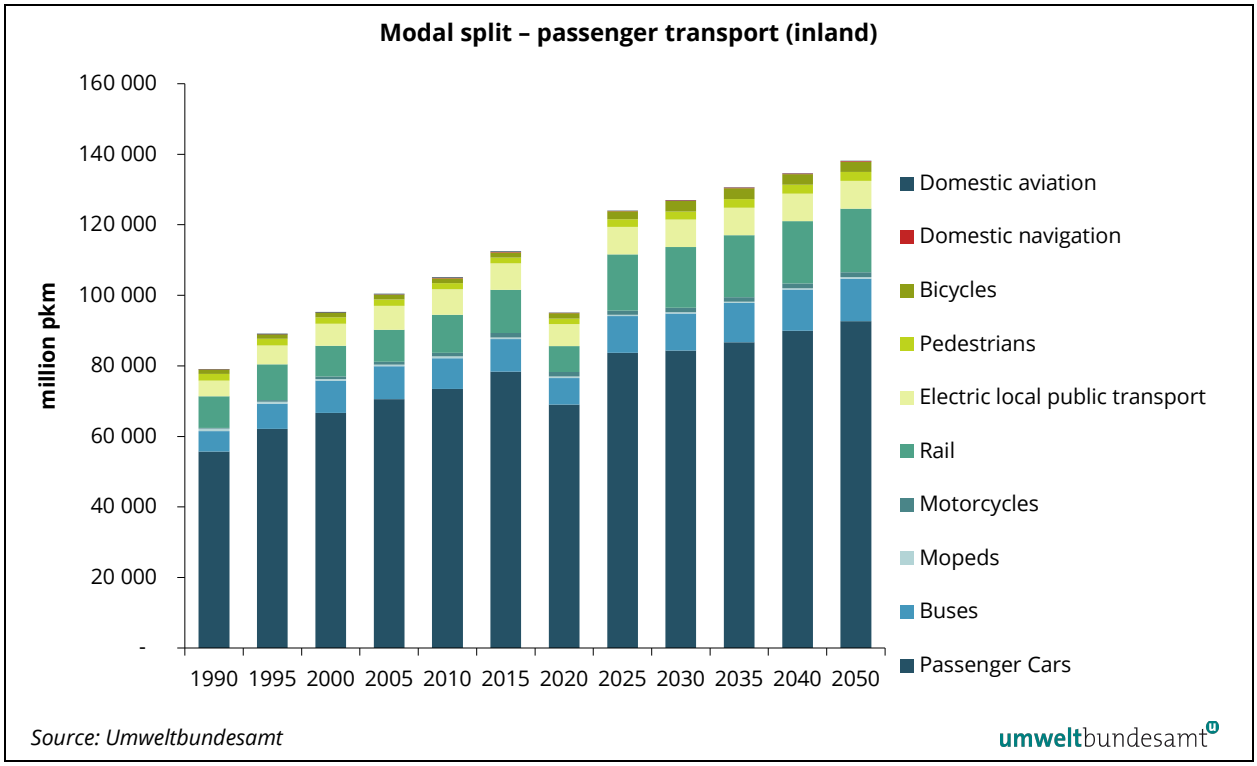
The WAM scenario is based on the same assumptions for PCs, LDVs and HDVs.

Development of passenger kilometres (pkm)

Passenger kilometres (pkm) have seen a steady increase since 1990. In the WEM scenario, it is assumed that pkm travelled will increase further, based on assumptions for the development of parameters such as the motorisation rate and population size. Compared to 2023, total pkm will increase by an average of 0.5% per year until 2050. The share of passenger rail transport (excluding electric local public transport) is expected to increase slightly. However, the share of rail transport will remain at around 13% (on average between 2024 and 2050). Road transport will continue to account for the largest share (87% on average between 2024 and 2050).

The following graphs show the modal split assumptions in inland passenger transport (excluding fuel export, international aviation and international navigation). The measures included in the WEM scenario will not result in a substantial change in the modal split of passenger transport.

Figure 23: Past trend and scenario (2024–2050) for pkm (excl. fuel export) – scenario with existing measures.



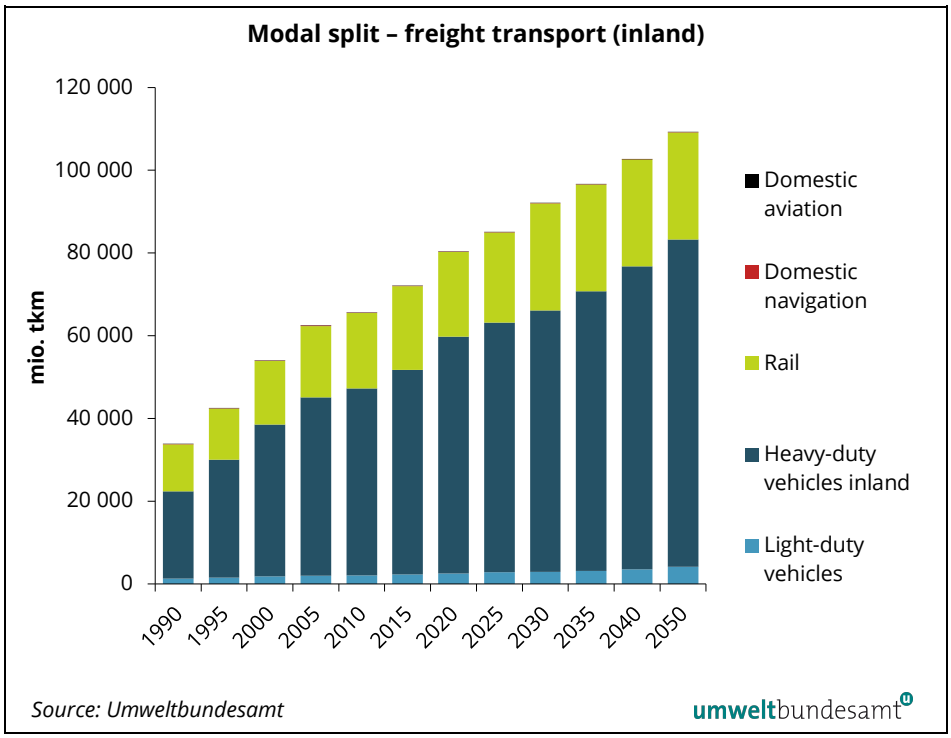
In the WAM scenario, passenger kilometres are expected to develop in a similar way, with a slight modal shift towards rail and public transport and active mobility.

Development of tonne kilometres (tkm)

Transport volumes (expressed in tkm) have increased since 1990 and are expected to rise further in the WEM scenario, based on assumptions for the development of parameters such as GDP growth. Compared to 2023, total tkm will increase by an average of 1% per year until 2050. The share of freight rail transport is expected to increase slightly. However, the share of rail transport will remain at around 26% (on average between 2024 and 2050). Road freight transport will continue to account for the largest share (74% on average between 2024 and 2050). Freight volumes of domestic navigation and aviation are expected to remain stable at a very low level.

The following graphs show the modal split and its development in inland freight transport (excluding fuel export, international aviation and international navigation). As shown in the figure below, the measures included in the scenario will not result in a change in the modal split of freight transport. Investments in rail infrastructure help to stabilise the share of rail transport and ensure its continued competitiveness.

Figure 24: Past trend and scenario (2024–2050) for tkm (excl. fuel export) – scenario with existing measures.



In the WAM scenario, a modal shift from road to rail is assumed.

Development of fuel export

Since the end of the 1990s, the gap between fuel sales in Austria and domestic fuel consumption has become larger. One of the reasons for this discrepancy is 'fuel export in vehicle tanks', which results from relatively low fuel prices in Austria compared to neighbouring countries. Especially the low tax on diesel fuel made Austria attractive for so-called "fuel tourism", a phenomenon which was very strong in the 1990s. A large number of vehicles still tend to fill up in Austria and use the fuel abroad. This has been confirmed by two national studies (MOLITOR et al. 2004, MOLITOR et al. 2009).

The table below shows that most neighbouring countries still have higher diesel prices than Austria. However, the recent price dynamic in the energy market has changed the stable pattern of a price difference of roughly 10 cents per litre. Thus, in 2023, the share of fuel exports in total GHG emissions from road transport was 11% (with 59% for PCs and 41% for HDVs), although this figure was higher in previous decades, at around 30%.

Table 10: Differences in gross diesel prices in €/l – average values for 2023)

Gross diesel prices	€/l	Difference to Austria
Austria	**1.64**	
Czech Republic	1.50	0.14
Hungary	1.62	0.02
Slovakia	1.55	0.09
Germany	1.73	-0.09
Slovenia	1.54	0.10
Italy	1.79	-0.15

It is assumed that the price difference between Austria and its neighbouring countries will remain stable over time, resulting in a relatively constant share of GHG emissions from fuel exports until 2050. No adaptations have been made in the WAM scenario.

The 'fuel export' phenomenon is relevant in the context of climate policies, for example with regard to Austria's commitment to the UNFCCC (Kyoto Protocol) because emissions are allocated according to national fuel sales. GHG emissions from fuel exports are thus assigned to Austria and included in the national total. Besides the difference in fuel prices, the development of fuel exports also depends on the development of vehicle fleets in neighbouring countries. In the WEM scenario, the volume of fuel exports decreases steadily, but its share in the total GHG emissions from road transport increases, as fleet electrification in neighbouring countries is forecast to be slower than in Austria.

Development of alternative fuels

SAF in 1.A.3.a Aviation

The WEM scenario contains the minimum blending quotas for sustainable aviation fuels (SAF from biofuels or synthetic origin) according to Regulation (EU) 2023/2405. Electric or hydrogen planes are not considered a valid option in the WEM scenario. No changes to the blending quotas have been made in the WAM scenario.

Biofuels in 1.A.3 Transport

Projections for alternative fuel consumption in the transport sector are considered in the context of meeting the European objective of achieving a 14% (energetic) share of renewable energy in the transport sector by 2030 (Renewable Energy Directive RED II 2018/2001/EU).

The 2030 target includes a sub-target for advanced biofuels (biofuels produced from specific raw materials listed in the Renewable Energy Directive – these amounts are incorporated into the calculated volumes).

In addition to biofuels blended with standard fuels, the projections include higher blends of diesel with HVO[6] and the use of pure biofuels, such as 100% biodiesel and HVO. HVO can be used as an additional blend for diesel on top of blending regular FAME biodiesel, given the high limits on biofuel composition of the fuel standard).

According to current blending standards, the limits of E10[7] and B7[8] have been used as a baseline to which "advanced biofuels" are added. Pure vegetable oil and biogas do not play a role in the WEM scenario. In the WAM scenario, the RED III Directive is implemented.

[6] Hydrotreated vegetable oil

[7] gasoline with 10% ethanol (volumetric)

[8] Blended diesel containing 7% biodiesel (volumetric)

Other fuels

The WEM projections for CNG (compressed natural gas) presented here are conservative, as vehicle registration data suggest that an immediate breakthrough is unlikely. The same is true for LPG (liquefied petroleum gas), which will fade out by 2030. Without the necessary incentives and sufficient availability of vehicle models on the market, hydrogen seems to be an unlikely alternative fuel option. In the WAM scenario, the RED III Directive is implemented.

Electricity

The share of renewable electricity in Austria's electric transport sector is particularly high, and this is a powerful lever in achieving the mandatory goal of a 14% share of renewable energy in transport by 2030. The amount of renewable electrical energy used is calculated using a factor of 2.5 for rail transport and 5 for road vehicles. Electricity used by other means of transport will be calculated without factors.

Current projections include all electrified road transport modes. It is assumed that the vehicle kilometres travelled by conventional vehicles will be replaced by those travelled by electric vehicles. The increased power consumption of electric vehicles has been included in the energy-producing sectors. In the WAM scenario, there are no significant changes in the share of electricity compared to the WEM scenario.

1.A.3.e – Other transportation – pipeline compressors

EU ETS/non-ETS

Until 2012, emissions from 'Other Transportation' (1A3e) were accounted for as non-ETS emissions. Since 2013, however, they have been covered by the ETS scheme, except for greenhouse gas emissions other than CO_2.

1.A.3.c, 1.A.3.d, 1.A.2.g.7, 1.A.4.b.2, 1.A.4.c.2, 1.A.5.b – Off-road

Projections for GHG emissions from rail (diesel and coal-based) show a slight yearly decrease of 0.3%, while GHG emissions from inland navigation increase by an average of 0.3% between 2023 and 2050. In both sub-categories, emissions follow the trend of fuel consumption.

Projections for non-road mobile machinery (NRMM) in the industry are based on the development of value added according to the NACE sectors of the DYNK model (WIFO 2018). Projections for NRMM in construction are based on the results of the MIO-ES model. An average yearly increase in the production index (baseline 2023) of 2.0% (construction) and 3.6% (other) up to 2050 has been assumed for the operating hours of mobile off-road machinery in industry.

Projections for NRMM in agriculture are based on grain harvesting. The number of hours that tractors are in use is expected to increase by around 0.2% on average per year between 2023 and 2050.

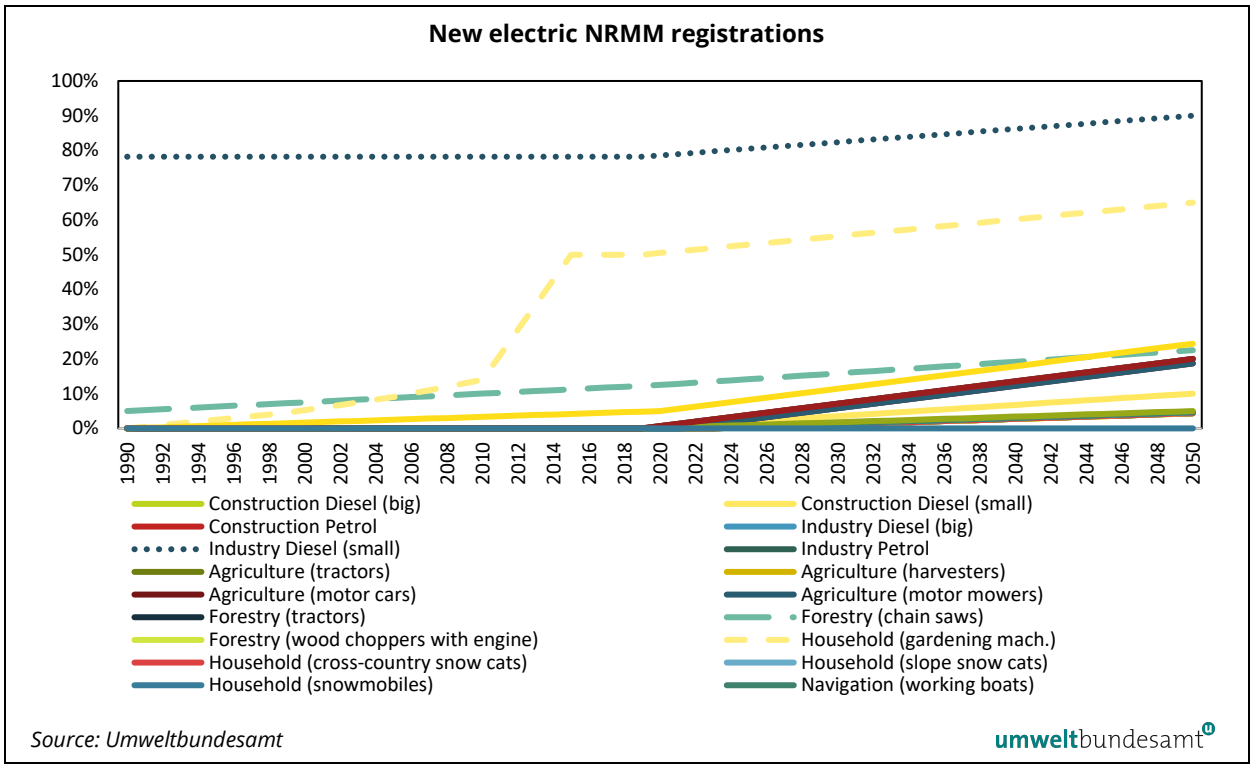
Projections for NRMM in forestry are based on woodcutting. The number of hours that tractors and chainsaws are used in forestry is expected to increase by

around 0.7% on average per year between 2032 and 2050, which reflects the historical average growth per year between 1990 and 2023.

Projections for NRMM in households are based on estimates of how many hours gardening tools are expected to be in use, showing an average yearly increase of 0.2% between 2023 and 2050. For other NRMM in households, a constant trend has been assumed due to a lack of historical data.

A moderate share of electrified mobile machinery in new registrations has been assumed for all NRMM sources in *1.A.4 Other Sectors*.

Figure 25: Electric shares in total new NRMM registrations.



Source: Umweltbundesamt

umweltbundesamt

In the WAM scenario, an advanced electrification of the NRMM is assumed.

3.1.3.3 Activities

1.A.3.a – Aviation

The baseline for the WEM scenario is derived from the real fuel sales from 2019 to 2023, according to Statistics Austria (energy balance) and the Austrian Air Pollution Inventory (OLI). Kerosene sales in 2024 were taken from the BMK's consumption statistics up to and including September and extrapolated to cover the whole year.

A record number of total flight movements were recorded at all Austrian airports in 2019. However, this trend was halted in 2020 by the pandemic, which led to an unprecedented decline of almost 75% and interrupted the steady increase in air traffic movements (Umweltbundesamt 2025a). Since 2022, air traffic has increased rapidly, with the number of flight movements in 2023

reaching around 80% of the numbers recorded in 2019. This rapid increase in 2023, 2024 and 2025 has rendered previous aviation projection obsolete.

From 2025 onwards, the WEM scenario is close to the Eurocontrol "base" scenario and is also valid for the WAM scenario. Key assumptions from the consultation between stakeholders of the Austrian aviation industry (ZOVI) and the Federal Environment Agency, which took place during the preparation of the SAF Roadmap, were adopted.

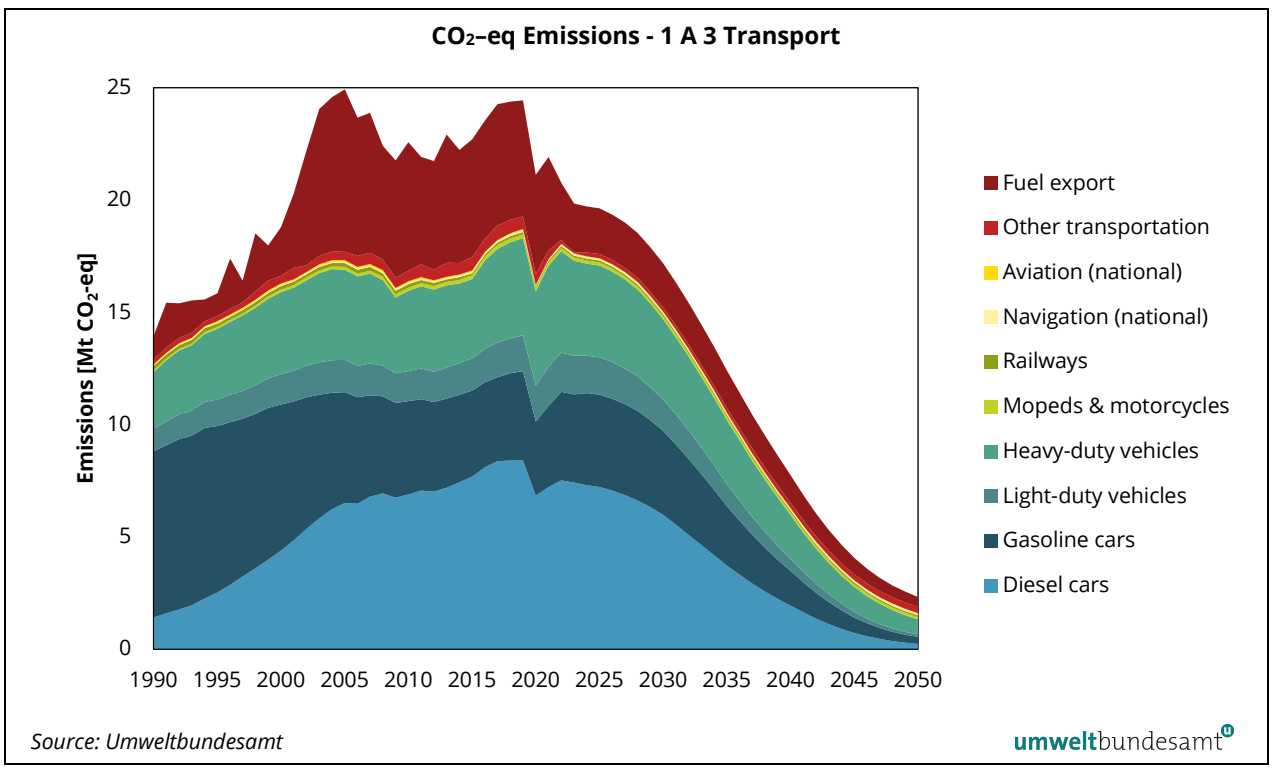
In the WEM scenario, GHG emissions from domestic aviation amount to 62 kt by 2050. In the WAM scenario, no changes to the SAF blending quotas have been made.

1.A.3.b – Road Transport

After a steady rise in GHG emissions in the transport sector, a decrease was observed between 2005 and 2012. This was due to lower fuel sales, increased biofuel blending and the gradual replacement of the vehicle fleet with newer vehicles with lower specific fuel consumption. Since then, GHG emissions from transport have continued to increase in line with rising traffic volumes. However, the pandemic year 2020 stopped this trend, with inland road transport reaching the pre-pandemic level once more in 2024.

For the WEM projections up to 2050, GHG emissions are projected to decline in line with the uptake of electric mobility, with a decrease of 88% compared to 2023.

Figure 26: CO_2–eq emissions from transport – scenario with existing measures.



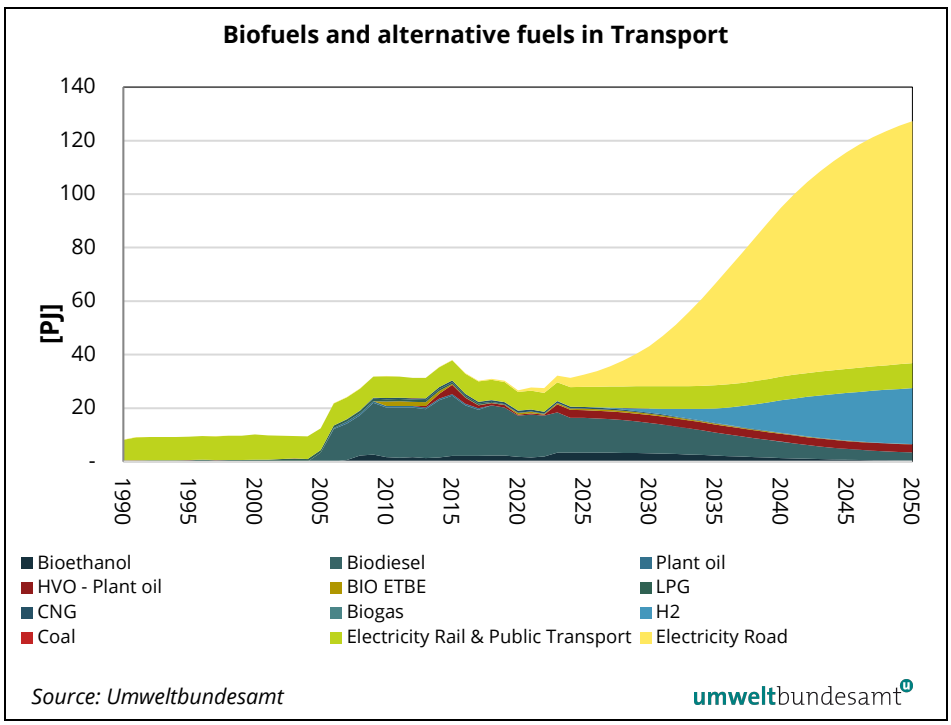
The WAM scenario for the transport sector was completed in July 2024 (hereinafter referred to as WAM24-NEKP). It is not based on the current WEM scenario described in this report (hereinafter referred to as WEM25) but on an earlier version from 2023 (hereinafter referred to as WEM23). The cut-off date for policies and measures in the WEM23 scenario is 1 January 2022. All calculated reduction effects *for 1.A.3 Transport and NRMM* result from a comparison of the WAM24 NEKP with the status quo of January 2022 of the WEM23 scenario.

The cut-off date for the current WEM25 scenario is 30 June 2024. Due to the later cut-off date, several policies and measures that were originally part of WAM24-NEKP have now come into force and are included in the WEM25 scenario. For this reason, this chapter only lists the policies and measures that go beyond those of the WEM25 scenario. In addition, no effects on GHG reduction are indicated, as the WEM25 and WAM24-NEKP scenarios have two different starting situations.

Since 2005, biogenic fuels (biodiesel, bioethanol, and vegetable/plant oil) have been used in the Austrian road transport sector. Biodiesel and bioethanol are mainly used for blending fossil fuels, whereas vegetable/plant oil is distributed in its pure form. As blended biofuels have the main share on the biofuel market, any reduction in energy consumption of fossil fuels caused by other transport policy measures will result in a similar reduction of the biofuel amounts.

The following graph shows the developments and trends in biofuels and alternative fuels, such as LPG, CNG and hydrogen up to 2050 in the WEM scenario. The base year 2023 shows the current data.

Figure 27: Biofuels and alternative fuels in Austria – scenario with existing measures.

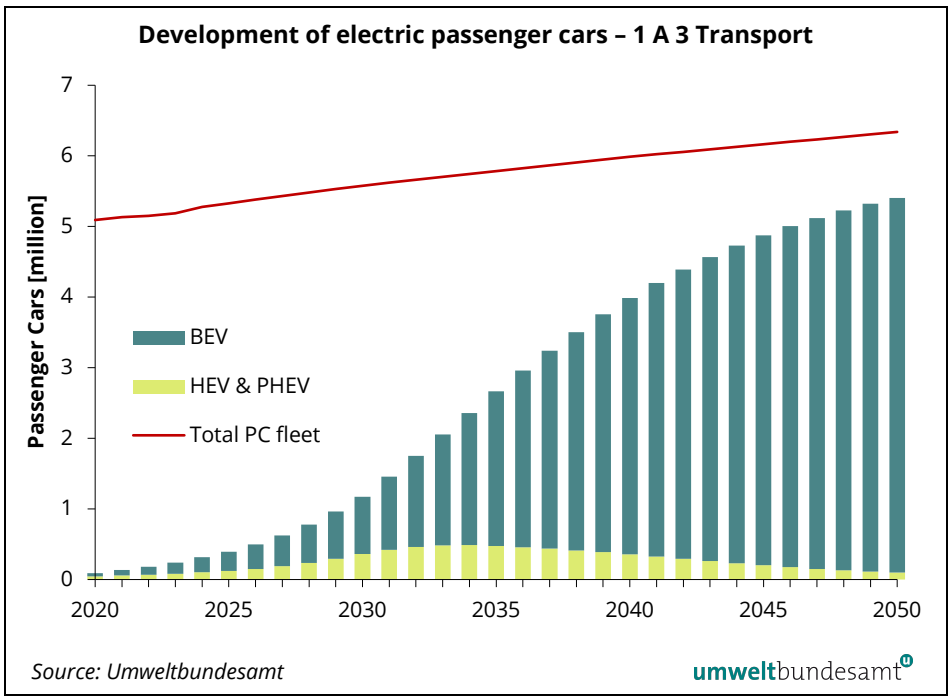


In the WAM scenario, the RED III directive is implemented.

The following graph shows the estimated passenger car fleet development for BEVs, HEVs and PHEVs in Austria up to 2050 in the WEM scenario (the base year 2023 shows the current data).

The electric vehicle stock is estimated to be roughly 1.2 million passenger cars in 2030, around 4 million passenger cars in 2040 and over 5 million passenger cars in 2050. This means that 85% of the total car fleet will be electrically powered, with the majority being BEVs (HEVs and PHEVs will play a minor role).

Figure 28: Electric mobility in Austria – scenario with existing measures.



The WAM scenario is based on the same assumptions for PCs, LDVs and HDVs.

1 A 3 e – Other transportation – pipeline compressors

Energy demand has seen some fluctuations in recent years, with a peak in 2017. In the future, energy demand is expected to increase slightly until 2050.

3.1.4 Other Sectors (CRT Source Category 1.A.4)

The category *1.A.4 Other Sectors* includes, *inter alia*, all greenhouse gas emissions from stationary fuel combustion in the small combustion sector. This summarises categories *1.A.4.a.1 Commercial/Institutional: Stationary combustion*, *1.A.4.b.1 Residential: Stationary combustion* and *1.A.4.c.1 Agriculture/Forestry/Fishing: Stationary combustion*. In addition, category *1.A.4 Other Sectors* includes greenhouse gas emissions from mobile sources in households and gardening including snowcats and **snowmobiles** (category *1.A.4.b.2 Residential: Mobile combustion*), as well as from agriculture and forestry (category *1.A.4.c.2 Agriculture/Forestry/Fishing: Mobile combustion*).

This section describes stationary fuel combustion emissions from category *1.A.4 Other Sectors* only. For further information on the methodology, assumptions

and activity of mobile sources from category *1.A.4 Other Sectors*, see chapter 3.1.3 above.

3.1.4.1 Methodology used for sectoral emission scenarios

Energy consumption from the stationary combustion activities of categories *1.A.4.a.1 Commercial/Institutional* and *1.A.4.b.1 Residential* was calculated using a comprehensive building model (INVERT/EE-Lab) by (E-THINK 2024, 2025). All stationary combustion activities from category *1.A.4.c.1 Agriculture/Forestry/Fishing* (e.g. greenhouses, drying facilities) were derived using the econometric input-output model MIO-ES (UMWELTBUNDESAMT 2023b).

The emission factors were taken from the national emission inventory. The methodology and references are discussed in Austria's National Inventory Document (UMWELTBUNDESAMT 2025a).

A short introduction to the building model can be found below.

3.1.4.1.1 Energy demand model for heating systems in buildings

Modelling of the energy demand for space heating, hot water preparation and cooling in private households and service buildings was carried out by e-think energy research. Detailed documentation is available in (E-THINK 2024, 2025).

The underlying model is referred to as INVERT/EE-Lab. This comprehensive dynamic bottom-up simulation tool is a further development of the INVERT model (see www.invert.at).

The model essentially consists of a disaggregated representation of the stock of buildings in Austria. This building stock is first mapped to building classes (age/size/renovation status), which are then divided into several building segments in combination with heating and hot water systems and model regions (city/country). These building segments are then subjected to an annual decision-making process in the model algorithm to use technologies or measures (new heating/hot water systems, insulation components, window replacement). The measure that appears to be the most attractive when economic aspects are taken into account is selected, with non-economic decision parameters being considered via a stochastic distribution approach.

The model evaluates the effects of different subsidy schemes (investment subsidies, feed-in tariffs, tax exemptions, fuel input subsidies, CO_2 taxes, soft loans and additional set-aside premiums) on the energy carrier mix. It also assesses the costs to society if certain strategies are promoted. Furthermore, the INVERT/EE-Lab model is designed to simulate different scenarios (price scenarios, insulation scenarios, different consumer behaviour patterns etc.) and their respective impact on future trends of renewable and conventional energy sources at national and regional levels.

At the core of the tool is a myopic, stochastic optimisation algorithm that optimises the objectives of 'agents' that represent decision-makers in building-re-

lated decisions. INVERT/EE-Lab models the stock of buildings in a highly disaggregated manner. Therefore, the simulation tool reflects the characteristics of an agent-based simulation.

The scenario model starts with the year 2021 (respectively 2022), based on a complete survey of all Austrian buildings conducted in 2001, 2011, 2021 and 2022 (Statistik Austria 2004, 2013, 2023, 2024b).

Based on the average energy demand (primary fuels) in this sector, a model calibration of non-monetary parameters has been performed using current national energy balance data of (Statistik Austria 2023, 2024a).

3.1.4.1.1.1 The basic decision algorithm

The basic decision-making/selection process is performed on an annual basis. For each building segment, it is decided whether the system (i.e. the building shell and the heating/domestic hot water system) should remain as it is or whether a new heating technology or a measure to improve the building shell is required.

The overall costs (monetary costs, societal costs or greenhouse gas emissions) of each new technology/measure are compared with the respective running costs of the existing structure, and the most cost-effective technology/measure is chosen.

The objective implemented in the model is to minimise monetary costs.

3.1.4.1.1.2 Modelling energy demand

Energy demand is modelled by taking into account the demand for energy services and energy efficiency. The two energy services considered are space heating and hot water supply. Behavioural aspects with respect to space heating (such as the level of indoor temperature, ventilation habits) are considered using a service factor. This parameter describes the relationship between actual and theoretical (calculated) energy consumption for space heating.

The model calculates the service factor as a function of the thermal quality (specific heat load) of the building and the degree of automation of the heating system (central heating system vs. single stove heating system).

The final energy demand for hot water supply is modelled on the basis of the number of people living in a dwelling, the service demand for domestic hot water (volume of hot water at 50 °C) per person and day and on the annual efficiency of the water heating system. The model incorporates the ageing of heating and domestic hot water systems, meaning that in the model, annual efficiency decreases from one year to the next.

3.1.4.1.1.3 Overview of technology options

The available technology options are divided into ‘single options’ and ‘combined options’. Single options include a change of the heating system or domestic hot water system only, installation of new windows, or insulation of the outside

walls only/ceiling only/floor only. Combined options include a change of the heating system and domestic hot water system, insulation of the outside walls and installation of new windows, thermal improvement of the entire building shell, insulation of the outside walls and ceiling, and a complete renovation.

Within each technology segment, a broad range of new systems can be selected for implementation. These include 20 different space heating options (with the possibility of hot water integration), nine space heating options (without hot water integration) and five different stand-alone hot water systems. Solar hot water generation and solar combined systems (solar space heating and hot water system) are also included in the model. For building shell alterations, the model implements up to ten different insulation materials for various parts of buildings and six different window types. The thickness of the insulation material is calculated using an optimisation algorithm (with upper and lower boundaries).

3.1.4.1.1.4 Input data

- Price scenarios by energy carrier,
- Funding programmes and amount of funding,
- Building stock (part of the model),
- Investment and operating costs of heating systems and renovation measures (part of the model),
- New construction rates.

3.1.4.1.1.5 Output data

- Final energy demand by energy carrier,
- Renovation rates result endogenously up to any defined maximum limits for various measures and building types,
- Investment sums for changes to the heating system or renovation measures (with or without improving energy efficiency of the building),
- Expenditure on energy carriers,
- Funding costs.

3.1.4.2 Assumptions

The basic assumptions about population, permanently occupied dwellings, residential and commercial buildings and the total gross floor area differ between the two scenarios due to the updated complete survey of all Austrian buildings in the WEM scenario.

Despite the declining population growth rate in Austria, the number of permanently occupied dwellings (principal residences) is expected to increase by about 14% from 2023 to 2050 in the WEM scenario (see Table 51, Annex 2) and by about 17% in the WAM scenario (see Table 52, Annex 2). This is because the trend towards single-person households is stronger than the overall population growth.

The number of residential buildings is expected to rise by 17% in the WEM scenario and by 23% in the WAM scenario from 2023 to 2050. The number of commercial (non-residential) buildings is expected to increase by about 17% in the WEM scenario and by about 24% in the WAM scenario over the same period (see Table 51 and Table 52 in Annex 2).

The total gross floor area of residential buildings is assumed to increase by 20% by 2050 in the WEM scenario and by 26% in the WAM scenario. During this period, the total gross floor area of commercial buildings is expected to increase by about 18% in the WEM scenario and by 24% in the WAM scenario (see Table 51 and Table 52 in Annex 2).

For some of the assumptions, there are further differences between the WEM and WAM scenarios.

3.1.4.2.1 Scenario "with existing measures"

In Austria, the policy on subsidising heating systems is aimed at the installation of efficient and low-emission (CO_2) boilers (replacing fossil fuel heating systems, old solid fuel appliances or direct electric heating). The federal and regional authorities therefore grant financial support for biomass, heat pumps, district heating and solar heating. The subsidies vary between the different local authorities. On average, subsidies cover between 50% and 75% of the eligible environmentally relevant installation costs if fossil fuel heating systems are permanently replaced. For low-income households, the subsidies cover 100% of these costs. In general, it is assumed that these percentages will remain constant until 2030 in the WEM scenario (see Table 49, Annex 2). After this, the upper limit is expected to decline until 2050.

The building renovation rate[9] indicates the proportion of gross floor space where improvement measures are performed on the thermal building envelope (house front, windows, top and bottom floor ceilings) in a given year. It is therefore an indicator of the building renewal, which usually reduces their heating demand (see Table 55, Annex 2).

The renovation rate for residential buildings is expected to rise, starting from about 0.7% in 2023 up to slightly above 0.9% by 2025, reaching 1.0% by 2030, 1.3% by 2035 and 1.5% by 2040. After this, the rate is expected to remain at 1.5% until 2045, before rising to 1.7% by 2050.

For commercial buildings, the renovation rate is set to remain consistent at about 0.3% from 2023 to 2025. It is then expected to rise to 0.4% by 2030, 0.6% by 2035, and 0.7% by 2040. It then remains at 0.7% until 2045 and is expected to rise to 0.8% by 2050.

[9] Thermal renovation rate expressed as the proportion of newly renovated gross floor space in relation to the total gross floor space stock in the year in which the measures are performed.

Model-based results predict a high boiler exchange rate[10] of 4.6% in residential buildings in 2023 and 4.1% in 2025. After this, the rate is expected to decline to 1.7% by 2030. It then decreases to 2.5% by 2035 and remains at 2.5% until 2040. In 2045 and 2050, the boiler exchange rate is expected to be about 2.8%. The boiler exchange rate in commercial buildings also declines from 3.6% in 2023 to 3.1% in 2025 and to 1.1% by 2030, followed by a slight increase to 1.9% by 2030. After this, it decreases to 1.8% by 2040. It then rises again, reaching 2.0% by 2045 and 2.2% by 2050 (see Table 57, Annex 2).

Moreover, the average final energy demand for heating in residential buildings is projected to decrease from 112 kWh/m² gross floor space in 2023 to 84 kWh/m² gross floor space in 2050. Similarly, the average heating demand for commercial buildings is expected to decline from 92 kWh/m² to 73 kWh/m² over the same period (see Table 53, Annex 2).

Price assumptions are especially important in this sector because they may influence decisions regarding the fuel used for heating systems in the long term, as well as decisions regarding the quality and quantity of thermal renovation activities. Over a period of about twenty years, these decisions can have a noticeable effect on specific energy demand.

From 2023 to 2050, energy prices for households and the commercial sector are expected to increase significantly for almost all fuels; all values are based on model results at real prices (€2023) (see Table 47, Annex 2):

For coal, an increase of around 64% is expected by 2050. However, solid fuels account for only a small proportion of total fuel consumption for heating.

For heating oil and other gas oil, an increase of around 57% is expected by 2050, while natural gas prices are expected to decline by 2.4%.

For wood logs and wood briquettes, an increase of around 15% is expected by 2050, while wood chips are expected to rise by about 28% during the same period. The price for wood pellets is expected to decline by 11%.

The electricity price (predominantly for heat pumps) is assumed to rise by about 15% by 2050.

District heating is expected to decrease by about 6.4% by 2050.

Chapter 4 provides more information on the measures included in the WEM.

3.1.4.2.2 Scenario "with additional measures"

The same policy on subsidising heating systems applies as in the WEM scenario. The subsidies vary between the different local authorities. On average, subsidies cover between 50% and 75% of the eligible environmentally relevant installation costs if fossil fuel heating systems are permanently replaced. For low-income households, the subsidies cover 100% of these costs. In general, it

[10] Boiler exchange rate expressed as the proportion of the gross floor space with a boiler exchange in relation to the total gross floor space stock in the year in which the measures are performed.

is assumed that these percentages will remain constant over the forecast period in the WAM scenario (see Table 50, Annex 2).

The building renovation rate[11] indicates the proportion of gross floor space where improvement measures are performed on the thermal building envelope (house front, windows, top and bottom floor ceilings) in a given year. It is therefore an indicator of the building renewal, which usually reduces heating demand (see Table 56, Annex 2).

The renovation rate for residential buildings is expected to rise substantially, from about 0.7% in 2023 up to slightly above 1.9% by 2040. After this, the rate is expected to decline to 1.6% by 2050.

For commercial buildings, the renovation rate starts at about 0.6% in 2023 and peaks at just under 1.4% around 2040. It is then expected to decline to 1.3% by 2050.

Model-based results predict a rise in the boiler exchange rate[12] in residential buildings from 2.5% in 2023 to 3.5% in 2035. There will be a noticeable decrease to 2.5% until 2040 and a steady rate of 2.5% until 2045, followed by a slow decrease to 2.4% by 2050. The boiler exchange rate in commercial buildings also rises from 1.8% in 2023 up to 2.7% in 2035, after which it decreases to 1.7% by 2040. It then rises again, reaching 2.0% by 2050 (see Table 58, Annex 2).

Moreover, the average final energy demand for heating in residential buildings is expected to decrease from 127 kWh/m² gross floor space in 2023 to 89 kWh/m² gross floor space in 2050, while the average heating demand for commercial buildings is expected to decrease from 128 kWh/m² to 77 kWh/m² over the same period (see Table 54, Annex 2).

Price assumptions are especially important in this sector because they may influence decisions regarding the fuel used for heating systems in the long term, as well as decisions regarding the quality and quantity of thermal renovation activities. Over a period of about twenty years, these decisions can have a noticeable effect on specific energy demand.

From 2023 to 2050, energy prices for households and the commercial sector are expected to rise considerably for almost all fuels. All values are based on model results at real prices (€2023), including the CO_2 tax on fossil fuels (see Table 48, Annex 2).

For coal, a decrease of around 66% is expected by 2050. However, solid fuels account for only a small proportion of total fuel consumption for heating.

For heating oil and other gas oil, an increase of around 48% is expected by 2050, while natural gas prices are expected to rise by 2.4%.

[11] Thermal renovation rate expressed as the proportion of newly renovated gross floor space in relation to the total gross floor space stock in the year in which the measures are performed.

[12] Boiler exchange rate expressed as the proportion of gross floor space with a boiler exchange in relation to the total gross floor space stock in the year in which the measures are performed.

For wood logs and wood briquettes, an increase of around 9.0% is expected by 2050, while wood chips are expected to rise by about 17% during the same period. The price for wood pellets is expected to decline by 1.0%.

The electricity price (predominantly for heat pumps) is assumed to decline by about 1.8% by 2050.

District heating is expected to decrease by about 30% by 2050.

Chapter 4 provides more information on the measures included in the WAM scenario.

3.1.4.3 Activities

The activities described in this chapter relate to stationary fuel combustion from category *1.A.4 Other Sectors,* as well as its use of electricity, solar heat, ambient heat and district heat.

Emissions from *1.A.4 Other Sectors: Stationary sources* were calculated based on the consumption of coal (including industrial waste), oil (heating oil and other gas oil, liquefied petroleum gas), gas (natural gas, hydrogen) and biomass (wood logs and wood briquettes, wood chips, wood pellets, charcoal, biogas, sewage sludge gas and landfill gas). These calculations are separate from those for sectors *1.A.4.a.1 Commercial/Institutional* and *1.A.4.b.1 Residential*, which were modelled using INVERT/EE-Lab. For sector *1.A.4.c.1 Agriculture/Forestry/Fishing,* emissions were calculated based on the consumption of coal, oil (gas oil and liquefied petroleum gas), gas (natural gas and hydrogen), wood logs and wood briquettes, biogas, sewage sludge gas and landfill gas and other biomass (wood chips and wood pellets). These were modelled using an econometric input-output model (MIO-ES).

3.1.4.3.1 Scenario “with existing measures”

There is a discernible trend towards renewable and alternative energies, which is reflected by a 117% increase in ambient and solar heat from 2023 to 2050. This coincides with a shift in electricity use, with a move away from direct electric heating towards energy-efficient heat pumps, which are predominantly installed in new buildings and renovated buildings. Electricity use (including space heating and hot water preparation) increases by 23% within the same timeframe.

Overall, biomass fuel consumption is expected to decline by 37% from 2023 to 2050. The share of fuel wood heating systems is expected to decline due to operating issues and the fact that log wood is more difficult to handle than other biomass fuels.

At the same time, there are driving forces for moving away from fossil fuels. Overall, the use of oil in the sector is expected to fall by 89% by 2050, alongside a 61% decline in gas consumption and a 99% decrease in coal use.

Total energy consumption in the overall sector *1.A.4 Other Sectors* is expected to decrease by 3.8% by 2050 compared to 2023.

Figure 29: Past trend of inventory fuel energy and energy balances activity (1990–2023) and of scenarios (2025–2050): Final energy demand from category 1.A.4 Other Sectors – scenario "with existing measures".

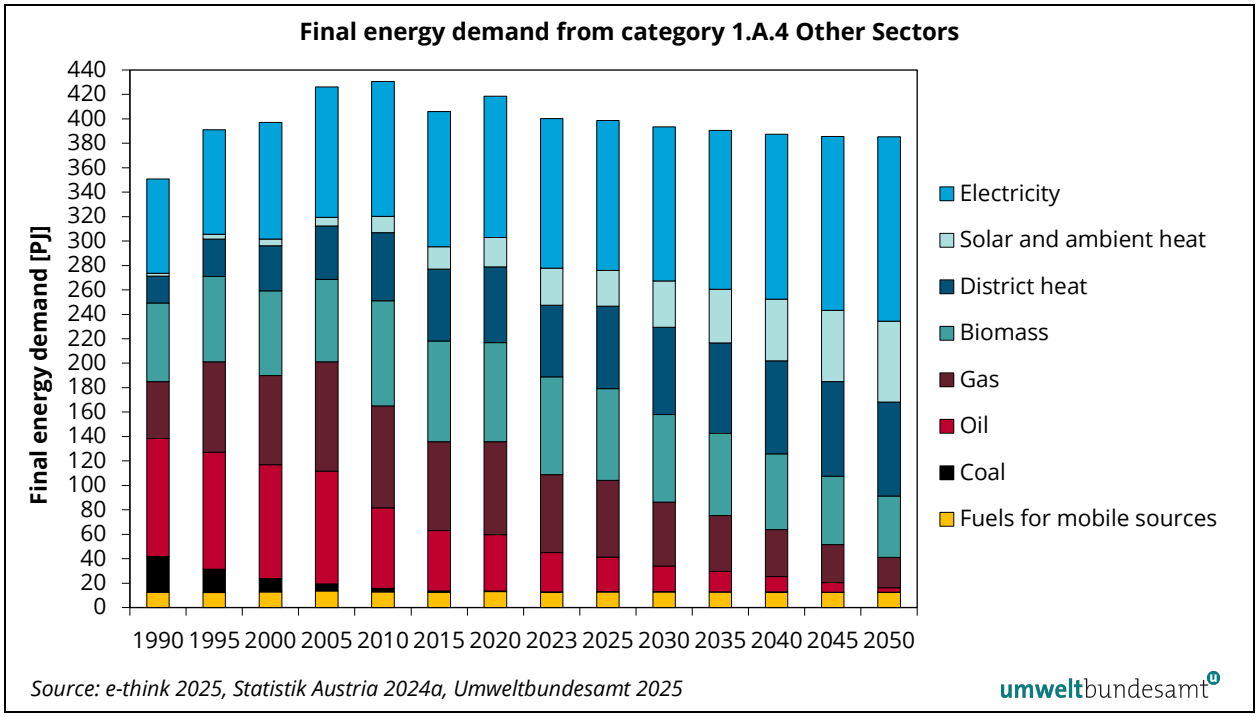
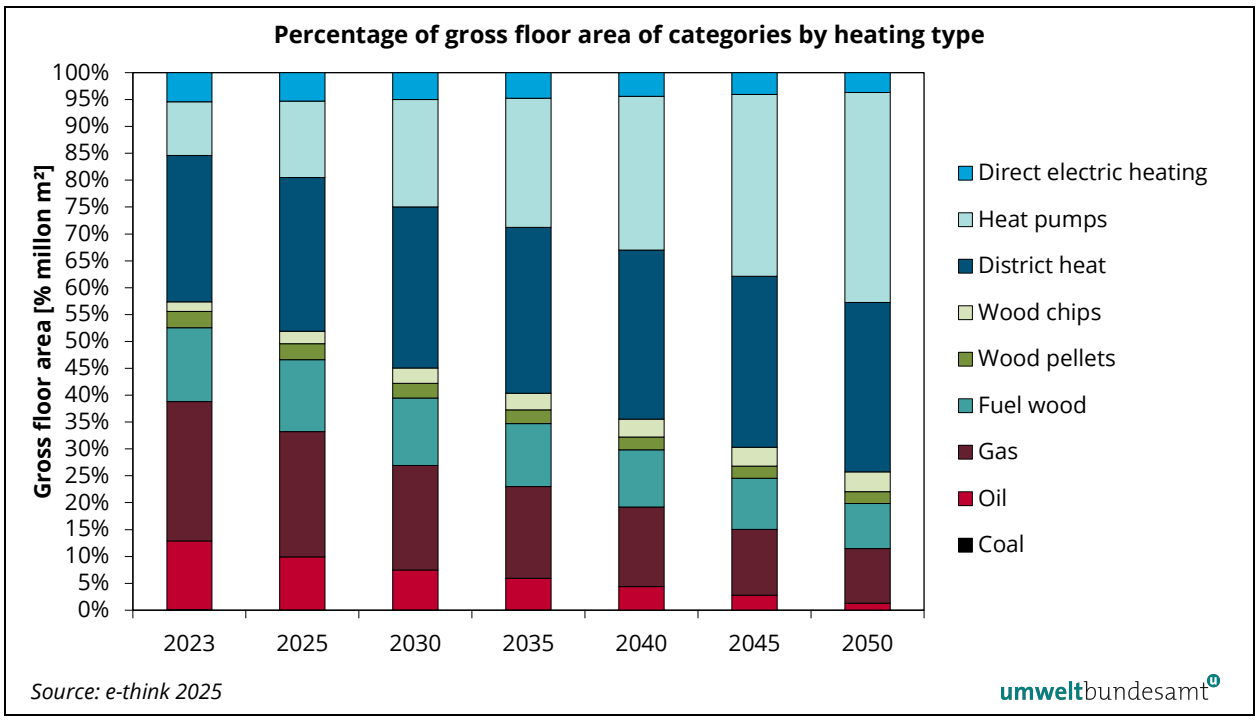


Figure 30: Percentage of gross floor area of categories 1.A.4.a.1 and 1.A.4.b.1 by heating type 2023–2050 – scenario "with existing measures".



3.1.4.3.2 Scenario "with additional measures"

There is a pronounced trend towards renewable and alternative energies, which is reflected by a 143% increase in ambient and solar heat from 2023 to 2050.

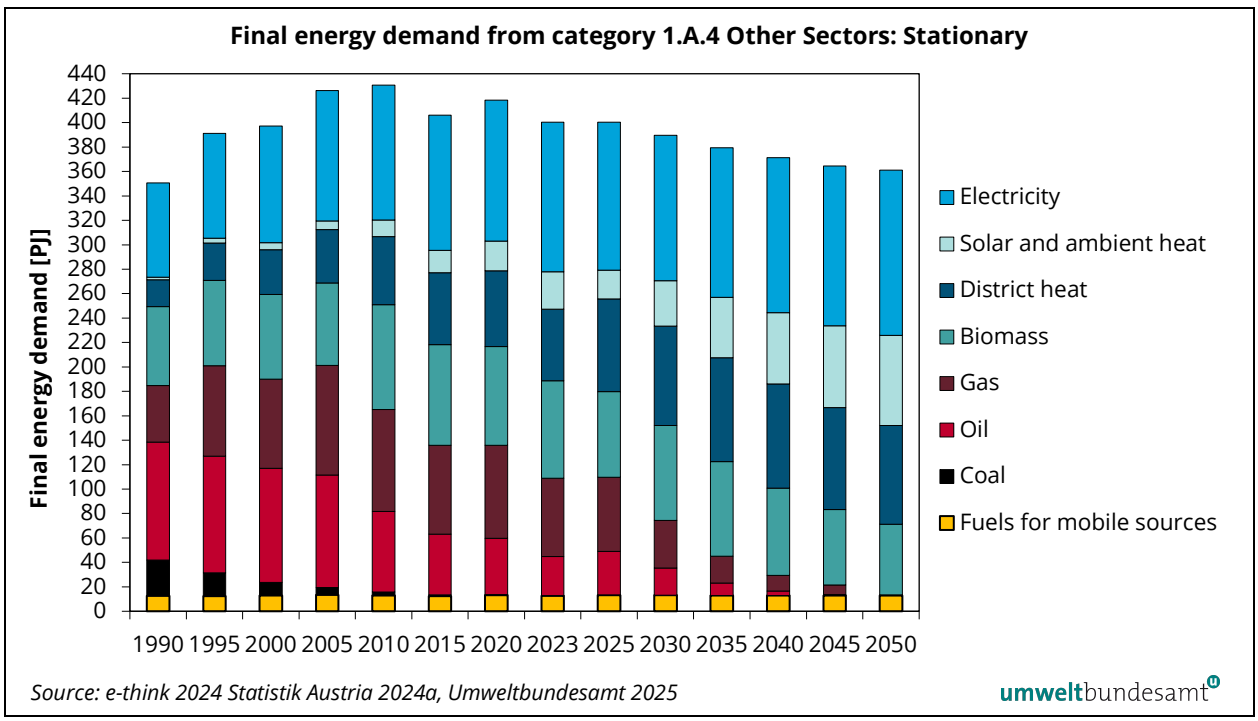
This coincides with a shift in electricity use, with a move away from direct electric heating towards energy-efficient heat pumps, which are predominantly installed in new buildings and renovated buildings. Electricity use (including space heating and hot water preparation) increases by 9.8% within the same timeframe.

Overall, biomass fuel consumption is expected to decline by 28% from 2023 to 2050. The share of fuel wood heating systems is expected to decline due to operating issues and the fact that log wood is more difficult to handle than other biomass fuels.

At the same time, assuming the transition of the building stock to zero-emission buildings by 2050, there are legal obligations for moving away from fossil fuels. Overall, the use of oil is expected to fall by 100% by 2050, alongside a 99% decline in gas consumption and a 96% decrease in coal use. Heating systems using renewable gaseous fuels, such as biogas, sewage sludge gas and landfill gas or blended hydrogen, will still be permitted from 2050 onwards.

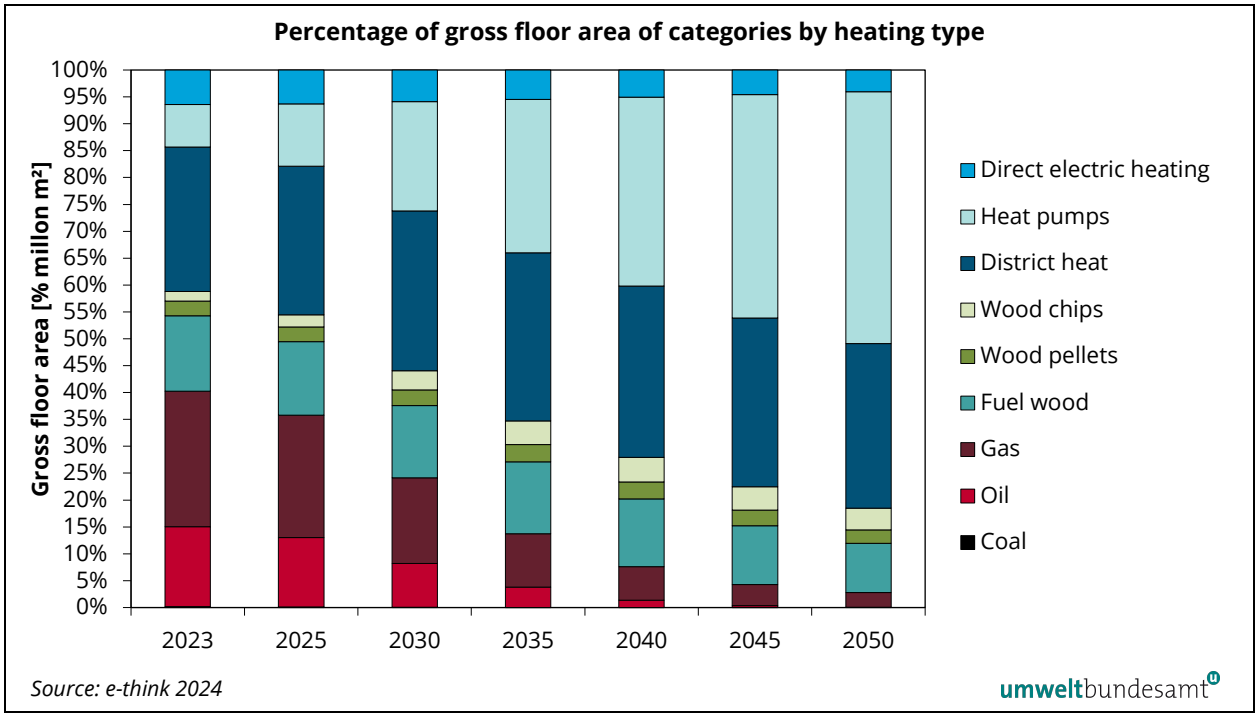
Total energy consumption is expected to fall by 10% in the overall sector *1.A.4 Other Sectors* by 2050 compared to 2023.

Figure 31: Past trend of inventory fuel energy and energy balances activity (1990–2023) and of scenarios (2025–2050): Final energy demand from category 1.A.4 Other Sectors – scenario "with additional measures".



Source: e-think 2024 Statistik Austria 2024a, Umweltbundesamt 2025

Figure 32: Percentage of gross floor area of categories 1.A.4.a.1 and 1.A.4.b.1 by heating type 2023–2050 – scenario "with additional measures".



3.1.5 Other (1.A.5)

This category summarises all emissions from mobile military sources, including emissions from military jet fuel. General methodological issues regarding the GEORG emission model can be found in the Transport chapter (3.1.3).

For NFR *1.A.5.b Military ground operations,* the downward historical trend was continued in the WEM scenario. The projections of activity data, aircraft fleet and emission factors for NFR *1.A.5.b military aviation* follow the same trend as those for NFR *1.A.3.a Aviation,* which is the same in the WEM and WAM scenarios.

3.1.6 Fugitive Emissions from Fuels (1.B)

This sector covers fugitive CH_4 emissions from brown coal open cast mining (1.B.1), fugitive CO_2 and CH_4 emissions from combined oil and natural gas production, fugitive CH_4 emissions from oil refineries and fugitive emissions from natural gas distribution, transmission and storage (1.B.2). The Austrian Climate Strategy does not include any specific measures to reduce emissions from this sector.

3.1.6.1 Methodology used for sectoral emission scenarios

The methodology used to calculate projected emissions is the same as that used for the Austrian GHG Inventory (UMWELTBUNDESAMT 2025a).

CH_4 emissions from storage are calculated by multiplying the amount of stored natural gas by a national emission factor. CH_4 emissions from natural gas distribution networks are calculated by multiplying the distribution network length by an implied emission factor.

CH_4 emissions from natural gas pipelines are calculated by multiplying the pipeline length by a national emission factor.

The post-meter CH_4 and CO_2 emissions from natural gas are calculated based on the final natural gas consumption of small consumers and an implied emission factor.

CO_2 and CH_4 emissions from oil and natural gas production are reported by the *Association of the Austrian Petroleum Industry* for the period 2003 to 2023. Projected emissions are calculated by multiplying oil or natural gas production by implied emission factors derived from previous years.

3.1.6.2 Assumptions

No specific policies or measures are considered in the emission scenarios.

In 2006, the last open-cast lignite mine in Austria was closed, and it is assumed that there will be no coal mining in the period up to 2050.

It is assumed that the number of end consumers will stop growing. It is also assumed that the length of the natural gas distribution network changes by two-thirds of the trend in final natural gas consumption, making it therefore 34% smaller than in 2023.

It is assumed that the total main and medium-range pipeline length will account for the same proportion of the natural gas distribution network length as the average percentage during the period 2019–2023 (main and medium range pipeline length accounts for 24% of the length of the distribution network). It is also assumed that the length of the main and medium-range pipelines will stop growing after the year 2024.

As natural gas final consumption declines, it is assumed that natural gas storage capacity will have reached a maximum in 2024 and will fall to 60% of current capacity by 2050.

The CH_4 emissions from the refinery are calculated using the emission factor from the GHG inventory, based on the projected refinery intake, which is assumed to decrease by 24% by 2050.

CH_4 emissions from natural gas processing are calculated using the average implied emission factors for the period 2019-2023, based on the domestic natural gas production assumed in the energy scenarios. It is assumed that natural gas production will be around 40% below the 2023 level. CO_2 emissions from raw gas processing are expected to increase by 50% per Nm^3 of processed gas by 2040, after which they will remain stable.

3.1.6.3 Activities

For natural gas consumption, refinery intake and natural gas production, data from the energy projections included in this report are used.

Past trends and scenarios of pipeline and distribution lengths and natural gas storage are presented in Table 11.

Table 11: Past trends and scenarios (2025–2050) activity

	Pipeline length [km]	Gas network length [km]	Natural gas stored [Mm³]
1990	3 628	11 672	1 500
2000	5 966	24 099	1 665
2010	6 798	28 733	3 070
2015	7 242	30 067	5 317
2020	7 230	30 569	5 100
2025	7 236	30 625	5 878
2030	6 085	25 754	5 900
2035	5 468	23 144	5 150
2040	5 371	22 735	4 400
2050	4 799	20 314	3 500

3.2 Industrial Processes & Product Use (CRT Category 2)

The main sources of emissions in this sector are the metal industry (in particular iron and steel production), the chemical industry (in particular ammonia and nitric acid production), the cement industry and the lime industry, as well as the use of limestone in iron and steel production and the use of halocarbons and SF_6. Detailed assumptions have been made for these sources.

The following chart shows greenhouse gas emissions aggregated into four categories of industrial processes. Most are expected to have relatively constant GHG emissions until 2050, with the exception of the metal industry. Emissions are generally lower in the WAM scenario, particularly from 2030 onwards (Table 33 and Table 34).

Figure 33: GHG emissions and projections (2024–2050) from Industrial Processes and Product Use in the WEM scenario.

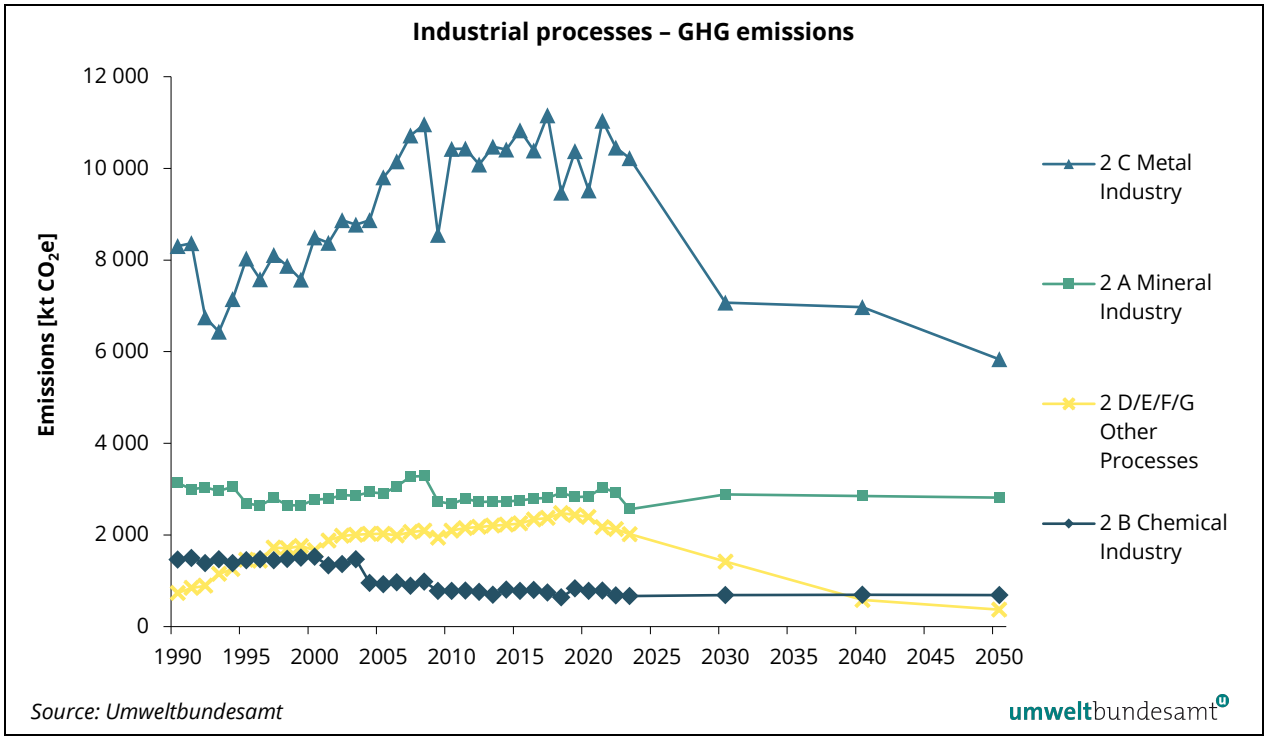
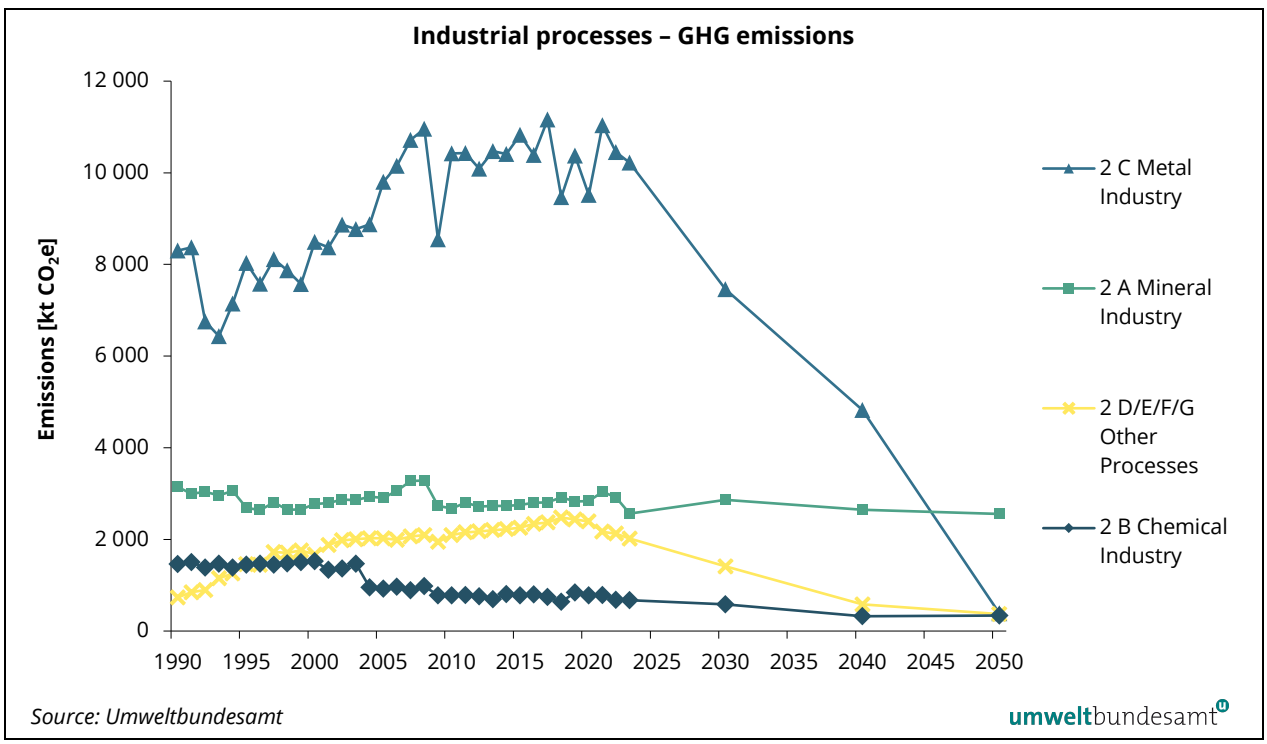


Figure 34: GHG emissions and projections (2024–2050) from Industrial Processes and Product Use in the WAM scenario.



3.2.1 Mineral, Chemical and Metal Industry (2.A, 2.B, 2.C)

3.2.1.1 Methodology for sectoral emission scenarios

The methodology used here is the same as that used in the Austrian Inventory. The emission factors and the methodology are discussed in detail in the Austrian Inventory Document (UMWELTBUNDESAMT 2025a).

3.2.1.2 Assumptions

Mineral industry

Activities in the cement and lime industry and in other sub-sectors (i.e. lime stone use, ceramic industry and soda ash use) have been derived from the respective sub-sectors' energy input, which, in turn, has been derived from the most recent shares of the use of each individual fuel in relation to the use at sector level. According to the IPCC 2006 Guidelines for inventory compilation, the demand for limestone in the iron and steel industry has been accounted for under 'iron and steel industry'.

Chemical industry

Ammonia production is linked to fertiliser demand and the chemical industry (urea/melamine), whereas nitric acid production is coupled to fertiliser production.

Metal industry

This source category covers CO_2 emissions from iron and steel production (2.C.1) and ferroalloy production (2.C.2), as well as PFC emissions from aluminium production (2.C.3) and SF_6 **used** in aluminium and magnesium foundries (2.C.4).

SF_6 is used as an inert gas in cases of fire in light metal foundries.

Further assumptions:

- Primary aluminium production plants in Austria closed down in 1992 and will not reopen (only secondary Al production will continue without SF_6).
- The Austrian Ordinance on Fluorinated Gases (Federal Law Gazette II No. 447/2002) prohibits the use of SF_6 as a protective gas in magnesium production. Therefore, the assumption for the emission projections is that SF_6 is not used.
- The production of pig iron and crude steel from oxygen steelmaking furnaces was assumed to be largely decoupled from economic growth, resulting in only marginal growth in this area. The WEM scenario took into account the forthcoming structural changes in iron and steel production, in particular the partial shift from the blast furnace route to the electric arc furnace route by 2030.

EU ETS/non-ETS

EU ETS/non-ETS emissions were split on the basis of sectoral fuel inputs/input materials. The ETS share of each fuel (averaged over the most recent years) was

used to determine the fuel inputs/input materials for the EU ETS/non-ETS sectors until 2040.

3.2.1.3 Activities

Figure 35 shows the assumptions used for the production of cement clinker, ammonia and crude steel.

While steel production shows a slow return to pre-pandemic levels after 2020, with constant production in subsequent decades, ammonia production decreases slightly until 2030 before increasing again slightly, mainly due to stabilising fertiliser demand and moderate increases in demand for other products for which ammonia is used. Cement clinker production increases slightly until 2050. As the WEM scenario takes updated production levels into account, in particular the production values for cement, iron and steel are slightly lower than in the WAM scenario.

Figure 35: Assumptions for the production of steel, ammonia and cement clinker in the WEM scenario.

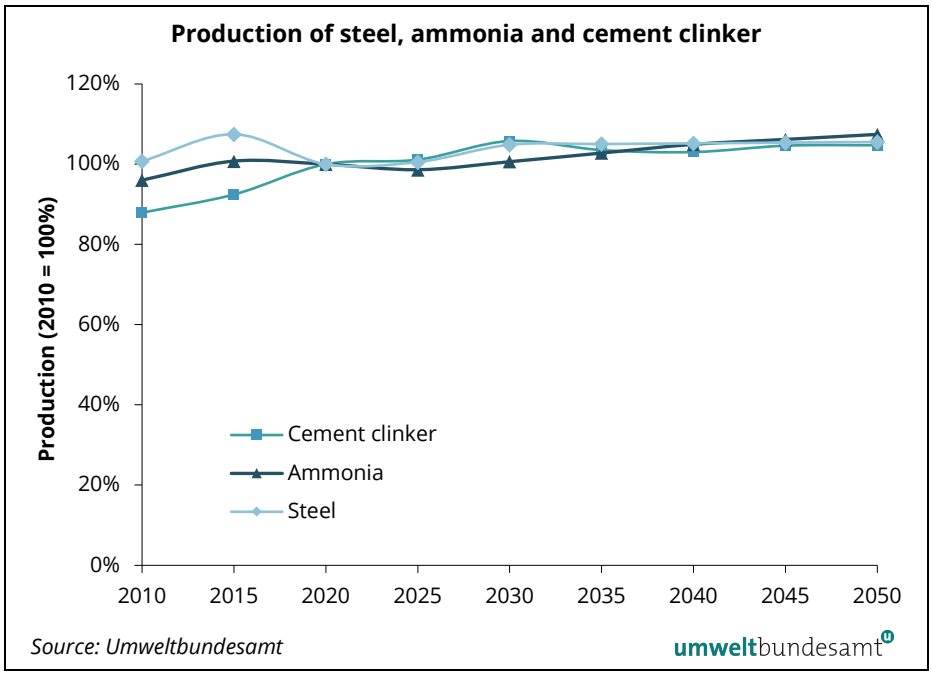
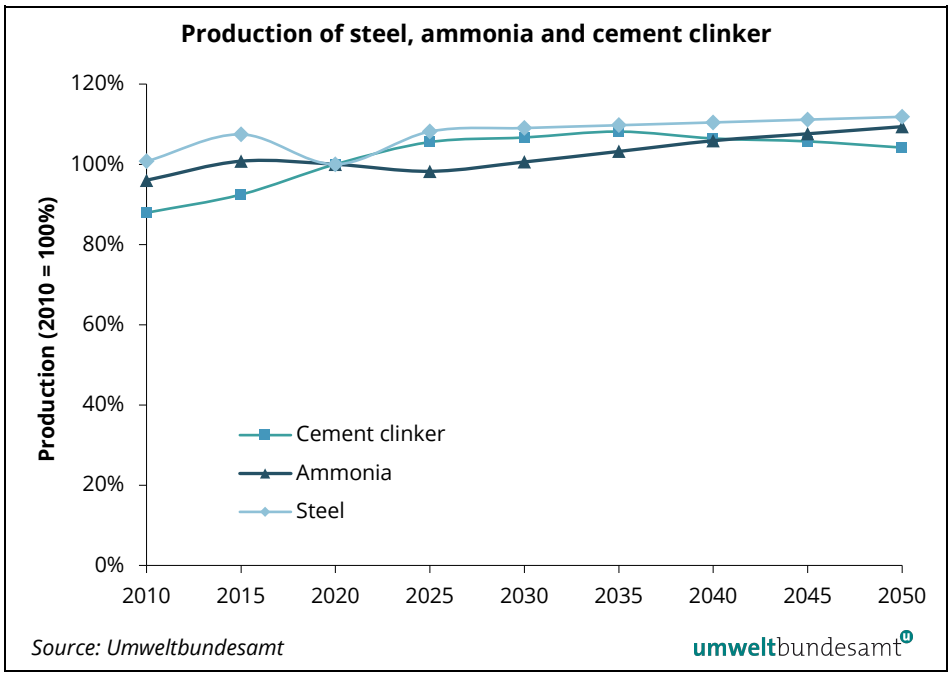


Figure 36: Assumptions for the production of steel, ammonia and cement clinker in the WAM scenario.



3.2.2 Fluorinated Gases (2.E, 2.F, 2.G)

Fluorinated gases have been used in Austria in a wide range of applications. The most important of these is the use of HFCs as refrigerants in refrigeration and air conditioning systems (2.F.1). Other important applications include the use of HFCs as blowing agents in the production of foams (2.F.2), the use of HFC, PFC and SF_6 as etching or insulation gases or in semi-conductor manufacturing (2.E.1) and the use of SF_6 (2.F.9) in soundproof windows. Minor applications include the use of HFCs as fire extinguishing agents (2.F.3), HFCs as propellants in aerosols (2.F.4), HFCs as solvents (2.F.5) and SF_6 as an insulating gas in electrical equipment, research, shoes and tyres (2.G.2).

There is no production of fluorochemicals (2.B.9) in Austria, and the scenario is based on the assumption that there will be no production up to 2050.

Although fluorinated gases are not used in large amounts (around 1 kt per year), they contributed 2.6% of the total GHG emissions in 2023 due to their high GWPs. In Austria's Third National Communication to the UNFCCC (2001), fluorinated gases were expected to account for 3% of the total GHG emissions by 2010 and as much as 5% by 2020 in the business-as-usual scenario. This was mainly due to the strong increase in the use of HFCs as substitutes for ozone-layer depleting 'Montreal gases' without reduction measures. Because of this expected scenario, the Federal Environment Ministry started a consultation procedure in spring 2001. The aim was to draft an ordinance on reducing and phasing out HFCs, PFCs and SF_6 in all relevant applications on the basis of the Federal Chemicals Act. The Austrian Ordinance on Fluorinated Gases was adopted in 2002 (Federal Law Gazette II No. 447/2002) and amended in 2007 (Federal Law Gazette II No. 139/2007). At a European level, the European Parliament and the Council of the European Union adopted Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases and Directive 2006/40/EC relating to emissions from air conditioning systems in motor vehicles. In 2014, the European Regulation was revised and replaced with Regulation (EU) No

517/2014, repealing Regulation (EC) No 842/2006. In addition to the measures set out in the 2006 Regulation, the 2014 Regulation aims to phase down and selectively restrict the placing of F gases on the market within the EU. In 2024, the regulation was revised (Regulation (EU) 2024/573) and now contains a planned phase-out of HFC use by 2050.

3.2.2.1 Methodology used for the sectoral emission scenarios

The projected emissions are based on the results of the Austrian GHG Inventory. For a comprehensive description of the emission estimation methodology, please refer to Austria's National Inventory Document 2025 (UMWELTBUNDESAMT 2025a).

The projections up to 2050 are based on the assumptions set out in Annex V of the F-gas Regulation, particularly the stepwise phase-out, and the MAC Directive. As the quotas set for the placing on the market of FC are only binding at EU level and recent years have shown that the reduction in Austria is not as fast as at EU level, projections also consider a delay compared to the reduction path at EU level. Measures voluntarily taken by the industry are not considered to end, even if they are not legally binding (this is relevant for minor sub-categories only). No other measures or additional voluntary efforts by the industry were considered.

Projections are calculated at the same level of detail by making assumptions about the development of activity data (e.g. refrigerants filled into new installations) or emissions for every sub-category.

Emission factors, which typically refer to leakage rates, are set to the values used for the latest inventory year 2023, as the measures considered have now been fully implemented.

Regarding disposal emissions, an increase of recovery, reuse and recycling is expected for the near future. However, as there is no robust data on disposal emissions, a default emission factor has been applied to historical years, which is also used for the projections.

Methodological issues for the main subcategories are provided in more detail below.

3.2.2.2 Assumptions

The following legal framework has been considered when estimating future emissions of F gases in Austria:

a. The European Regulation on fluorinated greenhouse gases (Regulation (EU) 2024/573) has been fully implemented. The regulation also contains a phase-out of HFC use in the EU. However, the stepwise reductions in the amounts placed on the market are defined only at EU level, whereas this development may differ at national level. Over the past few years, the amounts placed on the national market in Austria have not followed the phase-down trend of the EU regulation. The phase-down in the EU generally forces a phase-down in Austria, but this national phase-down is somewhat slower than that at EU level.

b. The Directive relating to emissions from air conditioning systems in motor vehicles (Directive EU 2006/40/EC) has been fully implemented.

Stationary Refrigeration and Air Conditioning:

Supermarkets: information on HFC phase-out plans was obtained from the majority of supermarket chains, while expert judgement was used for the rest of the market. Emission factors were held constant at 2023 levels, as emissions will almost exclusively come from existing installations (new installations, which may have lower leakage rates, are rather using natural refrigerants).

Stationary air conditioning is a sector that has shown high annual growth rates over the last decade. To project stocks and FC use in stocks, studies on the development of the market and information from industry experts were taken into account. Generally, the increase in annual stock is assumed to continue until 2030 and then remain at a more constant level (with somewhat differing development in the different sub-categories). The projections consider the restrictions and bans set out in the EU F-gas Regulation, as well as the phase-down of HFC use as forced by the EU quota system (with a slight delay, as explained above). Emission factors were kept at 2023 levels as they are already at a relatively low level and are not expected to decrease substantially further.

"Industrial refrigeration" and "Commercial refrigeration (other than supermarkets)" in the Austrian model are residual categories covering all HFC amounts not considered elsewhere. The phase-out of ODPs was completed several years ago, and the refrigeration sector is considered to be a practically saturated market. Due to the EU F-gas regulation in force, which contains bans and restrictions on HFC use and implements a quota system for placing HFCs on the market, the maximum HFC stock level has already been exceeded. Alternatives, such as low GWP solutions and natural refrigerants, have been introduced and are already feasible options for many applications. The projections consider the restrictions and bans set out in the EU F-gas Regulation, as well as the phase-down of HFC use as forced by the EU quota system (with a slight delay, as explained above). Emission factors were held at 2023 levels, as further technical improvements are not expected due to the phase-out.

Emissions from commercial stand-alone equipment only arise from decommissioning until all equipment is disposed of (this is a minor category).

For transport refrigeration, which also is a minor category in terms of emissions, the use of HFC refrigerants was assumed to halve by 2030 and then remain at the same level.

Mobile Air Conditioning: The MAC Directive (EU 2006/40/EC) requires that refrigerants with a GWP of less than 150 be introduced in new passenger cars placed on the market during the period 2011–2017, and in all passenger cars after 2017. For other types of vehicles, no restrictions are in place. However, communication with producers revealed that a switch to alternatives is also planned for these vehicles. This information has been incorporated into the calculations; the amounts filled into the new MACs are assumed to decrease and end by 2035 at the latest.

Foam Blowing: The Austrian Ordinance banned the use of fluorinated gases in this sub-category (including the use of XPS foams with a layer thickness of more than 8 cm containing HFCs with a GWP of less than 300, which had initially been permitted, but were banned in 2008). In 2017, there was no foam production in Austria involving the use of F gases; only some open cell foams were used. Emissions from stocks are still occurring (due to the long lifetime of XPS/PU plates) and this will continue even after 2040.

Fire Extinguishers: Constant stocks and constant emission factors based on 2023 data are assumed.

Aerosols: The F-gas Regulation bans the use of fluorinated gases in this sub-category, except for medical uses. From 2025, however, the amounts used for medical aerosols will have to be accounted for within the quota system. It is therefore assumed that HFC emissions from metered dose inhalers will remain constant until 2040, after which they will be phased out by 2050.

Semiconductors: Projections are based on the emissions for 2023, which are applied to all subsequent years.

Electrical Equipment: A continued increase of emissions has been assumed until 2030. As this sector is subject to restrictions under the EU F-gas Regulation 2024/573, it is assumed that alternatives are being implemented, leading to a decrease.

Other Uses of SF_6: The Austrian Ordinance bans the use of SF_6 in other applications such as footwear, car tyres and soundproof windows. Soundproof windows have an average lifespan of 25 years. Their production and installation ended in 2003. Therefore, emissions are expected to continue until 2028, when the last soundproof windows filled with SF_6 has been disposed of.

3.2.3 Solvent and Other Product Use (2.D & 2.G)

In this sub-sector, indirect CO_2 emissions from solvent use, CO_2 emissions from lubricant and paraffin use, as well as emissions from the use of N_2O (as an anaesthetic and in aerosol cans) are considered.

3.2.3.1 Indirect CO_2 Emissions from Solvent and Other Product Use

Emission projections for the period 2022–2050 are calculated using the emissions from the most recent inventory year and by assuming either a correlation with population growth or economic growth in certain sub-sectors, or continuation of trends in others, or constant development in sectors where technological advances offset an increase in solvent use.

3.2.3.2 CO_2 Emissions from Lubricant and Paraffin Wax Use

For the WEM projections, lubricant use was assumed to remain at 2023 levels, while paraffin wax use was projected based on the link between emissions and population growth.

3.2.3.3 N_2O Emissions from Solvent and Other Product Use

For N_2O emissions from 2 G 'Other Product Use', it has been assumed that emissions will remain at 2023 levels. A constant value is also used for the inventory of cream propellants. Use as an anaesthetic has decreased in previous years. However, it is unclear whether this trend will continue for much longer.

3.3 Agriculture (CRT Source Category 3)

3.3.1 Sector Overview

In this sector, the focus is on sources of methane (CH_4) and nitrous oxide (N_2O) emissions. This chapter gives an overview of European and Austrian farming policies, provides information on the basic economic and technological assumptions and describes the methodologies used for the sectoral scenarios by 2050.

The EU CAP strategic plan

The Common Agricultural Policy (CAP) is a European Union policy with a long tradition, embedded in the EU's framework for action. such as the goal of a climate-neutral Europe in 2050.

Austria submitted its CAP Strategic Plan (CAP-SP) 2023-2027 by the end of 2021. The plan was approved in September 2022. It includes interventions that enable participants to receive direct payments (formerly, the 1st pillar of the CAP) and measures financed by the EAFRD (formerly, the 2nd pillar of the CAP). In addition, sector programmes (fruit and vegetables, bees, wine, hops) were implemented. Since 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, extended to 2022), both climate mitigation and climate change adaptation measures have been prioritised over other measures. However, the volume of funds has not changed significantly.

Scenario 'with existing measures' (WEM)

The scenario is based on price projections for the EU from the OECD/FAO (OECD-FAO **2022)**, existing farm policies and the legal framework of regulations (see Chapter 4). It also takes into account the measures regulated by Austria's Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022).

Scenario 'with additional measures' (WAM)

The WAM scenario takes into account the additional agricultural policy measures outlined in the National Air Pollution Control Programme (NAPCP)

and the Integrated National Energy and Climate Plan (NECP) (BMK 2023c, 2024a).

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

3.3.2 Methodology used for the sectoral scenarios

The scenario with existing measures (WEM) is based on the measures already implemented in Austria as part of the CAP strategic plan. It also takes into account the NH_3 measures regulated under Austria's Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022), as amended in 2024 (Federal Law Gazette II No. 172/2024), which have an impact on indirect N_2O emissions. Chapter 4.9 provides information on measures implemented for the agricultural sector.

Activity data

PASMA (WIFO & BOKU 2023) provides the basic activity data for the WEM scenario from 2030 onwards. The projected data for the years before 2030 have been determined by interpolation. The data for horses and deer have been adjusted to align with the revised 2023 inventory data. As rabbits were first reported in the 2025 submission, the projected number of animals has been kept constant.

The PASMA Model

The Positive Agricultural Sector Model Austria (PASMA), which was 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 agrotourism. The method of Positive Mathematical Programming (PMP) assumes a profit-maximising equilibrium (e.g. marginal revenue equals marginal cost) in the base run, deriving 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 in the global agricultural commodity and food markets (OECD & FAO 2022). Forecasts of key economic indicators are based on Kaniovski et al.

(2021), while energy prices are consistent with those assumed for the energy sector.

There are several sources of market data that can be used as a basis for price projections. All prices, except for energy prices, were derived from the OECD-FAO outlook on agricultural markets (OECD & FAO 2022). Comparing these OECD forecasts with projections made by the European Commission (European Commission 2022) reveals that international bodies make very similar assumptions about the future development of key economic indicators. Due to the type of farm sector model used in this analysis, assumptions about the Austrian economic context (e.g., GDP growth and population dynamics) are not directly required. However, these assumptions are included in the exogenous price assumptions (mainly the consumer price index). Other driving forces (prices, technology and 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. Therefore, it was assumed that the prices of most activities would follow the previous development from this year onwards. Price estimates of 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.

This project involved developing a detailed set of assumptions about technical coefficients, yields and productivity through a stakeholder process. This included the expertise of farm production experts from the Austrian Chamber of Agriculture, the Austrian Agency for Health and Food Security (AGES) and participants of 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, there is a consensus that climate change is likely to lower country averages after 2030. One outcome of the discussions was that expected crop yields were lowered after 2030 and that the cost of stables for livestock would be significantly more expensive than in 2020. Assuming 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).

Emission calculation

Emissions are calculated based on the methodology used in the Austrian Greenhouse Gas Inventory. A comprehensive description can be found in Austria's National Inventory Document 2025 (UMWELTBUNDESAMT 2025a). The methodologies used in the projections are fully consistent with those described in (UMWELTBUNDESAMT 2025a).

3.3.2.1 Enteric Fermentation (3.A)

This source category includes CH_4 emissions from the fermentation of feed within the animal's digestive system.

WEM scenario

Feed intake parameters and methane conversion rates correspond to the national greenhouse gas inventory (UMWELTBUNDESAMT 2025a). Gross energy (GE) intake of dairy cows was calculated based on projected milk yields from (Wifo & Boku 2023).

WAM scenario

The WAM scenario includes additional measures for animal feeding, such as the use of methane-reducing feed additives. A 2% reduction in CH_4 from enteric fermentation was expected for cattle by 2030. The assumption is based on the use of phytogenic feed additives that are already used in livestock farming.

3.3.2.2 Manure Management (3.B)

WEM scenario

This source category includes CH_4 and N_2O emissions occurring during the housing and the storage of livestock manure.

The emission factors and parameters correspond to those of the national inventory.

Feed intake and excretion

Austria-specific volatile solid (VS) excretion and N excretion values for dairy cows were calculated based on projected milk yields (+10% from 2023 to 2030).

Animal waste management systems (AWMS)

The data on the distribution of animal waste management systems are based on an up-to-date and comprehensive survey of Austrian agricultural practices in 2023 (PÖLLINGER ET AL. 2025). For the projected years and cattle, a continuing trend towards loose housing systems was assumed. In addition, a trend towards liquid manure systems was assumed.

For all livestock categories other than cattle, the 2023 AWMS distribution according to (PÖLLINGER ET AL. 2025) remained constant for the projected years.

Based on the information in the CAP Strategic Plan, the share of dairy and suckling cows kept on pasture was slightly raised by 10% until 2030 compared to 2023, and then kept constant thereafter.

Most of the other assumptions about agricultural practices, such as the storage of solid farm manure and the proportion of farm manure treated in biogas plants, are consistent with those used in the Austrian Air Emission Inventory (OLI).

According to the Austrian Ammonia Reduction Ordinance, the covering of slurry storage facilities is mandatory for the storage of liquid manure. From 1 January 2025 onwards, new facilities with a manure capacity of at least 240m^3 must be covered with a solid cover. Existing facilities with a manure capacity of at least

240m^3 must be covered with a flexible artificial cover from 2028 onwards. However, there are exceptions for farms that have a natural crust. In the ammonia inventory, these measures were taken into account with a small effect on GHG emissions.

For more details, see Chapter 4.9.2.

WAM scenario

Feed intake and excretion

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

The assumptions for reducing the surplus of crude protein 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 of feed for dairy cows and fattening heifers was reduced by 2%, for breeding sows by 3% and for fattening pigs by 5% in 2030. The crude protein content was reduced by 1% for all livestock categories in 2025. The figures for the years 2026 to 2029 were derived by interpolation.

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

3.3.2.3 Rice Cultivation (3.C)

No rice cultivation activities are projected for Austria (notation key 'NO').

3.3.2.4 Agricultural Soils (3.D)

This source category includes N_2O emissions from anthropogenic N inputs to agricultural soils.

WEM scenario

Activity data, such as the quantities of mineral fertiliser, crop yields and cultivated areas, were taken from the PASMA model (WIFO & BOKU 2023) from 2030 onwards. If available yet, the figures for 2024 were used (e.g. for mineral fertilisers). The figures for the years up to 2029 were derived by interpolation. The quantities of nitrogen in animal manure available for application to agricultural soils were derived from calculations in Austria's agricultural model, following the nitrogen flow procedure.

The calculation of N-losses took into account the projected use of the different low-emission application techniques and solid-liquid separation until 2027, as set out in the CAP Strategic Plan. Based on these projections, it is estimated that the share of low-emission spreading techniques for the application of cattle manure will be increased to 33.1% and the application of pig manure to 80.4% by 2027. From 2028 onwards, the shares of the different techniques and the share of solid-liquid separation have been kept constant. For more details, see Chapter 4.9.1.

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

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

Adopting a conservative approach, the full potential of these measures is not considered until 2030.

WAM scenario

Inorganic N fertilisers

The WAM scenario includes the following additional measures:

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

Animal manure applied to soils

As in the WEM scenario, the proportion of low-emission spreading techniques and solid-liquid separation is based on Austria's CAP Strategic Plan until 2027. These values were kept constant until 2030, but were slightly increased for subsequent years. For more details, see Chapter 4.9.2.

3.3.2.5 Prescribed Burning of Savannas (3.E)

No prescribed burning of savannas is projected for Austria (notation key 'NO').

3.3.2.6 Field Burning of Agricultural Residues (3.F)

WEM and WAM scenarios

In Austria, a federal law restricts the burning of agricultural residues on open fields. Residue burning is only permitted occasionally and on a very small scale. For the latest inventory year 2023, no field burning occurred in Austria ("NO"). We assume that there will be no burning in the projected years either.

3.3.2.7 Liming (3.G)

WEM and WAM scenarios

For both scenarios, activity data is obtained from the PASMA model (WIFO & BOKU 2023) from 2030 onwards. The most recent amounts of limestone and dolomite available are for 2024. The figures for the years 2025-2029 were derived by interpolation.

3.3.2.8 Urea application (3.H)

WEM scenario

The urea application values are fully consistent with the activity data used for source category *3.D.1.a Inorganic N fertilizers*. The activity data for mineral fertiliser quantities were taken from the PASMA model (WIFO & BOKU 2023) from 2030 onwards. The most recent urea amounts available are for 2024. The figures for the years 2025-2029 were derived by interpolation.

WAM scenario

The WAM scenario includes the following additional measures:

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

3.3.2.9 Other carbon-containing fertilizers (3.I)

WEM scenario

The CAN fertilizer data is fully consistent with the activity data used for source category *3.D.a.1 Inorganic N fertilizers*. The activity data for mineral fertiliser quantities were taken from the PASMA model (WIFO & BOKU 2023) from 2030 onwards. The most recent CAN amounts available are for 2024. The figures for the years 2025-2029 were derived by interpolation.

WAM scenario

The WAM scenario includes the following additional measures:

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

3.4 Land Use, Land-Use Change and Forestry (CRT Source Category 4)

Since the last submission, LULUCF projections have been recalculated based on new historical data. Projected values are based on the same modelling exercise as in the previous submission and have only been updated according to the methodological changes to the GHG inventory. There were multiple recalculations in the latest national inventory submission (2025) that also affect the results of the updated projection. For details regarding the recalculations, see the National Inventory Document 2025 (UMWELTBUNDESAMT 2025a). In addition, the WEM projections for cropland and grassland have been updated based on a recent study for the agricultural sector, which also included area projections for agricultural land (WIFO & BOKU 2023).

Currently, only a WEM scenario is available for the forest land and HWP categories. WAM projections were expected to be ready for forest land and HWPs for the current submission, but due to a delay in the project, the results are not yet available. Once these are available, the next submission will also provide a WAM scenario for the cropland and grassland sub-categories based on (WIFO & BOKU 2023).

With regard to reporting Table 1a, it should be noted that categories 4.I and 4.J are artificial categories and do not correspond to the CRT (Common Reporting Tables) format. In our GHG projections, the direct and indirect N_2O emissions from soils are included in the respective land use category. Therefore, we reported IE (included elsewhere) for categories 4.I and 4.J in the reporting template. The same approach is applied to CH_4 emissions, which are included in the respective land use category, if projected. Emissions from wildfires (CRT category 4(IV)) are not projected due to a lack of data.

3.4.1 Forest (4.A) and HWP (4.G)

3.4.1.1 Methodology used for the sectoral scenarios

Emission projections for sector 4.A are based on a study of the GHG balance of the Austrian forests and their value chain (WEISS et al. 2020), which was conducted by the Austrian Research Centre for Forests (BFW), the University of Natural Resources and Applied Life Sciences, Vienna (BOKU), Kompetenzzentrum Holz (Wood K Plus) and Umweltbundesamt. The study comprises several scenarios, including a reference scenario (R) which corresponds to the existing measures scenario (WEM).

The reference scenario was established using historical field data from the Austrian national forest inventory (NFI) 2007/09, which served as input to the CALDIS model. CALDIS is a climate-sensitive single individual-tree based forest growth model (KINDERMANN 2010; GSCHWANTNER et al. 2010; LEDERMANN, 2002) that simulates forest development on the basis of the increment of single trees. It is based on a derivative of the PROGANUS model. The model applies a set of tree species-specific, mathematical-statistical equations which describe the diame-

ter growth and height growth of single individual trees. Temperature and precipitation data were fed into the model to simulate climatic conditions (on the basis of a regionalised RCP 4.5 climate scenario). Models for salvage cutting and incidental felling were also integrated. An in-growth model estimated the renewal of forest stands. On this basis, above- and below-ground biomass was calculated at single tree level (BFW 2015). Projections for soil organic carbon are based on the soil simulations for the forest reference level (BMNT 2019b) under the assumption that the average yearly forest soil carbon stock change will remain constant. The YASSO 15 model (LISKI et al. 2009, 2005; VISKARI et al. 2020) was applied to estimate soil organic carbon.

To ensure consistency between categories 4.A Forest land and 4.G HWPs, the harvested timber volumes and the increment were estimated and calibrated iteratively based on the CALDIS model (conducted by the Austrian Research Centre for Forests) and the forest sector model FOHOW2 (conducted by the University of Natural Resources and Applied Life Sciences, Vienna), which has been used for projections of HWP and fuel wood production as well as for wood demand. FOHOW2 (NORTHWAY et al. 2013) is a partial equilibrium dynamic forest sector model simulating Austria's wood product supply chain.

The modelling exercise only provides projections for total forest land (4.A) and no split into forest land sub-categories is available. In addition, it is assumed that the forest area remains constant in the WEM scenario. Forest land remaining forest land and land use changes to forest land were calculated separately based on forest area trends and emission factors from the GHG inventory.

The biomass harvest and increment on afforested and deforested land are calculated by multiplying the respective projected area by the annual biomass growth or drain rates. These growth and drain rates per hectare of afforested/deforested land are based on specific measurements of the National Forest Inventory 2016/21 at such NFI plots, and this methodology is also applied in the National GHG Inventory.

Regarding the reporting of parameters, no increment or removal data in cubic metres is reported under category 4.2 Afforested land in Table 3 because emissions/removals are calculated directly from these biomass stock changes. For calculating emissions from forest land remaining forest land, the harvest removals for energy use in cubic metres are not estimated separately. Instead, they are included in harvest removals for non-energy use, as all removals are accounted for as emissions from the forest biomass C pool (emissions from harvest removals for non-energy use are partly offset by being accounted for in the HWP sector). Consequently, the notation key "IE" is used for forest harvest removals for energy use in table 3.

3.4.1.2 Assumptions

The used reference scenario assumes that there will be no policy changes and that wood demand in terms of quantity and composition will follow the same trend as observed over the historical years. Similarly, it is assumed that market participants will not change their behaviour.

GDP growth projections up to 2018 were derived from the National Statistics/WIFO. For the projections beyond 2018, the OECD long-term forecasts were applied. Oil prices were taken from the EIA Annual Energy Outlook 2017.

Wood imports are determined in accordance with the future developments in the wood export markets. However, a maximum amount has been defined for wood imports in the model to limit wood imports, based on the assumption that the amount of wood available for import cannot increase indefinitely, given that demand is likely to rise in other countries as well. The maximum amount has been defined in line with the historical maximum amounts for the period 2000-2016. The external supply of recycled paper is limited to 1 million tonnes, which corresponds to the level of recent years.

Domestic fuel wood demand will be driven by market mechanisms only and will be in line with the domestic energy scenario for energy projections described in Chapter 3.1, as reported for the WEM scenario.

3.4.1.3 Activities

The land use change areas to forests were calculated based on an extrapolation of historical trends from the last NFI 2016/21. The remaining land area was calculated by subtracting the land use change areas from the total forest land area.

3.4.2 Non-forest Categories (4.B-4.F)

3.4.2.1 Cropland (4.B) and Grassland (4.C)

Methodology

Emission projections for the cropland and grassland sectors are based on projections derived from

- calculations using the PASMA model (Positive Agricultural Sector Model Austria), carried out by the Austrian Institute of Economic Research (WIFO) and the University of Natural Resources and Applied Life Sciences, Vienna (BOKU). The PASMA model was developed by the Austrian Institute of Economic Research (WIFO) (WIFO & BOKU 2023) and has also been used for activity data projections in the agriculture sector (CRT Source Category 3); and
- expert judgements provided by several experts from agricultural institutions in Austria.

Estimates of the area of land use change from cropland to grassland are based on the WEM scenario developed by WIFO & BOKU (2023), while changes from grassland to cropland are based on the arithmetic means of estimations obtained from expert judgements. This is because the WIFO & BOKU (2023) data led to unrealistically high land use changes. Land use changes from forest land to cropland and grassland, as well as remaining areas of cropland, are based on the results of the PASMA model. The area of grassland was calculated based on the net land use changes from and to grassland to obtain a consistent LU matrix. To account for the impact of the ÖPUL programme, the areas managed

through the four most important ÖPUL measures were also estimated using the PASMA model.

All emissions from both sectors are calculated using the methodology employed for the Austrian Greenhouse Gas Inventory. A comprehensive description can be found in the Austrian National Inventory Document (UMWELTBUNDESAMT 2025a).

Assumptions

For a more detailed description of the methodology and assumptions related to the PASMA model, see Chapter 3.2.2.

3.4.2.2 Wetlands (4.D), Settlements (4.E) and Other Land (4.G)

Methodology

Wetlands: The emission projections for sector 4.D follow the same methodology as the one used in the National Greenhouse Gas Inventory (UMWELTBUNDESAMT 2025a).

Settlements: The projected areas for sector 4.E Settlements are based on expert judgements, which in turn are based on the 14th Austrian Spatial Planning Report (ÖROK 2015) for the years 2040 and 2050. The LUC areas from forest land converted to settlement areas were estimated based on historical trends. For cropland converted to settlements, the projection is based on the residual area that is available from the net change of cropland by taking into account all other changes from and to cropland. As a final step to maintain overall area consistency, the area of grassland converted to settlement is calculated based on the residual area of the net change of settlements, taking into account all other changes from and to settlements.

Other land: Estimates of areas of forest land converted to other land are based on expert judgements, assuming that the annual LUC from forest land to other land remains constant (as in the last years of the historical time series).

Assumptions

Wetlands: The results of the Real Estate Database show an average annual increase in wetland area of 1% since 1990 (UMWELTBUNDESAMT 2025a). It is assumed that this long-term increase in wetland area, as well as the historical LUC from forest land to wetland will continue. The LUC from grassland to wetlands is calculated based on the net change in total wetland area, taking into account all other land use changes from and to wetlands.

Settlements: Expert judgements are based on the assumption that the population is steadily growing and settling mainly in urban and suburban regions, creating a corresponding demand for infrastructure. Assumptions for settlement developments are described in detail in the ÖROK study (2015).

Other land: It is assumed that the annual LUC from forest land to other land remains constant (as in the last years of the historical time series).

3.5 Waste (CRT Source Category 5)

This chapter includes information on the methods used for greenhouse gas projections, as well as the assumptions made regarding activity data projections in view of anticipated waste management and waste treatment activities. The projections described in this chapter encompass solid waste disposal, the biological treatment of solid waste, waste incineration, and wastewater treatment and discharge.

Waste management and treatment activities are sources of methane (CH_4), carbon dioxide (CO_2) and nitrous oxide (N_2O) emissions.

3.5.1 Solid Waste Disposal (5.A)

3.5.1.1 Methodology used for the sectoral emission scenarios

For the calculation of methane (CH_4) arising from solid waste disposal on land, the IPCC (Intergovernmental Panel on Climate Change) Tier 2 (First Order Decay) method has been applied, taking into account historical data on deposited waste, and considering that the degradable organic component (DOC) of waste decays slowly over a few decades (IPCC 2006). The Tier 2 method is recommended for calculating landfill emissions at a national level. It consists of two equations: one to calculate the amount of methane generated based on the amount of accumulated degradable organic carbon at landfills in a given year; and another to calculate the methane actually emitted after subtracting the recovered and oxidised methane.

CH_4 generation is calculated separately for the different waste types, taking into account waste type-specific factors (DOC, DOC_F and half-life times). The Austrian Inventory distinguishes between two main categories: 'residual waste' and 'non-residual waste'. 'Residual waste' refers to mixed waste from households and similar establishments that is collected by municipal waste collection systems and directly deposited at landfills. 'Non-residual waste' refers to all other deposited waste containing biodegradable compounds (wood, paper, textiles, residues etc.), including waste from industrial sources. The main fraction of deposited waste was residues from sorting and pre-treatment, accounting for 96% of the total waste deposited in 2023. This category has gained importance due to the ban on the direct disposal of untreated waste, as set out in the Landfill Ordinance.

Most of the activity data comes from the Electronic Data Management ('EMREG'), an electronic database managed by the BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology). EMREG delivers data as input to the national Federal Waste Management Plan (BMK 2023b). The parameters used in the emissions calculation are described in (UMWELTBUNDESAMT 2025a).

3.5.1.2 Assumptions

In the scenarios of future waste generation and disposal amounts, predictable future trends in waste management (resulting from the implementation of legal provisions, especially the Landfill Ordinance) are considered. Residues from the pre-treatment of municipal solid waste have become the main category of deposited solid waste. The assumptions are consistent with those made for the development of mechanically-biologically treated waste reported as a fraction under CRT Sector 5.B.1 Composting (mean value based on the amounts treated in MBT plants 2009-2023). Some sludges and minor amounts of construction waste are also expected to be landfilled in future years. The assumptions about the amounts of these waste types are based on the amounts deposited in 2023.

It is assumed that the methane recovery rate will decrease steadily due to the reduced gas generation potential of deposited waste. This assumption is based on the development of landfill gas recovery over the past few years, as reported by landfill site operators in Austria in several surveys (UMWELTBUNDESAMT 2014, UMWELTBUNDESAMT 2019a and UMWELTBUNDESAMT 2023c).

The parameters used for emission projections are the same as those used for the (historical) Austrian greenhouse gas inventory (see UMWELTBUNDESAMT 2025a).

3.5.1.3 Activities

Disposal of waste in landfills without undergoing a pre-treatment has not been allowed since 2009 (see Landfill Ordinance). Therefore, the main waste fraction relevant for current and future waste disposal (accounting for 96% in 2023) consists of residues from the pre-treatment of waste (covered by the main category of 'non-residual waste'), especially residues and stabilised waste from mechanical-biological treatment plants. It is expected that the amounts undergoing mechanical-biological treatment, and thus the landfilled residues from this activity, will remain constant at the mean level observed between 2009 and 2023 for the remainder of the projected period. This is in line with the assumption made for this activity, which is also reported under category 5.B (Biological Treatment of Solid Waste).

Another relevant waste fraction deposited in landfills is sludge from wastewater handling and sewage treatment, with a share of 3.9% in the total amount deposited in 2023. The projections for this activity are based on the respective amount deposited in 2023.

As the First Order Decay method is applied to emissions projections, data on historical waste disposal are also taken into account in the calculation (covering both 'residual' and 'non-residual' waste). Despite zero deposition since 2009, residual waste still accounted for 43% of total methane generation in 2023.

Table 12: Past trend (1990–2020) and scenarios

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	245	245
2015	0	132	132
2020	0	166	166
2025-2050	0	178	178

3.5.2 Biological Treatment of Solid Waste (5.B)

3.5.2.1 Methodology used for the sectoral emission scenarios

Sector 5.B covers category 5.B.1 – emissions from the composting of biogenic waste and mechanical-biological treatment (MBT) plants. It also covers category 5.B.2 – emissions from anaerobic digestion in biogas plants (unintentional leakages, storage of fermentation residues).

Composted biogenic waste comprises biogenic waste collected from households by separate collection systems, as well as other organic waste, such as municipal garden and park waste, which is treated in composting plants (centralised composting). It also includes bio-waste that is composted 'at source' (home composting/decentralised composting).

CH_4 and N_2O emissions from composting (5.B.1) are determined by multiplying the quantity of waste by the corresponding emission factor (see Table 13).

Table 13: Emission factors for composting and mechanical-biological treatment

[kg/t humid waste]	CH_4	N_2O
Biogenic waste composted	0.75	0.1
Mechanically-biologically treated waste	0.6	0.1

CH_4 emissions from anaerobic digestion (5.B.2) are calculated using the IPCC 2006 default CH_4 EF of 5% related to the biogas produced. From 2015 to 2030, it is assumed that leakage will gradually decrease to stabilise at a leakage rate of 1%.

The CH_4 generation potential was set at 110 m^3/t waste digested, based on an assumption made for mixed organic waste (UMWELTBUNDESAMT 2011).

3.5.2.2 Assumptions

Composting plants, home composting

Home-composted waste amounts are assumed to increase in line with population growth (STATISTIK AUSTRIA 2024c). It is expected that 50% of the waste treated in composting plants will remain at the 2023 level (loosely piled bulk

and wood used as structural material in the composting process). The remaining 50% is expected to increase in line with population growth (organic waste collected from households).

Mechanical-biological treatment plants

As regards the amount of waste undergoing mechanical-biological treatment (MBT) in Austria, there was a decrease in activities observed from 2007 to 2012. Since then, the amount of waste treated in MBT plants has stabilised. For projections, it is therefore assumed that the amount of mechanical-biologically treated waste will remain at the mean level of 2009–2023.

The emission factors used for the projections are in accordance with Austria's National Inventory Document 2025 (UMWELTBUNDESAMT 2025a; see also Table 13).

Anaerobic digestion

It is assumed that the amount of waste treated in anaerobic digestion plants will remain constant at the 2023 level, as there is no reliable information available on the future developments in anaerobic digestion or any impact on activity data.

In 2017, a new ordinance (Abfallbehandlungspflichtenverordnung, Federal Law Gazette II No. 120/2017) came into effect, requiring new biogas plants to ensure their storage facilities have a gas-tight cover. Against this background, emissions are expected to decrease. As the average lifetime of a biogas plant is estimated to be 15 years, it can be assumed that by 2030 only gas-tight biogas plants will be in operation. For this reason, it was assumed that the emission factor related to the CH_4 generated would decrease from 5% (2015) to a minimum of 1% (2030).

3.5.2.3 Activities

On the basis of the assumptions made, the projected activity data are as follows:

Table 14: Past trend (1990–2020) and scenarios (2025–2050) – activity data for biological waste treatment (Umweltbundesamt).

[kt waste treated, wet weight]	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
Mechanical-biologically treated waste	345	254	623	551	439	462	459	459	459	459	459	459
Anaerobically treated waste	0	0	152	378	438	544	627	627	627	627	627	627

3.5.3 Incineration and Open Burning of Waste (5.C)

This category includes CO_2 emissions from the incineration of waste oil and clinical waste, as well as CO_2, CH_4 and N_2O emissions from municipal waste incineration without energy recovery. All CO_2 emissions from Category 5 'Waste' are caused by waste incineration.

In Austria, waste oil is incinerated in specially designed 'USK facilities'. Emissions from the combustion of waste oil for energy recovery (e.g. in the cement industry) are reported under CRT sector 1.A – Fuel Combustion. In general, municipal, industrial and hazardous waste is combusted for energy recovery purposes in district heating plants or on industrial sites. These emissions are therefore reported under CRT sector 1.A – Fuel Combustion. In Austria, there was only one waste incineration plant without energy recovery in operation until 1991, with a capacity of 22,000 tonnes of municipal waste per year. This plant was rebuilt as a district heating plant and began operating in 1996. Consequently, emissions have been reported under CRT sector 1 A – Fuel Combustion since the reopening of this plant (i.e. from 1996 onwards).

3.5.3.1 Methodology used for the sectoral emission scenarios

For this calculation, the simple CORINAIR methodology was applied: the quantity of waste oil was multiplied by an emission factor for CO_2, CH_4 and N_2O. These emission factors are consistent with those used in the Austrian Inventory.

Table 15: Emission factors of IPCC Category 5 C – Waste Incineration (Umweltbundesamt).

Waste Type	CO_2 [kg/Mg]	CH_4 [g/Mg]	N_2O [g/Mg]
Clinical waste	880	100	12
Waste oil	3 224	2	24

3.5.3.2 Assumptions

It is assumed that the incineration of waste oil and clinical waste without energy recovery has been constant since 2010. As all existing and planned waste incineration plants include energy recovery, emissions are therefore reported under CRT sector 1.A – Fuel Combustion.

3.5.3.3 Activities

The 2005 Austrian Waste Incineration Ordinance sets strict air pollution limits for all types of waste incineration, without imposing quantity limits. All operators with a permit to incinerate a specific type of waste need to be registered in a national database. The number of waste incineration plants not included in sector 1.A is as follows:

Waste oil: 8 plants
Clinical waste: 1 plant

For incineration activities without energy recovery, constant values (500 Mg of clinical waste and 500 Mg of waste oil) are predicted for the years until 2050.

3.5.4 Wastewater Treatment and Discharge (5.D)

3.5.4.1 Methodology used for the sectoral emission scenarios

Domestic wastewater

CH_4 and N_2O emissions occur as direct emissions from wastewater treatment and as indirect emissions from wastewater after the discharge of effluent into waterways (IPCC 2006 GL). The following treatment and disposal paths are relevant for Austria and are therefore included in the projections:

- centralised aerobic wastewater treatment plants covering C- and CNP-plants (CH_4, N_2O)
- small domestic wastewater treatment plants for 4 PE to 50 PE (CH_4)
- septic tanks (CH_4)
- anaerobic (raw) sludge digestion (CH_4)
- discharge of treated wastewater into waterways (CH_4, N_2O)

N_2O emissions from wastewater handling are calculated separately for:

- advanced centralised wastewater treatment plants
- the effluent originating from wastewater treatment plants
- the effluent of the population not connected to wastewater treatment plants

N_2O emissions from wastewater treatment plants are calculated using Equation 6.9 from the IPCC 2006 Guidelines, CS activity data and EF:

$$\mathbf{N_2O_{PLANTS} = P * T_{CNP\text{-}PLANTS} * F_{IND\text{-}COM} * EF_{PLANT}}$$

Where:

N_2O_{PLANTS} = total N_2O emissions from plants for the inventory year, kg N_2O/yr
P = human population
$T_{CND\text{-}PLANTS}$ = degree of utilisation of modern, centralised wastewater treatment plants [%] (CS)
$F_{IND\text{–}COM}$ = fraction of industrial and commercial co-discharge (CS)
EF_{PLANT} = emission factor [BMLFUW 2015a] (CS)

For the calculation of indirect N_2O emissions, Equation 6.7 from the IPCC 2006 Guidelines is used, with CS activity data on nitrogen effluent:

$$\mathbf{N_2O\ Emissions = N_{EFFLUENT} * EF_{EFFLUENT} * 44/28}$$

Where:

$N_{EFFLUENT} = N_{effluent\ plants} + N_{effluent\ population\ not\ connected}$
EF_{PLANT} = [0.005 kg N_2O-N/kg N] (IPCC 2006 GL)

Data on historical nitrogen flows ($N_{effluent\ plants}$) are retrieved from EMREG ('Emissionsregister – Oberflächenwasserkörper', abbreviated as 'EMREG-OW'[13]), an electronic register of material emissions to surface water bodies from point sources, especially municipal sewage treatment plants. The $N_{effluent\ population\ not\ connected}$ is based on investigations carried out by ZESSNER & LINDTNER (2005), which provided an N value per inhabitant of 13 g N/EW/day (upper value of the range proposed). For the projections, N flows are expected to increase in line with Austrian population growth rates.

CH_4 emissions from domestic wastewater treatment are calculated using the methodology from the IPCC 2019 Refinement, applying the default emission factor defined as the product of B_o and MCF (see Table 6.3 (UPDATED) of IPCC 2019).

$$CH_4\ Emissions_j = (TOW_j - S_j) * EF_j - R_j$$

Where:

CH_4 $Emissions_j$ = CH_4 emissions from treatment/discharge pathway/system j (in kg CH_4/yr)

TOW= total organics in wastewater of treatment/discharge pathway/system j (in kg COD/yr) derived from previous step (table 330)

S_j= organic component removed from wastewater in the form of sludge from treatment/discharge pathway/system j (in kg COD/yr)

EF= emission factor for treatment/discharge pathway/system j (in kg CH_4/kg COD)

Rj= amount of CH_4 recovered or flared from treatment/discharge pathway/system j (in kg CH_4/yr)

Activity data (**TOW**) for centralised wastewater treatment plants are available from EMREG expressed as Chemical Oxygen Demand 'COD' (UMWELTBUNDESAMT 2024). The organics in the wastewater of septic tanks and small domestic plants are calculated based on population numbers and a specific COD load per capita of 120 g/PE.

Sj is only relevant for the calculation of emissions from wastewater treatment plants where sludge is removed for further anaerobic treatment. It is derived from national sources (BMLFUW 2015a, PARRAVICINI et al. 2022). There is no sludge removal in septic tanks or aquatic environments. Factor **R** was set to 0 as no methane is recovered during aerobic treatment. For more details on the methodology and factors considered, please refer to UMWELTBUNDESAMT 2025b.

In line with the IPCC 2019 Refinement (Table 6.3), an EF of 0.0075 kg CH_4/kg COD was used for centralised aerobic treatment plants and domestic wastewater treatment plants, and an EF of 0.125 kg CH_4/kg COD was applied for septic tanks. For the discharge of treated wastewater, the Tier 2 EF of 0.009 kg

[13] 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)

CH_4/kg COD was used for aquatic environments other than reservoirs, lakes and estuaries in the calculations.

CH_4 emissions from the treatment of raw sludge are calculated using equation 4.1 from the IPCC 2006 Guidelines (Volume 5, Chapter 4)

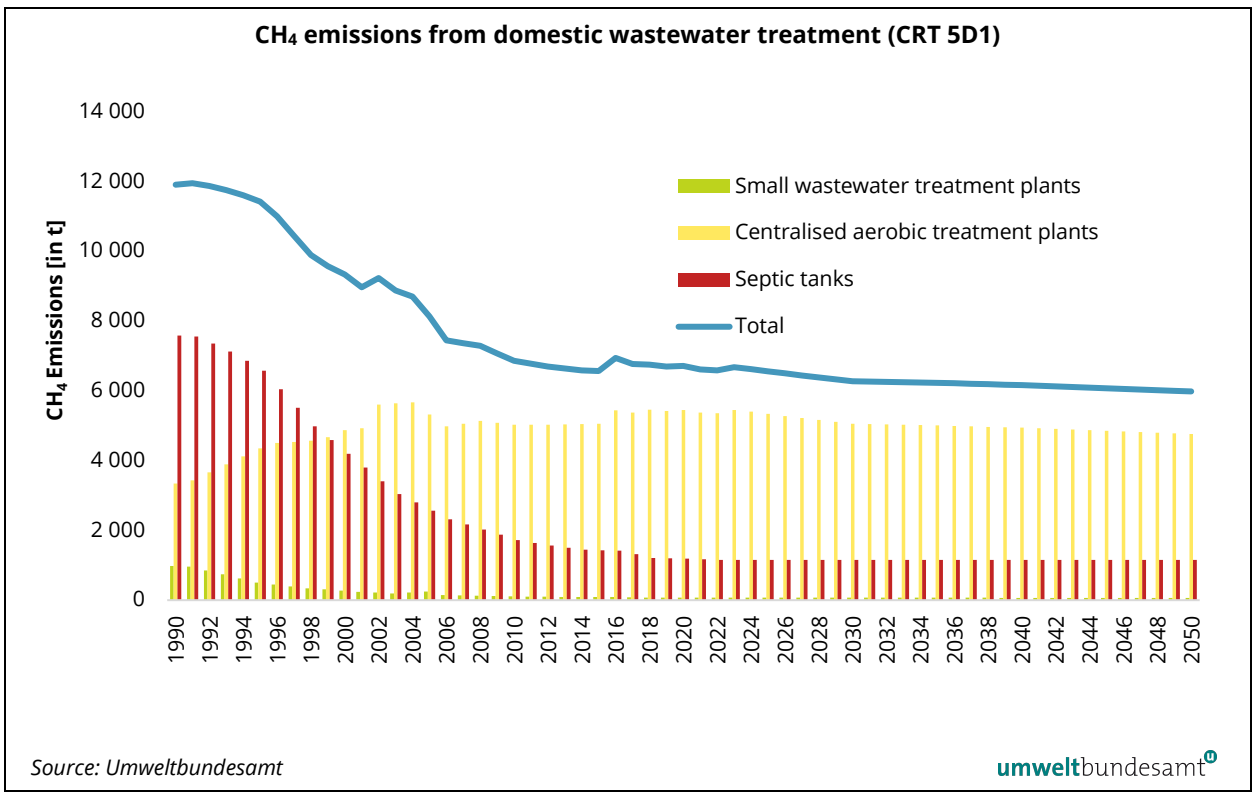
$$CH_4\ Emissions_i = M_i * EF_i$$

Where:

CH_4 $Emissions_i$	= total CH_4 emissions from treatment of sludge
M_i	= mass of sludge treated by biological treatment type
EF_i	= emission factor for treatment i (g CH_4/kg sludge treated)

The mass of sludge was derived from a COD balance based on DWA-A 131 and (PARRAVICINI et al. 2022) and the annually available COD flows (from the national EMREG register). An overall (weighted) EF of 9.2 CH_4/kg raw sludge (dry weight) was used, based on IPCC 2019, and applied to the total mass treated. The resulting CH_4 emissions from sludge treatment, largely from anaerobic digestion (accounting for 85%) are slightly higher than the direct emissions from wastewater treatment plants.

Figure 37: CH_4 emissions from domestic wastewater treatment (CRT 5D1)



Industrial wastewater

CH_4 and N_2O emissions from sub-category *5.D.2* Industrial wastewater handling are estimated based on a study conducted in 2019 (UMWELTBUNDESAMT 2019b) investigating the wastewater handling practices in Austrian industrial

plants. To determine CH_4 emissions, data on generated gas and methane concentration (measured by the plants) was collected via a survey among industrial wastewater plant operators. An EF of 1% of the methane generated was then applied to all plants with anaerobic pre-treatment. Indirect N_2O emissions were calculated using the measured N loads from direct industrial discharges reported annually within the EMREG database, as well as the emission factor for wastewater discharge, which is 0.005 kg N_2O-N/kg N (IPCC 2006).

A detailed description of the methodologies is included in Austria's Inventory Document 2025 (UMWELTBUNDESAMT 2025a).

3.5.4.2 Assumptions

The following assumptions were made for the projections:

- A continued slightly increasing connection rate to wastewater treatment plants ('wwtp') is assumed based on the historical data for 2022 (BML 2024) and future population growth (STATISTIK AUSTRIA 2024c).
- The number of people not connected to a sewer system but using septic tanks or small domestic treatment plants will remain at the same level as in 2022, the latest year for which data on the connection rate is available (BML 2024).
- The $N_{effluent}$ from wastewater treatment plants will increase as the population grows. The N load for industrial co-discharge is assumed to remain at the same level as in 2023.
- The already high level of carbon removal in Austria is not expected to increase much further, but is predicted to remain at the level of 2023 in all future years.
- The emission factor for anaerobic sludge treatment is expected to slightly decrease from 10 g CH_4/kg raw sludge (dm) to 8 g CH_4/kg raw sludge in 2030 and to 6 g CH_4/kg raw sludge in 2050 as an ongoing modernisation and replacement of old facilities can be expected.

Table 16: Past Trend (1990–2020) and scenarios (2025–2050) – indicators of wastewater treatment/management (STATISTIK AUSTRIA 2024c, BML 2024, Umweltbundesamt 2024).

	1990	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Inhabitants [1 000]	7 678	8 012	8 225	8 361	8 630	8 917	9 187	9 348	9 503	9 633	9 729	9 825
Connection rate to centralised wwtp [%]	59.0	84.3	88.9	93.9	95.1	96.0	96.3	96.4	96.4	96.5	96.5	96.5
Carbon removal rate [%][14]	85.0	94.7	91.2	94.6	94.9	95.0	95.2	95.2	95.2	95.2	95.2	95.2
Nitrogen effluent incl. pop. not connected to wwtp [t]	41 031	23 475	17 136	11 998	10 972	11 150	11 478	11 616	11 750	11 861	11 944	12 027

[14] covered: C- and CNP-plants as included in EMREG.

4 POLICIES & MEASURES

In its last submission in March 2023, Austria modelled only the "With Existing Measures" (WEM) scenario. This report provides a comprehensive update on the WEM scenario and introduces an additional "With Additional Measures" (WAM) scenario. The WEM scenario includes all mitigation measures implemented by the end of June 2024, while the WAM scenario incorporates planned policies and measures outlined in Austria's National Air Pollution Control Programme (BMK 2023c) and the Integrated National Energy and Climate Plan (BMK 2024a).

The content of the chapter on policies and measures (PaMs) complies with Article 18 (1) (a) and Annex VI of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action Regulation (EU 2018/1999), as well as with Article 37 and Annex XXIV of the related Implementing Regulation (EU 2020/1208).

The measures listed in this chapter form the basis of future efforts to limit GHG emissions beyond the commitments under the Effort Sharing Regulation (ESR) (EU) 2018/842. However, none of the measures on its own is expected to deliver an emission reduction beyond the existing commitments.

4.1 The Framework for Austria's Climate Policy

The following paragraphs list significant milestones in Austria's recent climate policy, providing information on the legal and institutional steps taken by the country to prepare for the implementation of international commitments[15].

Different legislative arrangements apply to the implementation of individual policies and measures, depending on the sectors and legislative and administrative competences involved. Based on the Climate Change Act, the National Climate Change Committee prepared a first programme covering measures ready for implementation in 2013 and 2014. This programme was adopted by the federal government and the federal provinces in 2013 (BMLFUW 2013). An update to the programme was adopted in 2016 (BMLFUW 2015c).

In June 2016, a Green Paper was published, launching a broad public consultation process, involving online contributions and working groups, which closed in December 2016 (BMWFW & BMLFUW). The results of this consultation were con-

[15]More detailed information can be found in the First Biennial Transparency Report under the United Nations Framework Convention on Climate Change and the Paris Agreement of the Austrian Federal Government: https://unfccc.int/sites/default/files/resource/AUT-BTR-2024.pdf and in the Integrated National Energy and Climate Plan for Austria Period 2021-2030: https://commission.europa.eu/publications/austria-final-updated-necp-2021-2030-submitted-2024_en.

sidered in the **Austrian Climate and Energy Strategy** (#mission 2030), finalised in May 2018 (BMNT & BMVIT 2018). This strategy served as the basis for the preparation of a draft Integrated Energy and Climate Plan in accordance with the Energy Governance Regulation (EU/2018/1999).

In 2019, the **Austrian Long-Term Strategy** was adopted, in which Austria committed to becoming climate neutral by no later than 2050, without using nuclear power. However, the Austrian government programme of the current federal government, which took office in 2020, includes a legally non-binding commitment to achieving climate neutrality already by 2040 and switching to energy from 100 per cent renewable sources by 2030.

The final **Integrated National Energy and Climate Plan (NECP) 2021-2030** (BMK 2019) included a number of detailed measures relating to greenhouse gas emissions, energy efficiency and renewable energy. The following objectives were set for 2030:

- Reducing greenhouse gas emissions by 48% compared to 2005 levels in sectors that are not covered by the EU Emissions Trading System;
- Increasing the share of renewable energy in gross final energy consumption to 46–50%;
- Covering 100% of domestic electricity consumption from renewable sources (national net balance, with exceptions for the control and balancing of the energy supply for grid stabilisation and internal electricity generation from fossil fuels in tangible goods production);
- Improving primary energy intensity (defined as primary energy consumption per unit of GDP) by 25–30% compared to 2015 levels.

The Austrian NECP (BMK 2024a) was updated in 2024. Due to the new conditions and challenges posed by the Coronavirus pandemic and the Russian war of aggression against Ukraine, the update is far-reaching compared to 2019. However, certain basic principles, such as transformation without nuclear energy, and certain targets, such as 100% renewable electricity (national balance) by 2030 or the fastest possible transition to emission-free mobility, are being retained.

Austria's updated NECP is therefore based on the following main guidelines:

- Increased ambition for the energy transition and climate action: Alignment with the new objectives of the EU Climate Law, the Fit for 55 package and the RePowerEU Plan, as well as the national 2040 climate-neutrality objective for the sectors listed in Annex 1 to the Climate Law;
- Accelerating greenhouse gas reductions by 2030, significantly increasing energy consumption reductions and accelerating the deployment of renewable energy;
- Increasing the resilience and reliability of the energy system, while considering the impacts of climate change;
- Increasing energy security in the context of the phase-out of Russian energy imports, in particular through the development of renewable energy sources;
- Additional focus on reducing non-CO_2 GHG emissions (in particular methane), as well as on targeted forest management and maintenance

measures to increase growth and resilience and to maintain productive capacity, with the aim of increasing carbon capture and storage and adapting forest stocks to climate change;

- Carbon storage in both agriculture and forestry (including wood products) and technical sinks;
- "Leaving no one behind" – this also applies to regions that are structurally heavily impacted by the transition towards climate neutrality.

4.2 Sectoral Methodologies

In general, sectoral definitions as requested by the UNFCCC reporting guidelines have been used. In each section, the methodologies applied to quantify the most important policies and measures are described. However, not all measures have been quantified, due to a lack of data or because of the complexity of the measures, their linkages with other policies, or uncertainty.

General descriptions of the measures can also be found in the following reports on sectoral scenarios: transport (HAUSBERGER &SCHWINGSHACKL 2025), other sectors – buildings (E-THINK 2025) and agriculture (WIFO & BOKU 2023).

It should be noted that quantifying the GHG emission reduction effect of a policy or measure for each year (as presented in the reporting template) does not simply involve adding up the individual effects of the measures. Interactions between measures must be taken into account, and measuring the total effect of measures by simply adding up figures derived from individual instruments tends to overestimate the total effect of the measures.

The measures are allocated on the basis of the following categories:

- Energy Industries (CRT 1.A.1) & Manufacturing Industries and Construction (1.A.2)
- Transport (CRT 1.A.3)
- Other sectors: representing energy consumption in commercial, institutional and residential buildings (CRT 1.A.4)
- Industrial Processes and Product Use (CRT sector 2)
- Agriculture (CRT sector 3)
- LULUCF (CRT sector 4)
- Waste (CRT sector 5)

The same categories have been used for reporting the projections, ensuring consistency between projection reporting and policies and measures.

The reporting of policies and measures is consistent with the corresponding reporting requirements of the EU and the UNFCCC.

In the following chapters, each policy and measure is described, including details on underlying actions, ambitions and assumptions. Summary data can be found in the Annex.

4.3 Cross-cutting Measures

The following measures relate to both the WEM and WAM scenarios, but they are taken into account with different prices in each scenario.

4.3.1 EU Emissions Trading System (ETS) (PaM Id.1)

GHG affected: CO_2, N_2O

Type of policy: regulatory, economic

Status: implemented

Start year of implementation: 2005

Implementing entity: federal government

Mitigation impact: not available

Indicator used to monitor and evaluate progress over time: emissions from the ETS installations: 2015: 29,492 kt CO_2eq; 2020: 27,034 kt CO_2eq; 2023: 24,414 kt CO_2eq

EU legislation	National implementation	Start
Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union Community, last amended by Directive (EU) 2023/959	Federal Law Gazette I No. 118/2011 (Emissions Allowance Trading Act), last amended by Federal Law Gazette I No. 196/2023	2005
Commission Implementing Regulation (EU) 2018/2066 on the monitoring and reporting of greenhouse gas emissions, last amended by Implementing Regulation (EU) 2024/2493		

The EU Emissions Trading Scheme is the most important policy instrument for energy-intensive installations. It is aimed at reducing CO_2 emissions from energy industries, manufacturing industries and industrial processes, as well as N_2O emissions from the chemical industry and CO_2 emissions from aircraft operators. The objective is to limit emissions by trading allowances (initially allocated for free or auctioned). Around 200 installations in Austria and around 15 aircraft operators assigned to Austria are covered by the EU ETS.

Certain industry sectors and heat generation still receive their allocations for free, on an interim basis. Industry sectors at significant risk of carbon leakage receive up to 100% of their allocations for free, based on a benchmarking system. Allocations for other sectors (except for district heating) will decrease to 0% by 2030.

The Union-wide quantity of ETS allowances has been reduced by Directive (EU) 2023/959 due to fewer allowances being available in 2024 and 2026 and a steeper cap trajectory afterwards. This revision of the ETS, which came into

force in June 2023, will lead to higher certificate prices. As a result of the revision, a number of additional industrial installations were included in the EU ETS in 2024.

The revised EU ETS Directive is set to reduce overall emissions by 62% by 2030 compared to the 2005 level in sectors covered by the EU ETS. GHG emissions from maritime transport will be included in the ETS from 2024, with a two-year phase-in period. In 2026, the Commission will assess the possibility of extending municipal waste incineration from 2028 onwards. However, from 2024 onwards, incinerators will have to monitor and report their emissions but will not have to surrender allowances.

Free allowances for trade- and energy-intensive industries will be gradually phased out to ensure the decarbonisation of these industries. To continue protecting these European industries from unfair international competition, a new carbon border adjustment mechanism will impose a carbon price on certain imported products, including steel and aluminium. The phase-out of free allowances will be synchronised with the phase-in of the carbon border adjustment mechanism and completed by 2034. Free allowances for the aviation sector will also be phased out, with full auctioning being reached by 2026.

Quantification/Projected GHG emissions/removals:

As industrial emissions are influenced by several factors, the effect produced by the ETS cannot be accurately quantified without an in-depth investigation. However, ETS evaluations have shown that the ETS has a positive effect on the scale of 'cleantech' innovations (Muuls et al. 2016). This is particularly true for the period from 2021 onwards, as CO_2 prices have risen significantly since then – from a maximum of €20 to €30 in the third period of the EU ETS to around €70 in 2024.

In the WEM scenario, in accordance with EC recommendations, prices are assumed to rise to €95 per tonne of CO_2 in 2030 and €190 per tonne of CO_2 in 2050 (fixed prices on the basis of 2023). In the WAM scenario, prices are assumed to rise to €100 per tonne of CO_2 in 2030 and €300 per tonne of CO_2 in 2050 (fixed prices on the basis of 2020).

4.3.2 Carbon pricing of fossil fuels (PaM Id°2)

GHG affected: CO_2

Type of policy instrument: economic, regulatory

Status: implemented

Start year of implementation: 2022

Implementing entity: federal government

Mitigation impact in transport sector: 2030: 1 474 kt CO_2-eq; 2050: 156 kt CO_2-eq

Mitigation impact in energy industries and buildings sector: not available

Indicator(s) used to monitor and evaluate progress over time: Share of passenger cars in the modal split (% of total pkm): 2025: 67%, 2030: 66%; 2040: 67%; 2050: 67%

The instruments listed below have been taken into account.

National Carbon Pricing Scheme *('Nationales Emissionshandelsgesetz')*

Type: National policy

National Implementation	Start
Federal Law Gazette I No. 10/2022 as amended (National GHG Certificate Act)	2022

The carbon pricing scheme applies to sectors outside the EU Emissions Trading System and is therefore expected to send price signals, particularly for fossil fuels, in the buildings and transport sectors. Its aim is to gradually introduce a cost-efficient and effective measure to reduce GHG emissions that are not subject to the EU ETS I. To this end, a national trading system for greenhouse gas emission certificates has been introduced. Between 2022 and 2027, national emission certificates will be priced under federal law, before the national emission trading scheme is transferred to the European system of the EU ETS 2. The aim in the transport sector is to reduce the use of fossil fuels, particularly in individual motorised transport, households and small industries. The intention is to encourage people to switch to public transport, thermal insulation or renewable heating systems, as well as heat generation and/or heat recovery.

The carbon pricing scheme is based on the National GHG Certificate Act (Federal Law Gazette I No. 10/2022 as amended). In the period 2022 to 2026, the suppliers of fossil energy must surrender certificates at fixed prices. The price started at €30 per tonne of CO_2 in 2022 and will increase up to €55 per tonne of CO_2 in 2025. The revenues will be used to provide uniform per capita compensation to private households, with this compensation being differentiated by region according to the availability of public transport. The national scheme will be replaced by the EU scheme ("ETS 2"), which will be fully operational by 2027.

The WEM scenario assumes that prices will rise to €100 per tonne of CO_2 in 2030 and to €190 per tonne of CO_2 in 2050 (fixed prices on the basis of 2023).

The WAM scenario assumes that prices will rise to €100 per tonne of CO_2 in 2030 and €200 per tonne of CO_2 in 2050 (fixed prices on the basis of 2020).

Emissions Trading System for Buildings, Road Transport and Additional Sectors *('ETS2')*

Type: EU policy

EU legislation	National implementation	Start
Directive (EU) 2023/959 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system	Federal Law Gazette I No. 196/2023 (Amendment of the Emission Allowances Act 2011 and CBAM Enforcement Act 2023)	2027

As part of the 2023 revisions of the ETS Directive, a new emissions trading system named ETS 2 was created. This new system will cover and address the CO_2 emissions from fuel combustion in buildings, road transport and additional sectors. In Austria, additional sectors were unilaterally included in the ETS 2 through Commission Delegated Decision (EU) 2024/2986.

Fuel suppliers will be required to monitor and report their emissions. These entities will be regulated under the ETS 2, which means 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 ETS 2 will become fully operational in 2027. In case of exceptionally high gas or oil prices in 2026, the start of the ETS 2 system could be postponed to 2028 to ensure a smooth implementation.

As a first step, the monitoring and reporting of emissions will begin in 2025. Regulated entities covered by the ETS 2 are required to hold a greenhouse gas emissions permit by 1 January 2025. Over the course of 2027, a 30% higher volume of allowances will be auctioned to provide market liquidity. As in the existing EU ETS, the ETS2 will operate with a dedicated, rule-based market stability reserve to mitigate insufficient or excessive supply of allowances to the market.

Quantification/Projected GHG emissions/removals:

As emissions in the sectors covered by the carbon pricing scheme are influenced by several factors, the effect produced by the ETS 2 cannot be accurately quantified without an in-depth investigation.

4.4 Energy Industries (CRT 1.A.1) and Manufacturing Industries and Construction (1.A.2)

The GHG emission reduction effect of individual policies and measures has been estimated where possible. For some measures, however, the reduction effect could not be estimated.

To quantify the effects of the relevant policies and measures in this sector, it has been assumed that an increase/decrease in the production of green electricity results in a corresponding decrease/increase in the production of electricity in fossil fuel power plants. Emission reductions have been calculated based on an emission factor of 0.4 t CO_2/MWh.

In the following, the assumptions behind the respective policies and measures are described in greater detail.

4.4.1 WEM Measures for Energy and Industry

4.4.1.1 Increase the share of renewable energy in power supply and district heating (PaM Id°3)

The main purpose of this policy is to increase the share of renewable energy in the supply of power and district heating, with the aim of reducing the climate impact of the energy system. Beyond the traditional use of large-scale hydropower for electricity generation, the Renewable Energy Expansion Act has set quantitative targets for increasing the share of wind power, photovoltaics, small and medium-sized hydropower plants and biomass/biogas in electricity generation. These targets are to be achieved through market premiums and investment support. Investment support has been granted for biomass-based district heating systems.

GHG affected: CO_2

Type of policy: regulatory, economic

Implementing entity: federal government

Mitigation impact: 11 300 kt CO_2 eq in 2030

Indicators used to monitor and evaluate progress over time: installed capacity of RES power plants: 2010: 1458MW; 2015: 3722MW; 2021: 6544MW; 2023: 10675MW; share of RES in district heating: 2010: 43%; 2015: 47%; 2020: 52%; 2023: 56%.

The following instruments have been taken into account in the current WEM scenario.

4.4.1.1.1 Renewable Energy Expansion Act *('Erneuerbaren-Ausbau-Gesetz')*

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources	Federal Law Gazette I No. 150/2021 (Renewable Energy Expansion Act)	2021

Directive 2018/2001 on the promotion of the use of energy from renewable sources was implemented through the Renewable Energy Expansion Act. The Renewable Energy Expansion Act establishes a harmonised system for promoting electricity production from renewable energy sources. This is achieved by granting market premiums and investment support for various forms of electricity generated from renewable sources, such as biomass, wind power, hydropower and photovoltaics.

The Renewable Energy Expansion Act was designed to increase funding for renewable energy expansion. It sets out new expansion targets for renewables by 2030 (vs. 2020):

Hydropower +5 TWh;

Wind power +10 TWh;

Photovoltaics +11 TWh;

Biomass and biogas +1 TWh.

4.4.1.1.2 Domestic Environmental Support Scheme *('Umweltförderung im Inland')*

Type: EU and National policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources	Federal Law Gazette No. 185/1993, last amendment Federal Law Gazette I No. 31/2024	1993

The objective of the Domestic Environmental Support Scheme is to protect the environment by preventing and reducing air pollution, greenhouse gases, noise and waste. The Domestic Environmental Support Scheme provides financial support for projects that improve environmental performance in the energy, manufacturing and service industries beyond mandatory standards. The Climate Protection Ministry puts the focus of its funding policy on climate change.

In 2023, over 99% of the projects funded by the Ministry were climate-related. Most of the support volume (73%) was allocated to renewable energy, with funding being provided for the distribution of heat and the switch to biomass heating, for example (BMK 2024c).

4.4.1.1.3 Austrian Climate and Energy Fund *('Klima- und Energiefonds')*

Type: National policy

National implementation	Start
Federal Law Gazette I No. 40/2007, last amended by Federal Law Gazette I No. 37/2017	2008

In 2007, the federal government established a dedicated fund (Climate and Energy Fund – KLI.EN) to support the reduction of greenhouse gases (GHGs) in Austria in the short, medium and long term. The focus is on the research and development of renewable energy systems, the development and testing of new transport and mobility systems and the market penetration of sustainable energy technologies, ranging from basic and applied research to the granting of subsidies for the implementation of climate-friendly technology. Support is provided to companies, research institutions and municipalities as well as to individuals, depending on the respective programme.

The KLI.EN fund supports measures in the fields of mobility, buildings, industrial production and energy supply, as these sectors are the main emitters of GHGs. In the field of energy transformation, the focus is on innovative PV systems and energy storage systems, among others.

Quantification of the mitigation impact/projected GHG emissions:

In accordance with the Renewable Energy Expansion Act, an additional 27 TWh (approximately) of electricity is expected to be produced by green electricity plants by 2030 compared to 2020 levels. This will result in emission reductions of about 10.5 Mt CO_2 eq. in 2030 (using an emission factor of 0.4 kt CO_2 eq./GWh electricity), but only some of these reductions will be realised at a national level.

An additional 3.5 TWh of district heat is expected to be produced by 2030 compared to 2020 levels. This will result in emission reductions of about 0.8 Mt CO_2 eq. in 2030 (using an emission factor of 0.22 kt CO_2 eq./GWh district heat).

4.4.1.2 Increase energy efficiency in energy and manufacturing industries (PaM Id°4)

Increasing energy efficiency in the energy and manufacturing industries is essential to reduce the growing demand for fuel and mitigate its environmental impact. In line with EU legislation (Energy Efficiency Directive (2012/27/EU)), Austria introduced an Energy Efficiency Act in 2014, which was revised in 2023.

GHG affected: CO_2

Type of policy: planning, economic, regulatory

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Indicators used to monitor and evaluate progress over time: final energy consumption of industry: 2010: 307PJ; 2015: 300PJ; 2020: 296PJ; 2023: 275PJ

Final energy consumption total: 2010: 1116J; 2015: 1097PJ; 2020: 1056PJ; 2023: 1029PJ

The following instruments have been taken into account in the current WEM scenario.

4.4.1.2.1 Energy Efficiency Act ('Energieeffizienzgesetz')

Type: EU policy

EU legislation	National implementation	Start
Energy Efficiency Directive 2012/27/EU, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC	Federal Law Gazette I No. 72/2014 (Energy Efficiency Act)	2014
Energy Efficiency Directive 2012/27/EU, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (as amended by Directive 2018/2002/EU)	Federal Law Gazette I No. 59/2023 (Revised Energy Efficiency Act)	2023

The Energy Efficiency Act aims to improve energy efficiency and reduce final energy consumption. It includes different provisions for energy suppliers, companies and the federal government.

The Energy Efficiency Act specifies an energy efficiency target of 920 PJ by 2030.

Large businesses must either conduct a mandatory external energy audit every four years or implement a mandatory energy or environmental management system that includes regular energy audits.

Energy suppliers must provide free advice to households on energy efficiency and energy savings.

Austria must meet an annual renovation goal of 3% for the federal building stock.

4.4.1.2.2 Domestic Environmental Support Scheme *('Umweltförderung im Inland')*

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast)	Federal Law Gazette No. 185/1993, last amendment Federal Law Gazette I No. 31/2024	1993

19% of the support volume provided by the Ministry was allocated to energy efficiency, with funding being provided for in-house energy savings in industry and services, thermal insulation and the switch to LED systems, for example (BMK 2024c).

Quantification of the mitigation impact/projected GHG emissions:

It has not been possible to quantify the total effect on projected GHG emissions for the energy and manufacturing industries alone. Furthermore, the reductions in electricity and district heating demand in other sectors have to be considered as well.

4.4.2 WAM Measures for Energy and Industry

4.4.2.1 Decarbonisation of the industry (PaM Id°5)

The main purpose of this policy is to reduce greenhouse gas emissions from the industry sector and mitigate its climate impact. The measure is focused on large enterprises and hard-to-abate industrial sectors.

GHG affected: CO_2

Type of policy instrument: economic, regulatory

Status: adopted

Start year of implementation: 2023

Implementing entity: federal government

Mitigation impact: 2030: 2 160 kt CO_2 eq*; 2035: 2 740* kt CO_2 eq*; 2040: 3 160* kt CO_2 eq*; 2045: 4 110* kt CO_2 eq*; 2050: 4 230* kt CO_2 eq

Indicator(s) used to monitor and evaluate progress over time: shares of biomass, electricity and hydrogen on the final energy demand of industry

Share of biomass: 2016: 16.7%; 2020: 15.8%; 2022: 18.5%; 2023: 18.7%;

Share of electricity: 2016: 31.7%; 2020: 31.1%; 2022: 29.7%; 2023: 29.7%;

Share of hydrogen: 2016: 0%; 2020: 0%; 2022: 0%; 2023: 0%.

Final energy demand of industry: 2016: 319,367 TJ; 2020: 305,004 TJ; 2022: 314,424 TJ; 2023: 285,904 TJ.
The following instruments have been taken into account.

4.4.2.1.1 Transformation of industry (‘*Transformation der Industrie*’)

Type: National policy

National implementation	Start
Federal Law Gazette No. 185/1993, last amendment Federal Law Gazette I No. 31/2024. Umweltförderungsgesetz UFG	2024

The aim of the industrial transformation programme is to support energy-intensive industries in making their production processes climate-neutral. This involves promotion of investment and operating costs (e.g. ‘Carbon Contracts for Difference’).

The federal government's climate and transformation campaign aims to help Austrian industrial companies to make their production processes climate-neutral. On the one hand, this strengthens value creation in Austria. On the other, it leads to greater independence from fossil fuel imports. Funding totalling around €5.7 billion is available until 2030.

As part of this climate and transformation offensive, a total of €2.975 billion will be made available for industrial transformation under the Environmental Funding Act (UFG) by 2030 (€175 million in 2023 and €400 million each year thereafter). The grants are awarded in a competitive tendering process, either as transformation or investment grants.

The transformation grant supports the equalisation of the cost difference between existing fossil fuels and new renewable energy sources when investing in climate-friendly technology. The transformation subsidy therefore covers both ongoing additional costs (OPEX) and proportionate investment costs (CAPEX), which are paid out annually over a maximum period of 10 years.

The investment grant supports investments in technical equipment or aggregates to avoid or reduce the environmental impact of greenhouse gas emissions. The investment grant therefore covers pure investment costs (CAPEX), which are paid out as a one-off payment.

4.4.2.1.2 Energy Efficiency Act (**'***Energieeffizienzgesetz***'**)

Type: EU policy

EU legislation	National implementation	Start
Energy Efficiency Directive (EU) 2023/1791	Federal Law Gazette I No. 59/2023 (Revised Energy Efficiency Act)	2023

The Energy Efficiency Act is aimed at improving energy efficiency and reducing final energy consumption. The targeted use of existing subsidies for non-ETS installations will increase energy efficiency, consequently reducing energy consumption and GHG emissions.

Tightened targets, the implementation of the "energy efficiency first" principle in planning and instruments for consumer information and empowerment will lead to greater energy efficiency than in the WEM scenario.

4.4.2.1.3 Environmental Support Act

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast)	Federal Law Gazette No. 185/1993, last amendment Federal Law Gazette I No. 31/2024	1993

In 2023, over 99% of the projects funded by the Ministry were climate-related. 5% of the support volume was allocated to the use of waste heat (BMK 2024c).

The new Energy Efficiency Programme provided €29 million of support for various energy-saving measures in 2023.

4.4.2.1.4 Renewable Gas Act (‘*Erneuerbares-Gas-Gesetz*’)

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413	Renewable Gas Act (Draft)	>2024

The Renewable Gas Act also aims to increase the share of green hydrogen in industry, contributing to the ramp-up of a hydrogen economy and helping to achieve the hydrogen targets set for the industry in RED III by 2030.

In the industry sector, modelling takes into account the targets of RED III to increase the share of renewable energy in the industrial sector (final energy consumption) by 1.6 percentage points per year, as well as the fulfilment of the hydrogen quota for industry.

The use of hydrogen in the industry sector (including non-energy consumption and energy systems) is assumed to amount to 12.3 PJ by 2030 and 39.3 PJ by 2040.

4.4.2.1.5 Circular Economy Strategy (‘*Kreislaufwirtschafts-Strategie*’)

Type: National policy

National implementation	Start
Circular Economy Strategy	2022

In the WAM scenario, the implementation of a circular economy strategy is assumed, focusing on increased recycling of building materials and the reparability of products.

Quantification of the mitigation impact/projected GHG emissions:

It has only been possible to quantify the total effect of the aforementioned instruments on the projected GHG emissions in the manufacturing industries.

4.4.2.2 Further enhancement of renewable energy in the electricity sector (PaM Id°6)

The main purpose of this policy, which is designed to reduce the climate impact of the energy system, is to further increase the share of renewable energy in the electricity and district heating supply. Beyond the WEM scenario, the potential is largely limited to PV and wind power plants. This potential is to be realised by providing support and removing barriers through improved market design.

GHG affected: CO_2

Type of policy instrument: regulatory, economic

Status: planned

Start year of implementation: >2024

Implementing entity: federal government

Mitigation impact: 2030: 3000 kt CO_2 eq*; 2050: 10600* kt CO_2 eq

Indicator(s) used to monitor and evaluate progress over time: installed capacity of wind and PV power plants: 2030: 25.9 GW; 2040: 37.9 GW; 2050: 43.9 GW

The following instruments have been taken into account.

4.4.2.2.1 Renewable Energy Expansion Act *('Erneuerbaren-Ausbau-Gesetz')*

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413	Draft Renewable Energy Expansion Act	>2024

In order to contribute to the implementation of the Renewable Energy Directive III (Regulation (EU) 2023/2413) and achieve the national goal of generating 100% of electricity from renewable energy sources in relation to consumption by 2030, Austria's WAM scenario assumes an additional 2 TWh of electricity generation from wind power and an additional 6 TWh from photovoltaics. This is in addition to the expansion set out under the Renewable Energy Expansion Act (EAG) in accordance with the WEM scenario. Compared to 2020, an additional 35 TWh of electricity is thus generated from renewable energy sources in the WAM scenario. By 2040, these volumes are expected to increase to 24 TWh from wind power and 30 TWh from photovoltaics.

4.4.2.2.2 Electricity Act ('*Elektrizitätswirtschaftsgesetz*')

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2019/944 on an Internal Market for Electricity	Draft Electricity Act	>2024

The electricity market has undergone significant changes since the adoption of the Third Internal Energy Market Package in 2009. The ongoing decarbonisation of the energy system and the development of new technologies are leading to an increasing decentralisation of energy generation and the emergence of new market players.

The new regulations aim to adapt the market rules to these circumstances, creating coherence with the support system of the Renewable Energy Expansion Act (EAG) to help achieve the European and national energy and climate targets. These include, in particular, the goal of providing 100% of total electricity consumption from renewable energy sources at a national level by 2030 and achieving climate neutrality in Austria by 2040.

The implementation of Directive (EU) 2019/944 will strengthen consumers' rights and support their active participation in the energy market.
The new provisions implementing Regulation (EU) 2019/941 on risk-preparedness in the electricity sector are also intended to ensure a secure and reliable electricity supply in future.

The new provisions contain stricter rules on prosecution, limitation periods and jurisdiction in matters relating to Regulation (EU) 1227/2011, in order to ensure its full implementation.

Quantification of the mitigation impact/projected GHG emissions:

By 2030, green electricity plants are expected to generate approx. 8 TWh more electricity in the WAM scenario than in the WEM scenario. This will result in emission reductions of about 3 Mt CO_2 eq. in 2030 (using an emission factor of 0.4 kt CO_2 eq./GWh electricity). However, only some of these reductions will be realised at a national level.

The expansion of renewable energy sources for electricity generation is needed to meet the growing demand in the transport (e-mobility), buildings (heat pumps) and industry (electrification) sectors.

4.4.2.3 Further enhancement of renewable energy through green gas (PaM Id°7)

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

GHG affected: CO_2

Type of policy instrument: regulatory, planning

Status: planned

Start year of implementation: >2024

Implementing entity: federal government

Mitigation impact: 2030: 1 000 kt CO_2 eq; 2040: 3 200 kt CO_2 eq; 2050: 4 300 kt CO_2 eq

Indicator(s) used to monitor and evaluate progress over time: Hydrogen produced nationally: 2025: 122 TJ; 2030: 14334 TJ; 2035: 17981 TJ; 2040: 50884 TJ

The following instruments have been taken into account.

4.4.2.3.1 Renewable Gas Act (‘*Erneuerbares-Gas-Gesetz*’)

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413	Renewable Gas Act (Draft)	>2024

In order to implement the Renewable Gas Act in accordance with the government bill of 21 February 2024, the modelling of the WAM scenario assumed that 10 TWh of biomethane would be produced and used by 2040.

In accordance with the hydrogen strategy, large quantities of hydrogen are assumed to be imported from 2035 onwards via the EU Hydrogen Backbone to supplement domestic production. The planned utilisation target of 15 TWh of renewable gas (biomethane and hydrogen) was modelled for 2035.

By 2030, 15% of the total hydrogen required will be imported, rising to 50% by 2040.

4.4.2.3.2 Hydrogen Strategy (‘*Wasserstoffstrategie*’)

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413	Hydrogen Strategy for Austria	2022

The construction of 1 GW_{el} of electrolysis capacity for the production of green hydrogen was assumed to be completed by 2030. In the WAM scenario, this capacity is expanded to 1.9 GW_{el} by 2040.

Quantification of the mitigation impact/projected GHG emissions:

It has only been possible to quantify the total effect on the projected GHG emissions as an overall effect of renewable gases compared to the WEM scenario (total across all sectors, including buildings, transport, etc.). Emission reductions are calculated assuming a substitution of natural gas (using an emission factor of 56 t CO2eq/TJ).

4.4.2.4 Expansion of geothermal energy and large heat pumps (PaM Id°8)

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

GHG affected: CO_2

Type of policy instrument: planning

Status: planned

Start year of implementation: >2024

Implementing entity: federal government

Mitigation impact: 2030: 80 kt CO_2 eq

Indicator(s) used to monitor and evaluate progress over time: District heating from geothermal energy and large heat pumps: 2025: 1079 TJ; 2030: 6816 TJ; 2035: 8184 TJ; 2040: 12741 TJ

The following instruments have been taken into account.

4.4.2.4.1 Geothermal energy roadmap *('Roadmap Geothermie')*

Type: EU and national policy

EU legislation	National implementation	Start
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413	Renewable Gas Act (Draft)	>2024

In 2022, the geothermal energy roadmap, which shows expansion potential up to 2030 and 2050, was published.

For the expansion of geothermal energy for district heating generation, Wien Energie's published plans were used as the basis for modelling the WAM scenario. By 2030, 1.5 TWh of heat will be provided from geothermal energy, rising to 3 TWh by 2040.

With regard to large heat pumps, modelling was based on the construction of the new large heat pump in Vienna's Simmering district, which will supply 25,000 households. This corresponds to a heat quantity of 1.5 PJ by 2030.

Quantification of the mitigation impact/projected GHG emissions:

Compared to the WEM scenario, the additional expansion of geothermal energy results in emission reductions of about 80 kt CO_2 eq. in 2030. Savings were calculated in comparison to heat production using natural gas boilers (60 t CO2eq/TJ).

4.5 Transport (CRT Source Category 1.A.3)

4.5.1 WEM measures for Transport

4.5.1.1 Increase the share of renewable energy sources in road transport (PaM Id°9)

One important and well-established policy target for the transport sector is to increase the share of clean energy sources in road transport. The EU Directive on the promotion of renewable energy sources requires Member States to replace at least 14% of the fuels used in transport with renewables (biofuels and electricity from renewable energy sources) by 2030. The Austrian Fuel Ordinance sets minimum targets for the share of biofuels (fatty acid methyl ester and ethanol) in the diesel and gasoline sold in Austria. Moreover, the increased share of electric mobility in road transport, along with a high share of renewable electricity, helps to achieve the renewable target in the transport sector.

GHG affected: CO_2

Type of policy instrument: regulatory (EU and national policy)

Status: implemented

Start year of implementation: 2004 / 2023 (RED II in national legislation)

Implementing entity: federal government

Mitigation impact: 2030: 1 635 kt CO_2eq; 2050: 632 kt CO_2eq

Indicator(s) used to monitor and evaluate progress over time: Share of renewable energy in transport incl. electricity: 2010: 9%; 2015: 10%; 2020: 8%; 2023: 10%; 2025: 10%; 2030: 14%; 2040: 42%; 2050: 67%

The following instrument has been taken into account.

4.5.1.1.1 Implementation of Directive 2018/2001 on the promotion of the use of energy from renewable sources *('Umsetzung der Richtlinie Erneuerbare Energieträger / RED II (2018/2001)* gemäß *Kraftstoffverordnung 2012')*

Description:

EU legislation	National implementation	Start
Directive 2018/2001/EC (RED II)	KVO[16] 2012, Federal Law Gazette II No 398/2012 (last amended in 2024)	2023
Fuel Quality Directive 2009/30/EC	KVO 2012, Federal Law Gazette II No 398/2012 (last amended in 2024)	2009
RES Directive 2009/28/EC (amendment, no longer in force) (RED I)	KVO 1999 Federal Law Gazette II No. 168/2009	2009
RES-E Directive 2001/77/EC (no longer in force)	KVO 1999 Federal Law Gazette II No. 168/2009	2009
Biofuels Directive 2003/30/EC (no longer in force)	KVO 1999 Federal Law Gazette II No. 417/2004	2004

[16] KVO = Kraftstoffverordnung / Austrian Fuel Ordinance

Biofuels have been on the Austrian market since 2005, primarily as a blend of biodiesel with conventional diesel. Since October 2007, ethanol has been added to petrol (gasoline). Standards are in place for gasoline fuel (E10) and diesel fuel (B7). This means that, at present, up to 10% ethanol can be blended with gasoline fuels and up to 7% fatty acid methyl ester (FAME) can be added to diesel fuels. Further details can be found in Austria's annual report on biofuels in the transport sector (BMK 2024d).

The RED II Directive (Directive 2018/2001/EC) establishes target values for the use of renewable energy sources in transport from 2021 to 2030 (the overall EU target being 32% for renewable energy sources consumption by 2030). Moreover, Member States must require fuel suppliers to supply a minimum of 14% of the energy consumed in road and rail transport by 2030 as renewable energy.

In Austria's current WEM scenario, the RED II targets for the use of renewable energy sources, as well as the requirements of the Fuel Quality Directive, are implemented via the national Fuel Ordinance (KVO – Kraftstoffverordnung), which sets a GHG emission reduction target of 13% by 2030.

E10[17] was introduced in Austria in 2023 and is now available on the domestic market. Since then, the volume of hydrotreated vegetable oil (HVO) and biodiesel has increased, and this trend is reflected. The assumed fade-out of pure plant oil has been revised, with sales volumes being maintained at a low level. Fossil LPG in vehicles will be phased out by 2030 and replaced by biogas, though competition for biogas is expected. Companies need to put them on the market to meet rising GHG targets, since the volumes marketed via blending are currently limited.

Assumptions about the development of the volume of biofuels blended with fossil fuels largely depend on the amount of fossil fuel sold in the transport sector. As electromobility expands, the blending of bioethanol and biodiesel will gradually decrease. Consequently, the GHG-reduction potential will decrease over time. Renewable Fuels of Non-Biological Origin (RFNBOs), PtX[18], and electricity-based fuels are likely to remain negligible.

4.5.1.2 Promotion of e-Mobility (PaM Id°10)

The shift from internal combustion engines to electric engines is the most important and relevant measure in the WEM scenario. In 2023 and 2024, the EU has set ambitious CO_2 emission reduction targets for passenger cars, light-duty commercial vehicles and heavy-duty vehicles and is therefore calling on manufacturers and society to switch to e-mobility. While national subsidies for battery electric passenger cars and light-duty commercial vehicles are slowly fading out, the purchase of heavy-duty vehicles and urban buses with electric or fuel-cell electric engines is still supported by national subsidy programmes. This is because the investment costs for these vehicles are still higher than for those with internal combustion engines. Two instruments have been taken into account,

[17] E10 is a gasoline fuel that contains a maximum of 10 vol.-% bioethanol in addition to fossil gasoline.

[18] Power-to-X (electricity conversion, e.g. to hydrogen)

which are described in detail below. Together, they generate the following effects:

Mitigation impact: 2030: 3 081 kt CO_{2eq}; 2050: 4 946 kt CO_{2eq}

Indicator used to monitor and evaluate progress over time: Share of BEVs in new passenger car registrations: 2010: 0.04%; 2015: 0.06%; 2020: 7%; 2023: 21%; 2025: 20%; 2030: 50%; 2040: 100%; 2050: 100%

The following instruments have been taken into account:

4.5.1.2.1 EU CO_2 reduction targets for PC, LDV and HDV *('CO_2 Grenzwerte für PKW, LNF und SNF')*

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory (EU policy)

Status: implemented

Start year of implementation: 2023 | 2024 (heavy-duty vehicles) | 2021 (urban buses)

Implementing entity: European Union (standards for car industry monitored by federal government and reported to EU)

Description:

EU legislation	National implementation	Start
Regulation (EU) 2023/851		2023
Regulation (EU) 2024/1610		2024

Compared to 2021, Regulation (EU) 2023/851 sets the following targets for CO_2 emission performance standards for new passenger cars and for new light commercial vehicles: -15% by 2025, -55% (passenger cars) and -50% (light commercial vehicles) by 2030, and -100% by 2035.

Compared to the 2019 reporting period, the targets for CO_2 emission performance standards for heavy-duty vehicles are as follows: -15% by 2025, -45% by 2030, -65% by 2035, and -90% by 2040. From 2030 onwards, the phase-out of internal combustion engines for urban buses is suggested. The projections for the fleet of urban buses include the requirements of the Clean Vehicle Directive (Directive (EU) 2019/1161).

However, shortly after the new regulations for CO_2 emission performance standards for passenger cars, light-duty commercial vehicles and heavy-duty vehicles were adopted, discussions about weakening the emission performance standards began. The outcome of these discussions is still uncertain and has not yet been reflected in the WEM measures.

4.5.1.2.2 Promotion of zero-emission HDV (‘*Förderprogramme EBIN, ENIN, LADIN*’)[19]

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: national funding programme

Status: implemented

Start year of implementation: 2021

Implementing entity: FFG

Description:

EU legislation	National implementation	Start
Directive (EU) 2019/1161	Straßenfahrzeug-Beschaffungsgesetz, Federal Law Gazette I No. 163/2021	2021

Incentive mechanisms through funding programmes for zero-emission buses (EBIN) and trucks (ENIN) and charging infrastructure (LADIN) have been included in the projections. The EBIN and ENIN programmes form part of the Austrian Recovery and Resilience Plan 2020-2026 (ERRF – NextGenerationEU) and provide funding for zero-emission vehicles. Funding for related charging infrastructure is available via the LADIN programme.

Regarding the funding of electric passenger cars and light-duty vehicles in Austria, as well as the related charging infrastructure, it is acknowledged that funding programmes in recent years (e-mobility for private individuals, e-mobility for companies, local authorities, associations, etc.) have contributed significantly to the growth of the electric vehicle fleet. As demand for electric passenger cars and light-duty vehicles is now steady and funding programmes and subsidies are coming to an end, it is assumed that no further funding programmes or subsidies will be available for electric passenger cars and light-duty vehicles after 2023.

Current projections include all electrified transport modes on the road. For the projections, it has been assumed that the vehicle kilometres of conventional diesel and gasoline cars, as well as buses, will be substituted by electric vehicles. The increased power consumption of electric vehicles has been factored into the energy-producing sectors.

4.5.1.3 Increase fuel efficiency in road transport (PaM Id°11)

Increasing fuel efficiency in road transport is an essential measure for limiting energy demand in transport. One of the measures that increase fuel efficiency is optimising and harmonising driving speeds. The klimaaktiv EcoDriving programme has been implemented to raise awareness of the effect of the personal driving behaviour on fuel efficiency. The programme aims to improve driving performance through awareness raising and training programmes. Furthermore, speed limits established in response to concerns about the air quality (IG-

[19] ‘Umstellung von Busflotten auf emissionsfreie Antriebe’ (EBIN) and ‘Initiative zur Umstellung von Nutzfahrzeugflotten auf emissionsfreie Antriebe’ (ENIN) as well as Förderprogramm ‘LADIN – Ladeinfrastruktur’

L) help to reduce fuel consumption and standardise driving speeds on motorways.

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory (IG-L), information-related (EcoDriving)

Status: implemented

Start year of implementation: 1997 (IG-L) / 2004 (EcoDriving)

Implementing entity: federal government

Mitigation impact: 2030: 91 kt CO_2-eq; 2050: 75 kt CO_2-eq

Indicator used to monitor and evaluate progress over time:
Specific fuel consumption of passenger car fleet on motorways in g/km:
2010: 63; 2015: 60; 2020: 58; 2023: 55; 2025: 53; 2030: 45; 2040: 16; 2050: 3

The following instruments have been taken into account:

4.5.1.3.1 Air quality induced speed limits (‘*Bestehende Tempolimits gemäß Immissionsschutzgesetz-Luft (IG-L)*’)

EU legislation	National implementation	Start
Air Quality Directive 2008/50/EC	Federal Law Gazette I No 115/1997 (last amended 2018)	1997/NA
	Emissionsgesetz-Luft 2018 (EG-L 2018), Federal Law Gazette I No. 75/2018	

The Austrian Ambient Air Quality Act establishes ambient air quality limit values for several pollutants.

In order to reduce and avoid exceedances of the limit value for NO_2, speed limits have been lowered on certain sections of the Austrian motorways, either permanently or in sections controlled by traffic management systems. Based on an analysis of mileage-based speed, a difference in driving speeds of 6.2 km/h was used as input for the NEMO model (Dippold et al. 2012). The calculated reduction potentials for energy use and emissions were simulated in the NEMO model. Emissions were calculated based on traffic volumes and speed on the respective motorway sections.

4.5.1.3.2 EcoDriving initiative (‘*klimaaktiv mobil Spritsparinitiative*’)

Promoting fuel-efficient driving is a measure aimed at reducing CO_2 emissions through a behavioural change. The ‘klimaaktiv mobil’ initiative includes the ‘klimaaktiv mobil’ fuel saving initiative (‘klimaaktiv Spritsparinitiative’) to encourage fuel-efficient driving. Training sessions in fuel-efficient driving are offered to car, truck, bus and train drivers with the aim of reducing fuel consumption. Compared to conventional driving, GHG emissions can be reduced by 5–15%. Nationwide competitions and pilot campaigns for companies with large fleets have been organised, leading to energy savings.

4.5.1.4 Promotion of klimaaktiv mobil mobility management and active mobility (PaM Id°12)

One of the most important policy measures is the promotion of a modal shift towards environmentally friendly transport modes.

The 'klimaaktiv mobil' programme, which focuses on mobility management and awareness-raising, is an essential tool for promoting environmentally friendly and active modes of transport (cycling and walking). The cornerstones of 'klimaaktiv mobil' include a funding programme for businesses, communities and associations, target group-oriented counselling programmes, awareness-raising initiatives, partnerships, as well as training and certification initiatives. The programme also supports the planning and implementation of walking and cycling infrastructure.

GHG affected: CO_2, CH_4, N_2O

Type of policy: financial, awareness raising, national policy, subsidies

Status: implemented and ongoing (klimaaktiv mobil)

Start year of implementation: 2006 (klimaaktiv mobil)

Implementing entity: federal government (klimaaktiv mobil)

Mitigation impact: 2030: 698 kt CO_2-eq; 2050: 53 kt CO_2-eq

Indicator used to monitor and evaluate progress over time: Share of active mobility in modal split in % of total pkm: 2010: 3.0%; 2015: 2.8%; 2020: 3.3%; 2023: 3.5%; 2025: 3.7%; 2030: 4.2%; 2040: 4.1%; 2050: 4.0%

The following instrument has been taken into account.

4.5.1.4.1 'klimaaktiv mobil' initiative - Mobility management and awareness ('*Mobilitätsmanagement und Bewusstseinsbildung – klimaaktiv mobil Programm*')

The 'klimaaktiv mobil' initiative of the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) offers a wide range of measures to promote climate-friendly mobility management and cycling initiatives. Its aim is to motivate and support relevant stakeholders and decision-makers in developing and implementing projects that promote climate-friendly, efficient and sustainable mobility. Numerous projects have already been successfully implemented:

- Mobility management for commercial building promoters and fleet owners;
- Mobility management for leisure, tourism and youth;
- Mobility management for cities, municipalities and regions.

Furthermore, several thousand climate-friendly mobility projects have been initiated and implemented by establishments, cities, municipalities and regions, tourist facilities and schools.

Recently, funding has also become available for active mobility infrastructure (i.e. infrastructure for walking and cycling) including planning. To further promote cycling, especially for longer distances and for the transport of goods, e-bikes and e-cargo bikes are also financially supported.

The CO_2 mitigation potential of klimaaktiv mobil is calculated using a CO_2 reduction factor per euro invested, based on the results of project reports since 2007. As funding for the programme is only secured until 2030, no further investments are considered beyond this date. However, since the impact of a project continues for several years after funding (30 years for cycling infrastructure and 10 years for mobility management measures), a decreasing CO_2 mitigation potential is expected after 2030.

4.5.1.5 Expanding and increasing the attractiveness of public transport (PaM Id°13)

One of the most important political measures is to promote a shift towards environmentally friendly modes of transport, such as public transport and, in particular, rail.

Although Austria is one of the EU member states with a high share of passenger transport by rail, significant investments in rail infrastructure and services continue to be made to improve passenger services. To further promote public transport, the nationwide "Climate Ticket (KlimaTicket)" has been introduced. This makes travelling by public transport more attractive from both an economic perspective and in terms of user-friendliness.

GHG affected: CO_2, CH_4, N_2O

Type of policy: financial, national policy, subsidies

Status: implemented

Start year of implementation: 2024 (Austrian Federal Railway Framework Plan 2024 – 2029) / 2021 (KlimaTicket)

Implementing entity: federal government (KlimaTicket), Austrian Federal Railways (ÖBB)

Mitigation impact: 2030: 913 kt CO_2-eq; 2050: 109 kt CO_2-eq

Indicator used to monitor and evaluate progress over time:
Share of electric public transport in modal split in % of total pkm:
2010: 17%; 2015: 18%; 2020: 14%[20]; 2023: 18%; 2025: 19%; 2030: 20%; 2040: 19%; 2050: 19%;

The following instruments have been taken into account.

[20] Covid pandemic in 2020.

4.5.1.5.1 Austrian Federal Railway Framework Plan 2024 – 2029 – passengers ('ÖBB Rahmenplan 2024 – 2029 – Personenverkehr')

EU legislation	National legislation	Start
/	Bundesbahngesetz, Federal Law Gazette No. 825/1992 (last amended 2021), §42	2003

The Austrian federal railway framework plan sets out investments in the ÖBB-Infrastruktur AG network. The legal basis for this is Section 42 of the Federal Railways Act.

The Austrian federal railway framework plan includes planned projects and their investment sums, which are scheduled for implementation over a 6-year period. Furthermore, the framework plan also includes the expenses foreseen for the maintenance of the rail network during this period. This forms the substantive basis for the subsidies of the BMK to ÖBB-Infrastruktur AG, which are subsequently contractually agreed (subsidy contracts). The Federal Railways Act stipulates that the framework plan should be updated annually for a period of one year and adjusted to the new period. As part of the present Austrian railway framework plan, the "target network 2025+" for passenger and freight transport (see also Modal shift in freight transport) will be implemented.

In the area of rail passenger transport, the Austrian railway framework plan will reduce the travel time on important axes through large-scale infrastructure projects (Brenner Base Tunnel, Semmering Base Tunnel, Koralm Tunnel) and investments in electrification, automation and digitalisation. Furthermore, renovations of railway stations, improved customer services and better connections will make travelling by rail more attractive.

4.5.1.5.2 Nationwide and Regional public transport ticket ('*KlimaTicket Österreich" und "KlimaTicket Regional*')

EU legislation	National legislation	Start
/	Bundesgesetz über die Einführung des Klimatickets (Klimaticketgesetz - KlimaticketG), Federal Law Gazette I No. 75/2021 One Mobility Gesetz (One G) Federal Law Gazette I No. 363/2021	2021

On 26 October 2021, the KlimaTicket ("climate ticket"), an integrated public transport ticket, was introduced in Austria. Previously, each regional transport company had its own ticketing service, so customers travelling in more than one region had to buy several tickets from different transport companies.

The KlimaTicket is available in national and regional versions. The national version ("KlimaTicket Österreich") is valid on all public transportation across Austria and can be purchased for €1,095 per year (€3 per day). The regional version ("KlimaTicket Regional") is valid on all public transportation in a specific region, with prices ranging from €365 per year to €860 per year.

The instrument was introduced to incentivise the use of public transport by making it easier, cheaper and thus more attractive.

4.5.1.6 Modal shift in freight transport (PaM Id°14)

One of the most important policy measures is the promotion of a shift towards environmentally friendly modes of transport.

Similarly to passenger transport, a modal shift towards environmentally friendly modes of transport is necessary to reduce the GHG emissions in freight transport. Austria is meeting this challenge by continuously investing in rail freight infrastructure as part of the Austrian federal railway framework plan ("ÖBB Rahmenplan"). As part of this plan, the "target network 2025+" will be implemented, including improvements to major TEN-T axes (esp. the Scandinavian-Mediterranean corridor and Baltic Adriatic corridor). These improvements to the railway network will benefit all rail freight companies transporting goods in and through Austria.

Furthermore, Austria promotes the modal shift from road to rail or inland waterways by supporting companies that transport goods by rail and by improving the conditions for waterborne transport.

GHG affected: CO_2, CH_4, N_2O

Type of policy: financial, national policy, subsidies

Status: implemented

Start year of implementation: 2024 (Austrian Federal Railway Framework Plan 2024 – 2029) / 2023 (Action Plan Danube 2030) / 2017/18 (Rail Freight Subsidy, Promotion of corporate rail connections and terminals for freight transport)

Implementing entity: Austrian Federal Railways (ÖBB), Austrian waterways company (ViaDonau), Federal ministry (funding programmes)

Mitigation impact: 2030: 614 kt CO_2-eq; 2050: 98 kt CO_2-eq

Indicator used to monitor and evaluate progress over time: Share of rail transport in modal split in % of total tkm: 2010: 28%; 2010: 28%; 2020: 26; 2023: 24%; 2025: 26%; 2030: 28%; 2040: 25%; 2050: 24%

The following instruments have been taken into account.

4.5.1.6.1 Austrian Federal Railways Framework Plan 2024–2029 – freight *('ÖBB Rahmenplan 2024–2029 – Güterverkehr')*

EU legislation	National legislation	Start
/	Bundesbahngesetz, Federal Law Gazette. No. 825/1992 (last amended 2021), §42	2003

The Austrian Federal Railways Framework Plan aims to increase the capacity of the rail network for freight transport. This includes large-scale infrastructure

projects along important TEN-T axes (the Brenner Base Tunnel on the Scandinavian-Mediterranean corridor, the Semmering Base Tunnel on the Baltic-Adriatic corridor). The plan also involves investments in intermodal terminals and cargo centres (Villach, Graz, Wels and Vienna), as well as electrification and ongoing investments in automation and digitalisation.

4.5.1.6.2 Action Plan Danube 2030 ('Aktionsprogramm Donau 2030 des BMK')

Within the framework of the Action Plan Danube, Austria is continuously working on improving the Danube navigation channel to enable the transport of goods via inland vessel even in times of low water levels. The focus is on customer-oriented waterway management and improved navigation on the Danube, with the aim of reducing greenhouse gas emissions and increasing the environmental friendliness of Danube navigation, as well as ensuring flood protection and damage minimisation in the event of a flood disaster (BMK 2023a).

It was assumed that the continued promotion of Danube navigation would at least guarantee the upholding of the current freight volumes until 2050.

4.5.1.6.3 Rail Freight Subsidy and Promotion of corporate rail connections and terminals for freight transport *('Schienengüterverkehrsförderung und Anschlussbahn- und Terminalförderung')*

The purpose of the rail freight subsidy is to provide rail freight transport services in the production forms of (a) single-wagon transport, (b) unaccompanied combined transport or (c) transport of trucks and trailers by train ("Rollende Landstraße"). The subsidy is provided in the form of a non-repayable grant. [21]

The promotion of corporate rail connections for transport is an instrument that aims to support investment in corporate feeder lines in order to maintain and expand the railway network. Investments in terminals and handling facilities are also supported. The improvement of rail infrastructure at company and industrial sites aims to shift transport activities from road to rail. The intention is to increase the proportion of freight transported by rail by promoting and financing feeder lines at company locations.[22]

4.5.1.7 Greening the truck toll (PaM Id°15)

Regulatory measures with indirect financial impact can contribute to behavioural change in the transport sector as individuals and especially companies seek to optimise their costs. A truck toll based on the EURO class, with special tariffs for zero-emission trucks or buses over 3.5 tonnes, creates incentives for transport companies to renew their fleets in order to reduce their costs.

GHG affected: CO_2, CH_4, N_2O

[21] https://www.bmk.gv.at/themen/verkehr/eisenbahn/foerderungen/sgv-plus.html

[22] https://www.bmk.gv.at/themen/verkehr/eisenbahn/foerderungen/anschlussbahnen.html

Type of policy instrument: regulatory (truck toll)

Status: implemented

Start year of implementation: 2002 *(truck toll)* | 2023 *(truck toll extended to include also the external costs of CO2 emissions)*

Implementing entity: federal government

Mitigation impact: 2030: 39 kt CO_2-eq; 2050: -

Indicator used to monitor and evaluate progress over time: Share of EEV HDV in total mileage on motorways: 2010: 0%; 2015: 0%; 2020: 0.018%; 2023: 0.023% 2025: 1%; 2030: 6%; 2040: 39%; 2050: 61%

The following instrument has been taken into account.

4.5.1.7.1 Greening the truck toll (‘*Ökologisierung der LKW-Maut*‘)

EU legislation	National implementation	Start
Directive (EU) 2022/362 (Taxation of heavy goods vehicles)	Federal Law Gazette I No. 109/2002 (last amended 2023)	2002

As set out in the Federal Roads Toll Act and the Ordinance on Toll Tariffs, the mileage-based truck toll has been split into three categories (according to the number of axles) since 1 January 2010. These categories are differentiated by CO_2 class (each CO_2 class corresponds to certain EURO classes), day-time and night-time driving and zero emission-vehicles. This measure is based on EU Directive 2006/38/EC on the charging of heavy goods vehicles for the use of certain infrastructures (amending Directive 1999/62/EC). In 2023, Directive (EU) 2022/362 (amending Directive 1999/62/EC) introduced a further differentiation of the toll tariffs, based on the external costs of transport-related CO_2. Depending on the CO_2 emission class, the toll rate is reduced by up to 75% or 100% for zero-emission trucks or buses over 3.5 tonnes (-75% for the infrastructure costs, -100% for the costs related to CO_2 emissions).

The reduction potential of this measure is based on observations of historical fleet renewal rates after toll rate changes, as well as on expert estimates by TU Graz, which have all been incorporated into the NEMO model. The reduction potential of an early fleet renewal decreases over time and runs out by 2045. The future renewal cycle of the heavy-duty vehicle fleet is determined by the fleet module of the NEMO model, which assumes that older vehicles are removed on a regular basis.

4.5.1.8 SAF in aviation (PaM Id°16)

Aviation contributes significantly to greenhouse gas emissions. At a European level, the new ReFuelEU Aviation Regulation (EU) 2023/2405 defines minimum shares of synthetic aviation fuels (SAF) that all aviation fuel made available to aircraft operators at each Union airport must contain in order to reduce GHG emissions.

GHG affected: CO_2,

Type of policy instrument: regulatory

Status: implemented

Start year of implementation: 2024

Implementing entity: federal government

Mitigation impact: 2030: 39 kt CO_2-eq; 2050: -

Indicator used to monitor and evaluate progress over time: Share of SAF in kerosene consumption (vol.): 2010: - ; 2015: - ; 2020: - ; 2023: -; 2025: 2%; 2030: 6%; 2040: 34%; 2050: 70%

The following instrument has been taken into account.

4.5.1.8.1 Sustainable Aviation Fuels *('SAF im Flugverkehr')*

EU legislation	National implementation	Start
Regulation (EU) 2023/2405		2024

The defined minimum share of SAF in aviation fuel starts at 2% in 2025, rises to 6% in 2030 and reaches 70% in 2050.

4.5.2 WAM measures for Transport

The WAM24-NEKP scenario was completed in July 2024. It is based on the WEM23 scenario, rather than the WEM25 scenario (which is described in this report). The cut-off date for policies and measures in the WEM23 scenario is 1 January 2022. All reduction effects calculated in the WAM24-NEKP scenario result from a comparison with the status quo as at 1 January 2022.

The cut-off date for the current WEM25 scenario is 30 June 2024. Due to the later cut-off date, several policies and measures that were originally part of WAM24-NEKP have now come into force and are included in the WEM25 scenario. For this reason, this chapter only lists the policies and measures that go beyond those of the WEM25 scenario. In addition, no effects on GHG reduction are indicated, as the WEM25 and WAM24-NEKP scenarios have two different starting situations.

4.5.2.1 Accelerated increase of renewable energy sources in transport (PaM Id°17)

GHG affected: CO_2

Type of policy instrument: economic; fiscal; regulatory (EU and national policy)

Status: planned

Start year of implementation: >2024

Implementing entity: federal government

Mitigation impact:

Indicator(s) used to monitor and evaluate progress over time:
Share of renewable energy in transport incl. electricity (energetic, in %): 2010: 9%; 2015: 10%; 2020: 8%; 2023: 10%; 2025: 11%; 2030: 20%; 2040: 48%; 2050: 74%

The following instrument has been taken into account:

4.5.2.1.1 REDIII (‘*Erneuerbare-Energien-Richtlinie RED III*’)

EU legislation	National implementation	Start
Directive (EU) 2023/2413	(Revision of the Fuel Regulation KVO 2012)	2024

The WAM24-NEKP scenario incorporates the implementation of Directive (EU) 2023/2413 (Renewable Energy Directive - RED III). According to RED III, the energy target for 2030 is modelled at 29% (energy content), taking into account electricity for road and other land transport, as well as current biofuel blending. The sub-target of 5.5% is modelled with 1% RFNBOs and 4.5% advanced biofuels (added to the current biofuels).

4.5.2.2 Advanced electrification of non-road mobile machinery (NRMM) (PaM Id°18)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: economic (subsidies); fiscal; voluntary/negotiated agreements; financial;

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time:
Share of large electric industrial & construction vehicles/machines in new NRMM registrations (in %): 2010: 0.8%; 2015: 1%; 2020: 1,2%; 2023: 1.3%; 2030: 2.2%

In the baseline of the projections, a moderate level of electrification is already included for all non-road mobile machinery. The WAM24-NEKP scenario is based on the implementation of political measures to increase the share of new electric registrations in the non-road mobile machinery (NRMM) sector.

The following targets for new electric NRMM registrations in 2030 have been defined and are implemented in the WAM24-NEKP scenario (the percentages in brackets show the share of new registrations in the WEM25 scenario for comparison):

- 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%)

A comparison with WEM25 is permissible at this point, as there were no significant deviations from the new registration rates of WEM23.

4.5.2.3 Enforcement of active mobility and mobility management (PaM Id°19)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: economic; information; planning; voluntary/negotiated agreements (financial, awareness raising, national policy, subsidies)

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces, cities, municipalities

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time:
Share of active mobility in the modal split in % of total pkm:
2010: 3.0%; 2015: 2.8%; 2020: 3.3%; 2023: 3.5%; 2025: 3.7%; 2030: 4.5%; 2040: 4.5%; 2050: 4.3%

The WAM24-NEKP scenario includes further improvements in the area of active mobility as well as measures to increase the attractiveness of car sharing and carpooling services. These lead to a reduction in the number of car journeys and an increased shift to walking and cycling. The three key elements of this measure are:

- Expansion of infrastructure for walking and cycling;
- Implementation of an attractive nationwide car-sharing scheme;
- Promotion of carpooling on the way to work.

These three elements are supported by mobility management measures.

4.5.2.4 Enforced attractiveness of public transport incl. a guaranteed minimum service (PaM Id°20)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: financial, national policy, negotiated agreements

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces, cities, municipalities

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time:
Share of public transport in the modal split in % of total pkm:
2010: 17%; 2015: 18%; 2020: 14%[23]; 2023: 18%; 2025: 20%; 2030: 23%; 2040: 24%; 2050: 23%

[23] Covid pandemic in 2020.

By expanding and extending the public transport services to include a guaranteed minimum service ("mobility guarantee"), significantly more car journeys are shifted to public transport. The following measures are implemented:

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

4.5.2.5 Enforcement of rail freight funding (PaM Id°21)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: subsidies

Status: planned

Start year of implementation: >2024

Implementing entity: federal government

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time:
Share of rail transport in modal split in % of total tkm:
2010: 28%; 2010: 28%; 2020: 26; 2023: 24%; 2025: 29%; 2030: 33%; 2040: 32%; 2050: 31%

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

4.6 Other Sectors (CRT Source Category 1.A.4) – Stationary Combustion (Buildings)

This section describes measures related to energy consumption from category *1.A.4 Other Sectors* only. These measures are interlinked with the energy supply from the Energy Industries sector (see Chapter 4.4). For further information on policies and measures of mobile sources from category *1.A.4 Other Sectors*, see chapter 4.5.

Significant national policy instruments that promote the implementation of measures include the Housing Support Scheme ('Wohnbauförderung'), the Technical Building & Construction Regulations of the regional authorities ('Bundesländer'), the Domestic Environmental Support Scheme ('Umweltförderung im Inland'), the Austrian Climate and Energy Fund ('Klima- und Energiefonds') and the Austrian Climate Protection Initiative ('klimaaktiv'). The latter three programmes are financed by the federal government.

4.6.1 WEM Measures for Other Sectors – Buildings

4.6.1.1 Climate Neutral New Buildings (PaM Id°22)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic

Status: implemented

Start year of implementation: 1993

Implementing entity: federal government, federal provinces

Mitigation impact (against fictitious WOM scenario): 2025: 7.6 kt CO2eq; 2030: 32 kt CO2eq; 2035: 67 kt CO2eq; 2040: 104 kt CO2eq; 2045: 110 kt CO2eq; 2050: 112 kt CO2eq

Indicators used to monitor and evaluate progress over time:
a) Useful heat per gross floor area of subsidised new buildings (level with measure set) (Housing Support Scheme): 2010: 32 kWh/(m².a); 2015: 26 kWh/(m².a); 2020: 27 kWh/(m².a); 2023: 30 kWh/(m².a) (BMK 2025)
b) Useful heat per gross floor area of subsidised new buildings (level mandatory by building code) (Housing Support Scheme): 2010: 49 kWh/(m².a); 2015: 42 kWh/(m².a); 2020: 36 kWh/(m².a); 2023: 40 kWh/(m².a) (BMK 2025)

Increasing the energy efficiency of buildings is one of the most effective means of reducing the carbon footprint of the Austrian population. Tighter mandatory construction standards improve the energy performance of new buildings. Installing heating systems using renewable energy sources is another key factor in achieving climate neutral new buildings (regarding the energy use for space heating and hot water preparation).

In the WEM scenario, the full implementation of Directive 2010/31/EU establishes the nearly zero-energy building standard for new buildings. High-efficiency alternative heating systems have to be considered, if available. The requirement for a renewable energy share encourages 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 energy efficiency standards than the minimum criteria are met for 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.

Objectives *Efficiency improvements of buildings*
Efficiency improvement of appliances
Efficiency improvement in services/tertiary sector

The following instruments have been taken into account.

4.6.1.1.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('*OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz*')

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	OIB Guideline 6, 2023 edition (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)
	National plan according to Art. 9(3) of Directive 2010/31/EU, edition 2018 (OIB-330.6-005/18)	2018

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for both residential and non-residential buildings.

The federal provinces are responsible for translating this guideline into their respective regional laws (amending the previous editions of OIB Guideline 6, released in October 2011, March 2015 and April 2019). The periodic revisions of OIB Guideline 6 incorporate the successive phases of the National Plan.

The National Plan mandated that building standards for new buildings be updated every two years in order to achieve the 'nearly zero energy' building standard required by the EU Directive by 2020, a target that has already been met. The focus has shifted to include not only the thermal heat demand of buildings but also hot water, ventilation, cooling, the electricity demand, and photovoltaics – all of which impact total energy efficiency. Moreover, the new energy performance certificate for buildings specifies parameters such as the total energy efficiency factor, CO_2 emissions and the demand for primary energy on the cover sheet. It also sets out minimum requirements for useful thermal heat demand and final energy consumption.

There is no information about policy costs. However, the level of ambition of the National Plan is set to meet the cost-optimal level of the EPBD (Directive 2010/31/EU) through a corresponding OIB document released in March 2014 ('OIB-Dokument zum Nachweis der Kostenoptimalität der Anforderungen der OIB-RL6 bzw. des Nationalen Plans gemäß 2010/31/EU', latest revision by OIB-330.6-012/24).

4.6.1.1.2 Oil Boiler Installation Prohibition Act ('*Ölkesseleinbauverbotsgesetz – ÖKEVG 2019*')

Type: national legislation: Federal Law Gazette I No. 6/2020 (repealed by Federal Law Gazette I No. 8/2024).

The installation of liquid or solid fossil fuel boilers in newly constructed buildings has been prohibited since 2020. The Renewable Heat Act repealed this legislation on 29 February 2024.

4.6.1.1.3 Renewable Heat Act (‘*Erneuerbare-Wärme-Gesetz – EWG*’)

Type: national legislation: Federal Law Gazette I No. 8/2024 (repealing Federal Law Gazette I No. 6/2020).

The installation of all heating systems suitable for fossil fuels (as well as district heating that has not been quality-assured) in newly constructed buildings is prohibited as of 29 February 2024. Only renewable gas from directly connected own generation plants may still be used for the heating of newly constructed buildings.

The full effectiveness of the restrictions on fossil fuel heating systems in new buildings is not expected until the end of 2024, as transitional agreements apply.

4.6.1.1.4 Funding Programmes for New Buildings (‘Förderprogramme für Neubauten’)

Type: national legislation, national policy, regional policy

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 31/2024 (latest amendment considered in the WEM scenario)	2024
	Federal Law Gazette No. 185/1993	1993

In the WEM scenario, it has been assumed that the following funding and national programmes will be continued in order to support renewable heating systems and to improve the thermal energy efficiency of the envelopes of new buildings:

Housing Support Scheme (‘Wohnbauförderung’)

- The Housing Support Scheme provides additional subsidies for the construction of new buildings with further improved energy efficiency, the use of modern heating systems (particularly those combining cleaner biomass heating system technologies with solar systems), as well as the use of ventilation and heat recovery systems. On a temporary basis, the new economic policy measures set out in the Financial Equalisation Act (Federal Law Gazette I No. 168/2023, as amended by Federal Law Gazette I 59/2024), are taken into account (‘Konjunkturpaket Wohn- und Eigentumsoffensive’, ‘Zukunftsfonds Wohnen und Sanieren’). In the WEM scenario, the Housing Support Scheme will remain available until 2050, although with reduced funding.

Domestic Environmental Support Scheme, including Energy Efficiency Programme (‘Umweltförderung im Inland inkl. Energieeffizienzprogramm’)

- Subsidies from the Domestic Environmental Support Scheme for the construction of new buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. The main instrument will

be available until 2030 and the Energy Efficiency Programme until 2034 in the WEM scenario.

Austrian Climate and Energy Fund ('Klima- und Energiefonds')

- Subsidies from the Austrian Climate and Energy Fund for the construction of new buildings are linked to the fulfilment of environmental requirements within specific funding initiatives.

In the WEM scenario, it has been assumed that the annual climate-effective funding provided for new buildings (building-related funding only)[24] at nominal prices will increase by 22% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Wohnen und Sanieren'). Subsequently, funding is expected to decline by 29% by 2030, 30% by 2035, 32% by 2040, 37% by 2045 and 48% by 2050 compared to 2023 (see Table 17).

Table 17: Budget of funding programmes for energy efficiency and heating systems of new buildings – scenario 'with existing measures'.

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2025 to 2050**
Commercial/Institutional buildings	1.9	2.1	1.2	:	:	:	:	**12**
Residential buildings	366	452	259	256	249	230	193	**6 932**
Heating systems[25]	16	13	11	11	11	9.8	8.2	**276**
Total	**384**	**467**	**271**	**267**	**259**	**240**	**201**	**7 221**

4.6.1.2 Thermal Renovation of the Building Stock (PaM Id°23)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic, information

Status: implemented

Start year of implementation: 1993

Implementing entity: federal government, federal provinces

Mitigation impact (against climate normalised GHG emissions 2023): 2025: 112 kt CO2eq; 2030: 285 kt CO2eq; 2035: 437 kt CO2eq; 2040: 578 kt CO2eq; 2045: 706 kt CO2eq; 2050: 816 kt CO2eq

[24] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of supporting renewable heating systems and improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think 2025) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

[25] The estimated funding for heating systems is incorporated into the INVERT/EE-Lab model by (e-think 2025) for new buildings and existing buildings combined.

Indicators used to monitor and evaluate progress over time:
a) Useful heat per gross floor area of subsidised major renovation (level with measure set) (Housing Support Scheme): 2010: 53 kWh/(m².a); 2015: 48 kWh/(m².a); 2020: 44 kWh/(m².a); 2023: 43 kWh/(m².a) (BMK 2025)
b) Useful heat per gross floor area of subsidised major renovation (level before measure set) (Housing Support Scheme): 2010: 193 kWh/(m².a); 2015: 174 kWh/(m².a); 2020: 173 kWh/(m².a); 2023: 160 kWh/(m².a) (BMK 2025)
c) Number of dwellings undergoing subsidised major renovation (Housing Support Scheme): 2010: 43 481; 2015: 20 051; 2020: 15 160; 2023: 17 630 (BMK 2025)

Description Increasing the energy efficiency of buildings is one of the most effective means of reducing the carbon footprint of the Austrian population. Tighter mandatory construction standards improve the energy performance of buildings undergoing major renovation (or renovations of single building components).

In the WEM scenario, the full implementation of Directive 2010/31/EU maintains a mandatory energy performance standard for buildings undergoing major renovations (and for single building components). In the case of subsidies from the Housing Support Scheme ('Wohnbauförderung'), additional funding is granted if higher energy efficiency standards than the minimum criteria are met for the building envelope. 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 achieved. Mandatory energy performance certificates may encourage people to opt for higher energy efficiency when renting, leasing or selling buildings or dwellings. However, in the WEM scenario, buildings with poor thermal envelope quality are not subject to renovation obligations.

Due to regulations regarding the reporting date, the WEM scenario does not include the conversion of the existing building stock to zero-emission buildings by 2050, as specified in the mandatory national building renovation plans and other building envelope objectives outlined in Directive (EU) 2024/1275.

There are interdependencies with the measures outlined in Chapter 4.6.1.3 Replacement of Fossil Fuels in Building Stock (PaM Id°24), since energy efficiency measures entail, for example, exchanging heating systems to switch to renewables and low-carbon technologies.

Objectives *Efficiency improvements of buildings*
Efficiency improvement in services/tertiary sector

The following instruments have been taken into account.

4.6.1.2.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('*OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz*')

Type: EU policy, national policy, regional legislation

EU legislation	National Implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	OIB Guideline 6, 2023 edition (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)
	National plan according to Art. 9(3) of Directive 2010/31/EU, 2018 edition (OIB-330.6-005/18)	2018

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for residential and non-residential buildings.

The federal provinces are responsible for translating this guideline into their respective regional laws (amending the previous editions of OIB Guideline 6, released in October 2011, March 2015 and April 2019). The periodic revisions of OIB Guideline 6 incorporate the successive phases of the National Plan.

The National Plan set evolving mandatory targets for existing buildings undergoing major renovations. The final stage of these targets has already been achieved. The focus is now not only on the thermal heat demand of buildings but also on hot water, ventilation, cooling, the demand for electricity, and photovoltaics – all of which impact total energy efficiency. Moreover, the new energy performance certificate for buildings specifies parameters such as the total energy efficiency factor, CO_2 emissions and the demand for primary energy on the cover sheet. It also sets out minimum requirements for useful thermal heat demand and final energy consumption.

There is no information about policy costs. However, the level of ambition of the National Plan is set to meet the cost-optimal level of the EPBD (Directive 2010/31/EU) through a corresponding OIB document released in March 2014 ('OIB-Dokument zum Nachweis der Kostenoptimalität der Anforderungen der OIB-RL6 bzw. des Nationalen Plans gemäß 2010/31/EU', latest revision by OIB-330.6-012/24).

4.6.1.2.2 Energy Efficiency Act – Federal buildings *('Bundes-Energieeffizienzgesetz – EEffG')*

Type: EU policy

EU legislation	National implementation	Start
Directive 2012/27/EU, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (as amended by Directive 2018/2002/EU)	Federal Law Gazette I No. 72/2014 (as amended by Federal Law Gazette I No. 59/2023)	2023
Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC	Federal Law Gazette I No. 72/2014 (as amended by Federal Law Gazette I No. 68/2020)	2014

In the WEM scenario, the national government complies fully with all the obligations set out in Article 5 of Directive 2012/27/EU regarding thermal renovation:

A renovation rate of at least 3% of the total floor area of heated and/or cooled buildings that are owned and occupied by its central government is achieved each year. These buildings are transformed into at least nearly zero-energy buildings (in accordance with Directive 2010/31/EU). Exceptions for federal buildings officially protected, where lower requirements are applicable, are agreed upon in cooperation with the Federal Monuments Office.

4.6.1.2.3 Funding Programmes for Thermal Renovation ('*Förderprogramme für thermische Renovierung*')

Type: national legislation, national policy, regional policy

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), amended by Directive 2018/844	Federal Law Gazette I No. 31/2024 (latest amendment considered in WEM scenario)	2024
	Federal Law Gazette No. 185/1993	1993

In the WEM scenario, it has been assumed that the following funding and national programmes will be continued in order to improve the thermal energy efficiency of the envelopes of existing buildings:

Housing Support Scheme ('Wohnbauförderung')

- The Housing Support Scheme provides additional subsidies for major renovations that further improve energy efficiency. On a temporary basis, the new economic policy measures set out in the Financial Equalisation Act (Federal Law Gazette I No. 168/2023, as amended by Federal Law Gazette I 59/2024) are taken into account ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds Wohnen und Sanieren'). In the WEM scenario, the Housing Support Scheme will remain available until 2050, although with reduced funding.

Domestic Environmental Support Scheme, including Energy Efficiency Programme ('Umweltförderung im Inland inkl. Energieeffizienzprogramm')

- Subsidies from the Domestic Environmental Support Scheme for the thermal renovation of existing commercial and institutional buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. The main instrument will be available until 2030 and the Energy Efficiency Programme until 2034 in the WEM scenario.

Building Renovation Initiative for Commercial/Institutional Buildings ('Sanierungsoffensive für Betriebe')

- The Building Renovation Initiative for Commercial/Institutional Buildings is an incentive offered by the federal government to promote the renovation of commercial and institutional buildings. This instrument will be available until 2025 in the WEM scenario.

Building Renovation Initiative for Residential Buildings ('Sanierungsoffensive für Private')

- The Building Renovation Initiative for Residential Buildings, which was launched in 2011 by the federal government, is an incentive to promote the renovation of private buildings. This instrument will be available for private households until 2027 in the WEM scenario.

Austrian Climate and Energy Fund ('Klima- und Energiefonds')

- Subsidies from the Austrian Climate and Energy Fund for the thermal renovation of existing buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. This instrument will be available until 2030 in the WEM scenario.

Public investment in thermal renovation

- Public investment in the thermal renovation of federal and provincial government buildings is funded directly from national or provincial budgets. These investments are not accounted for as a funding programme within the WEM scenario.
- Public investment in the thermal renovation of community buildings is promoted by the Municipal Investment Act (Federal Law Gazette I No. 185/2022) until 2027 in the WEM scenario. Due to reporting date regulations, its successor (Federal Law Gazette I No. 128/2024) is not included in the WEM scenario.

In the WEM scenario, fiscal policy measures regarding the thermal insulation of existing buildings are taken into account (Federal Law Gazette No. 400/1988, as amended by Federal Law Gazette No. I 36/2024):

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 in the WEM scenario.

The measures for building renovation are supported by various information and networking activities, such as the Austrian Climate Protection initiative

('klimaaktiv'), as well as consultancy service, information and education campaigns by federal provinces. The cost of these activities is not accounted for as a funding programme in the WEM scenario. However, they are important enablers of the effectiveness of all the climate-effective funding initiatives considered:

Austrian Climate Protection Initiative ('klimaaktiv'):

- e5-communities: consultancy for communities to promote climate policies
- energy saving: education, information and advice for consumers and commercial enterprises on how to reduce energy consumption
- renewable energy: provision of know-how and networking support for committed companies and associations

Consultancy services and information campaigns

In the WEM scenario, it is assumed that the annual climate-effective funding provided for the renovation of buildings without heating systems (building-related funding only)[26] at nominal prices will increase by 86% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Wohnen und Sanieren'), public investment promotion ('Kommunalinvestitionsgesetz') and fiscal policy measures ('Öko-Investitionszuschlag', 'Öko-Sonderausgabenpauschale'). Subsequently, funding is expected to decline by 21% by 2030, 56% by 2035, 85% by 2040, 90% by 2045 and 91% by 2050 compared to 2023 (see Table 18).

Table 18: Budget of funding programmes for thermal renovation of existing buildings (w/o heating system) – scenario 'with existing measures'.

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2025 to 2050**
Commercial/Institutional buildings	25	22	3.9	:	:	:	:	**82**
Residential buildings	406	779	335	188	66	43	41	**5 500**
Total	**431**	**802**	**339**	**188**	**66**	**43**	**41**	**5 581**

All subsidies for heating systems in existing buildings (with or without thermal renovation of the building envelope) are considered in Chapter 4.6.1.3 Replacement of Fossil Fuels in Building Stock (PaM Id°24).

[26] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think 2025) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

4.6.1.2.4 Act on the Presentation of an Energy Performance Certificate *('Energieausweis-Vorlage-Gesetz 2012 – EAVG 2012')*

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 27/2012	2012

The aim of the recast of the Directive on the energy performance of buildings (2010/31/EU) is to improve the efficiency of previous building regulations and to address deficiencies in national implementation. The mechanisms remain the same:

Definition of calculation methods for total energy efficiency and minimum requirements;

Specifications for the creation, submission and notification of the energy performance certificate;

Inspections of heating and cooling systems.

The new elements include requirements for building technology systems and low-energy buildings, as well as the compulsory creation of financial incentives by the Member States.

Austria has implemented the Energy Performance of Buildings Directive and introduced several measures, such as the Act on the Presentation of an Energy Performance Certificate ('Energieausweis-Vorlage-Gesetz 2012' – EAVG 2012), and the Guidelines of the Austrian Institute of Construction Engineering (OIB) have been adopted to maximise energy efficiency in new and existing residential buildings in Austria.

An energy performance certificate has to specify the thermal heating demand and the total energy efficiency factor of a particular building. When selling a building or an apartment, the owner is obliged to present an energy performance certificate for the building. The energy performance certificate must not be more than 10 years old and must be provided at least 14 days after the sale. It is assumed that the energy performance certificate influences potential buyers' decisions. This will encourage sellers to improve the energy performance of their properties. A quantification of the emission reductions achieved through this measure has not been possible.

4.6.1.3 Replacement of Fossil Fuels in Building Stock (PaM Id°24)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic, information

Status: implemented

Start year of implementation: 1993

Implementing entity: federal government, federal provinces

Mitigation impact (against climate normalised GHG emissions 2023): 2025: 1 178 kt CO2eq; 2030: 2 149 kt CO2eq; 2035: 2 698 kt CO2eq; 2040: 3 283 kt CO2eq; 2045: 3 958 kt CO2eq; 2050: 4 541 kt CO2eq

Indicators used to monitor and evaluate progress over time:
a) Gross floor area undergoing subsidised exchange of heating system (Housing Support Scheme): 2010: 5 734 thousand m², 2015: 2 886 thousand m², 2020: 3 435 thousand m², 2023: 10 373 thousand m² (BMK 2025)
b) Number of cases of subsidised exchange of heating system (Stepping out of Oil and Gas): 2020: 6 615 cases; 2023: 39 812 cases (BMK 2021, 2024c)

Description

Increasing the share of renewable energy in heating systems is the other important measure used to reduce CO_2 emissions.

In the WEM scenario, the full implementation of Directive 2010/31/EU requires that, when replacing heating systems in buildings (with or without thermal renovation of the building envelope), high-efficiency alternative systems must be considered, where available. Requirements on the renewable share support 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 replacing 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 is still permitted if not subsided. Awareness-raising measures are expected to increase the replacement of fossil fuel heating systems. However, the WEM scenario does not take into account the requirement to replace existing fossil fuel heating systems with renewable heating systems.

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

Objectives

Efficiency improvements of buildings
Efficiency improvement in services/tertiary sector
Efficiency improvement of appliances
Increase in renewable energy supply in heating and cooling sector

The following instruments have been taken into account.

4.6.1.3.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('*OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz*')

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU) and as amended by the Directive 2018/844	OIB Guideline 6, 2023 edition (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for residential and non-residential buildings.

The federal provinces are responsible for translating this guideline into their respective regional laws (amending the previous editions of OIB Guideline 6, released in October 2011, March 2015 and April 2019). As with heating systems, the technical, ecological, economic and legal feasibility of high-efficiency alternative systems, if available, must be taken into account and documented in the case of major renovations.

4.6.1.3.2 Funding Programmes for Replacement of Fossil Heating Systems *('Förderprogramme für den Austausch fossiler Heizsysteme')*

Type: national policy

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 31/2024 (latest amendment considered in WEM scenario)	2024
	Federal Law Gazette No. 185/1993	1993

In the WEM scenario, it has been assumed that the following funding and national programmes will be continued in order to support the installation of renewable heating systems in existing buildings:

Housing Support Scheme ('Wohnbauförderung')

- The Housing Support Scheme provides additional subsidies for the use of modern heating systems that use only renewable energy sources (in particular those combining cleaner biomass heating system technologies with solar systems), as well as for ventilation and heat recovery systems. In exceptional cases, where condensing gas boilers are promoted, compensatory measures such as solar thermal or photovoltaic installations are mandatory. On a temporary basis, new economic policy measures by the Financial Equalisation Act (Federal Law Gazette I No. 168/2023, as amended by Federal Law Gazette I 59/2024) are taken into account ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Umwelt und Klima'). Furthermore, additional budget is allocated until 2025 to

support the increase in federal subsidies under the Heating Replacement Purpose Grant Act (Federal Law Gazette I No. 197/2023, 'Heizungsumstiegs-Zweckzuschussgesetz'). In the WEM scenario, the Housing Support Scheme will remain available until 2050, although with reduced funding.

Domestic Environmental Support Scheme, including Energy Efficiency Programme ('Umweltförderung im Inland inkl. Energieeffizienzprogramm')

- Subsidies from the Domestic Environmental Support Scheme for switching from fossil fuel heating systems to renewable heating systems in existing commercial and institutional buildings are linked to the fulfilment of environmental requirements within specific funding initiatives. The main instrument will be available until 2030 and the Energy Efficiency Programme until 2034 in the WEM scenario.

Stepping out of Oil and Gas ('Raus aus Öl und Gas') as the focus programme of the Building Renovation Initiative for Residential Buildings ('Sanierungsoffensive für Private')

- The Building Renovation Initiative for Residential Buildings ('Sanierungsoffensive für Private') is a federal government incentive that was launched in 2011 to promote the renovation of private buildings. Financial support is available under the Stepping out of Oil and Gas ('Raus aus Öl und Gas') focus programme for replacing fossil fuel heating systems (oil, gas and coal/coke all-purpose burners, as well as electricity-powered night or direct storage heaters) with climate-friendly technology. Examples of climate-friendly technologies include the connection to local district heating, biomass boilers (using wood logs and wood briquettes, wood chips and wood pellets) and heat pumps. All installed new systems have to be highly efficient and environmentally friendly (in accordance with the list of eligible appliances). Additional subsidies are granted for the centralisation of heating systems in multi-storey residential buildings and for the installation of solar thermal systems. The initiative is aimed at the owners and tenants of apartments in multi-storey buildings, as well as those in detached and semi-detached family houses. The subsidy rates (including top-ups by the federal provinces) are up to 75% for common households and up to 100% for low-income households ('Sauber Heizen für Alle').
- In the WEM scenario, it is assumed that the Stepping out of Oil and Gas ('Raus aus Öl und Gas') focus programme will be available common private households until 2027. Full cost coverage will be granted to low-income households ('Sauber Heizen für Alle') until 2030 in the WEM scenario.

Austrian Climate and Energy Fund ('Klima- und Energiefonds')

- Subsidies from the Austrian Climate and Energy Fund for switching from fossil fuel heating systems to renewable heating systems are linked to the fulfilment of environmental requirements within specific funding initiatives. This instrument will be available until 2030 in the WEM scenario.

Public investment in replacing fossil fuel heating systems

- Public investment in replacing fossil fuel heating systems in federal and provincial government buildings is funded directly from national or provincial budgets. These investments are not accounted for as a funding programme within the WEM scenario.
- Public investment in replacing fossil fuel heating systems in community buildings is promoted by the Municipal Investment Act (Federal Law Gazette I No. 185/2022) until 2027 in the WEM scenario. Due to reporting date regulations, its successor (Federal Law Gazette I No. 128/2024) is not included in the WEM scenario.

In the WEM scenario, fiscal policy measures regarding the replacement of fossil fuel heating systems in existing buildings are taken into account (Federal Law Gazette No. 400/1988, as amended by Federal Law Gazette No. I 36/2024):

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 in the WEM scenario.

The measures for replacing fossil fuel heating systems are supported by various information and networking activities, such as the Austrian Climate Protection Initiative ('klimaaktiv'), as well as consultancy services, information and education campaigns by federal provinces. The costs of these activities are not accounted for as a funding programme in the WEM scenario. However, they are important enablers of the effectiveness of all climate-effective funding initiatives considered:

Austrian Climate Protection Initiative ('klimaaktiv'):

- e5-communities: consultancy for communities to promote climate policies
- energy saving: education, information and advice for consumers and commercial enterprises on how to reduce energy consumption
- renewable energy: provision of know-how and networking support for committed companies and associations

Consultancy services and information campaigns

In the WEM scenario, it is assumed that the annual climate-effective funding provided for the replacement of heating systems without new buildings (building-related funding only)[27] at nominal prices will increase by 326% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Umwelt und Klima', 'Heizungsumstiegs-Zweckzuschussgesetz'), public investment promotion ('Kommunalinvestitionsgesetz') and fiscal policy measures ('Öko-Investitionszuschlag', 'Öko-Sonderausgabenpauschale'). Subsequently, funding is expected to decline by 18% by 2030, 77% by 2035, 87% by 2040, 92% by 2045 and 94% by 2050 compared to 2023 (see Table 19).

Table 19: Budget of funding programmes for replacement of heating systems (w/o new buildings)

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2023 to 2050**
Commercial/Institutional buildings	48	91	16	:	:	:	:	**408**
Residential buildings	469	2 109	408	121	69	41	32	**7 231**
Total	**517**	**2 201**	**425**	**121**	**69**	**41**	**32**	**7 639**

All subsidies for heating systems in new buildings are considered in Chapter 4.6.1.1 Climate Neutral New Buildings (PaM Id°22) above.

All subsidies for the renovation of the building envelope in existing buildings (with or without exchange of the heating system) are considered in Chapter 4.6.1.2 Thermal Renovation of the Building Stock (PaM Id°23) above.

4.6.1.4 Energy Efficiency Measures in Buildings (PaM Id°25)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, information

Status: implemented

Start year of implementation: 2007

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Indicators used to monitor and evaluate progress over time:
a) Average electricity consumption of households (w/o space heating and hot water preparation): 2010: 3 149 kWh; 2015: 3 073 kWh; 2020: 3 253 kWh; 2023: 3 326 kWh (Statistik Austria 2024d, 2024e)

[27] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of supporting renewable heating systems and improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think, 2025) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

Description

A further policy target is to increase energy efficiency in electricity demand in buildings, which is to be achieved through far-reaching instruments at EU level. This includes the eco-design requirements for energy-using products (Directive 2005/32/EC) and the mandatory labelling of household appliances according to their energy consumption (see Energy Labelling of Space and Water Heating Products instrument below), supported by awareness-raising measures at national level to inform people about energy-efficient products, and advice provided by regional energy agencies.

In the WEM scenario, this is reflected by assuming higher overall efficiency of new heating systems and appliances.

Objectives

Efficiency improvements of buildings
Efficiency improvement of appliances
Efficiency improvement in services/tertiary sector

The following instruments have been taken into account.

4.6.1.4.1 Eco-design Ordinance ('*Ökodesign-Verordnung 2007 – ODV 2007*')

Type: EU policy

EU legislation	National implementation	Start
Eco-design Directive 2012/27/EU (amending Directive 2009/125/EC)	Federal Law Gazette II No. 187/2011 (Amendment)	2011
	Federal Law Gazette II No. 126/2007	2007

The national Eco-design Ordinance ('Ökodesign-Verordnung 2007 – ODV 2007) was enacted to implement Directive 2005/32/EC, setting the legal basis for minimum standards for energy-related products. The 2011 amendment transposed EU Eco-design Directive 2009/125/EC into national law. It establishes minimum eco-design requirements for specific energy-using products. These products are marked with a CE label and must meet the minimum requirements defined in the EU Directive.

During the first phase of implementing the Eco-design Directive, consumer products (household appliances) were primarily affected. The amended Directive extends this scope to include services and industries, such as heating systems, ventilation and air conditioning, machines, pumps and transformers.

The eco-design requirements are defined by several Commission Regulations (EU), including those relating to space heaters and combination heaters, water heaters and hot water storage tanks, solid fuel local space heaters and local space heaters and for solid fuel boilers.

In product design, environmental impacts (resource use and energy consumption, emissions and recyclability) and safety-related requirements must be considered, as well as the whole product life cycle, from the choice of raw materials until final waste disposal.

In the WEM scenario, this is reflected by assuming higher overall efficiency of new heating systems and appliances.

4.6.1.4.2 Energy Labelling of Space and Water Heating Products *('Elektrotechnikgesetz 1992')*

Type: EU policy

EU legislation	National implementation	Start
Regulation (EU) 2017/1369 setting a framework for energy labelling and repealing Directive 2010/30/EU (repealing Directive 2010/30/EU)	Federal Law Gazette I No. 204/2022 (repealing Federal Law Gazette II No. 232/2011)	2022
Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products	Federal Law Gazette II No. 232/2011	2011

Former Directive 2010/30/EU stipulated that the consumption of energy and other resources by energy-related products should be indicated by labelling and standard product information. This was implemented in Austria in 2011 (Federal Law Gazette II No. 232/2011). The directive specified different energy classes, ranging from A+++ (the best class) to D (the poorest performance class). As with the new Eco-design Regulation (EU) 2017/1369, the scope has been expanded to include a larger group of energy-related products.

Regulation (EU) 2017/1369 (repealing Directive 2010/30/EU) establishes a framework for energy labelling with a new scope for the energy classes (A to G). National market surveillance and control of products has been included in the Electrical Engineering Act (*'Elektrotechnikgesetz 1992'*), which repeals former legislation.

Energy labelling helps consumers to compare space and water heating products, as well as other energy-related products, in terms of their energy consumption. Requirements for specific electricity consumption have been established for the following products: dishwashers, refrigerators, freezers, washing machines, televisions, room air conditioning appliances, tumble dryers, vacuum cleaners, space and combination heaters, water heaters and electric lamps.

In the WEM scenario, this is reflected by assuming higher overall efficiency of new heating systems and appliances.

4.6.1.4.3 Funding Programmes for Energy Efficiency Measures in Buildings *('Förderprogramme für Energieeffizienzmaßnahmen in Gebäuden')*

Type: national policy, information

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 31/2024 (latest amendment considered in WEM scenario)	2024
	Federal Law Gazette No. 185/1993	1993

In the WEM scenario, it has been assumed that the following funding and national programmes will be continued in order to improve the energy efficiency of heating systems and appliances:

Domestic Environmental Support Scheme, including Energy Efficiency Programme ('Umweltförderung im Inland inkl. Energieeffizienzprogramm')

- Subsidies from the Domestic Environmental Support Scheme for energy efficiency measures in existing commercial and institutional buildings are linked to the fulfilment of environmental requirements within specific funding initiatives.

Funding for energy efficiency measures in buildings is provided under all relevant funding programmes of the federal government and the federal provinces.

Measures to improve the energy efficiency of buildings provided by the federal provinces include hydraulic balancing of the heat distribution, optimisation of technical building appliances, promotion of the exchange of old household appliances for energy-efficient ones, energy consulting and elaboration of renovation concepts.

The measures for higher energy efficiency of heating systems and appliances are supported by various information and networking activities, such as the Austrian Climate Protection Initiative ('klimaaktiv'), as well as consultancy services, information and education campaigns by federal provinces. The costs of these activities are not accounted for in the WEM scenario as a funding programme. However, they are important enablers of the effectiveness of all the climate-effective funding initiatives considered (see Chapters 4.6.1.1, 4.6.1.2 and 4.6.1.3):

Austrian Climate Protection Initiative ('klimaaktiv'):

- e5-communities: consultancy for communities to promote climate policies
- energy saving: education, information and advice for consumers and commercial enterprises on how to reduce energy consumption
- renewable energy: provision of know-how and networking support for committed companies and associations
- Consultancy services and information campaigns

In the WEM scenario, this is reflected by assuming higher overall efficiency of new heating systems and appliances.

All subsidies for the construction of new buildings, including heating systems, are considered in Chapter 4.6.1.1 Climate Neutral New Buildings (PaM Id°22).

All subsidies for the renovation of the building envelope in existing buildings (with or without exchange of the heating system) are considered in Chapter 4.6.1.2 Thermal Renovation of the Building Stock (PaM Id°23).

All subsidies for the replacement of fossil fuel heating systems (alongside the modernisation of inefficient heating systems) are considered in Chapter 4.6.1.3 Replacement of Fossil Fuels in Building Stock (PaM Id°24).

4.6.2 WAM Measures for Other Sectors – Buildings

The WAM scenario includes measures that have not yet been implemented, but are likely to be, as they are outlined in the Integrated National Energy and Climate Plan (BMK 2024a).

It should be noted that the WAM scenario is far from containing all possible measures. Therefore, the WAM scenario cannot be considered an upper limit for the renovation potential or for the use of renewable energy, both in terms of the pace or depth of measures.

4.6.2.1 Accelerated Path to Climate Neutral New Buildings (PaM Id°26)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic

Status: planned

Start year of implementation: 2023

Implementing entity: federal government, federal provinces

Mitigation impact (against WEM scenario): 2025: 12 kt CO2eq; 2030: 13 kt CO2eq; 2035: 14 kt CO2eq; 2040: 17 kt CO2eq; 2045: 20 kt CO2eq; 2050: 22 kt CO2eq

Indicators used to monitor and evaluate progress over time: see Chapter 4.6.1.1.

Description The measures of Climate Neutral New Buildings (PaM Id°22) underlying the WEM scenario also apply to the WAM scenario. In the WAM scenario, advanced building codes and adaptations to funding programmes are in place.

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

Objectives *Efficiency improvements of buildings*
Efficiency improvement of appliances
Efficiency improvement in services/tertiary sector

The instruments of Climate Neutral New Buildings (PaM Id°22) underlying the WEM scenario also apply to the WAM scenario (adaptations may apply).

OIB Guideline 6 – Energy Savings and Thermal Insulation
('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz')

Oil Boiler Installation Prohibition Act
('Ölkesseleinbauverbotsgesetz – ÖKEVG 2019')

Renewable Heat Act
('Erneuerbare-Wärme–Gesetz – EWG')

Funding Programmes for New Buildings
('Förderprogramme für Neubau')

The following instruments are adapted in the WAM scenario.

4.6.2.1.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('*OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz*')

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)	OIB Guideline 6, 2025 edition (OIB-330.6-005/25) (draft) and its successors	2025 (depending on legislation in the federal provinces)
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	OIB Guideline 6, 2023 edition (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)
	National plan according to Art. 9(3) of Directive 2010/31/EU, 2018 edition (OIB-330.6-005/18)	2018

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for residential and non-residential buildings.

The 2025 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (draft released in January 2025) transposes the current EU Directive on the energy performance of buildings (Directive (EU) 2024/1275) into national law for residential and non-residential buildings.

Due to time constraints, the 2023 edition (but not the draft 2025 edition) of the OIB Guideline 6 is part of the WAM scenario. However, it is considered that the federal provinces fully comply with all obligations set out in Directive (EU) 2024/1275.

The zero-emission standard is defined in the OIB Guideline 6, 2025 edition and its successors, with the level of ambition set to meet the cost-optimal level (update of the OIB document 'proof of cost optimality'). The maximum threshold value for the energy demand of a zero-emission building is at least 10% lower

than the threshold value for the total primary energy consumption of the former nearly zero-energy building standard.

From 2028, all new buildings owned by public bodies must be zero-emission buildings with high efficiency, and from 2030, this requirement will apply to all other new buildings. They will cover any remaining energy demand through renewable sources and will be suitable for solar systems.

4.6.2.1.2 Funding Programmes for New Buildings *('Förderprogramme für Neubauten')*

Type: national legislation, national policy, regional policy

In the WAM scenario, the same funding and national programmes as outlined in the description of the WEM scenario (see Chapter 4.6.1.1 above) will be extended until 2050 to support renewable heating systems and improve the thermal energy efficiency of the building envelope of new buildings.

Funding is set at the same level as (or slightly below) climate-effective funds at nominal prices compared to the WEM scenario.

In the WAM scenario, it is assumed that the annual climate-effective funding provided for new buildings (building-related funding only)[28] at nominal prices will increase by 24% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Wohnen und Sanieren'). Subsequently, funding is expected to increase by 21% by 2030, 18% by 2035, 15% by 2040, 12% by 2045 and 8.5% by 2050 compared to 2023 (see Table 20).

Table 20: Budget of funding programmes for energy efficiency and heating systems of new buildings – scenario 'with additional measures'.

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2023 to 2050**
Commercial/Institutional buildings	1.9	2.3	2.3	2.3	2.3	2.3	2.3	**60**
Residential buildings	366	460	449	437	425	414	402	**11 196**
Heating systems[29]	16	13	13	13	13	13	13	**334**
Total	**384**	**476**	**464**	**453**	**441**	**429**	**417**	**11 590**

[28] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of supporting renewable heating systems and improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think 2024) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

[29] The estimated funding for heating systems is incorporated into the INVERT/EE-Lab model by (e-think, 2024) for new buildings and existing buildings combined.

4.6.2.2 Accelerated Thermal Renovation of the Building Stock (PaM Id°27)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic, information

Status: implemented

Start year of implementation: 2023

Implementing entity: federal government, federal provinces

Mitigation impact (against WEM scenario): 2025: 7.5 kt CO2eq; 2030: 31 kt CO2eq; 2035: -6.1 kt CO2eq; 2040: -56 kt CO2eq; 2045: -121 kt CO2eq; 2050: -197 kt CO2eq

Indicators used to monitor and evaluate progress over time: see Chapter 4.6.1.2.

Description The measures of Thermal Renovation of the Building Stock (PaM Id°23) underlying the WEM scenario also apply to the WAM scenario. In the WAM scenario, advanced building codes, coordinated thermal renovation planning, obligations for thermal renovation and adaptations to funding programmes are in place. The existing building stock will be converted into zero-emission buildings by 2050.

Objectives *Efficiency improvements of buildings*
Efficiency improvement in services/tertiary sector

The instruments of Thermal Renovation of the Building Stock (PaM Id°23) underlying the WEM scenario also apply to the WAM scenario (adaptations may apply).

OIB Guideline 6 – Energy Savings and Thermal Insulation
('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz')

Funding Programmes for Existing Buildings
('Förderprogramme für bestehende Gebäude')

Act on the Presentation of an Energy Performance Certificate
('Energieausweis-Vorlage-Gesetz 2012 – EAVG 2012')

The following instruments are adapted in the WAM scenario.

4.6.2.2.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz')

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)	OIB Guideline 6, edition 2025 (OIB-330.6-005/25) (draft) and its successors	2025 (depending on legislation in the federal provinces)

EU legislation	National implementation	Start
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU,) and as amended by Directive 2018/844	OIB Guideline 6, edition 2023 (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for residential and non-residential buildings.

The 2025 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (draft released in January 2025) transposes the current EU Directive on the energy performance of buildings (Directive (EU) 2024/1275) into national law for residential and non-residential buildings.

Due to time constraints, the 2023 edition (but not the draft 2025 edition) of the OIB Guideline 6 is part of the WAM scenario. However, it is considered that the federal provinces fully comply with all obligations set out in Directive (EU) 2024/1275.

The zero-emission standard is defined in the OIB Guideline 6, 2025 edition and its successors, with the level of ambition set to meet the cost-optimal level (update of the OIB document 'proof of cost optimality'). The maximum threshold value for the energy demand of a zero-emission building is at least 10% lower than the threshold value for the total primary energy consumption of the former nearly zero-energy building standard.

All buildings will be zero-emission buildings with high efficiency by 2050. They will cover any remaining energy demand through renewable sources and will be suitable for solar systems. Exceptions, such as those for historic buildings, may apply.

The mandatory conversion of the existing building stock to zero-emission buildings by 2050 will be outlined in the foreseen national building renovation plan. Interim targets for reducing primary energy consumption (residential buildings), setting out renovation obligations (non-residential buildings) and considering the phase-out of fossil fuel heating systems by 2040 are formulated by the OIB and implemented by all federal provinces.

The introduction of building renovation passports, as defined by the 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.

4.6.2.2.2 Energy Efficiency Act – Buildings Owned by Public Bodies *('Energieeffizienzgesetz')*

Type: EU policy

EU legislation	National implementation	Start
Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast)	Federal Law Gazette I No. 29/2024	2024

In the WAM scenario, the federal state, the federal provinces and the municipalities fully comply with all obligations set out in Article 6 of Directive (EU) 2023/1791 regarding thermal renovation:

A renovation rate of at least 3% of the total floor area of heated and/or cooled buildings that are owned by public bodies is achieved each year 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 officially protected, where lower requirements are applicable, are agreed upon in cooperation with the Federal Monuments Office.

4.6.2.2.3 Funding Programmes for Existing Buildings ('*Förderprogramme für bestehende Gebäude*')

Type: national legislation, national policy, regional policy, local policy

EU legislation	National implementation	Start
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)	Federal Law Gazette I No. 31/2024 (and its successors)	2024
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 31/2024	2024
	Federal Law Gazette No. 185/1993	1993

In the WAM scenario, the same funding and national programmes as outlined in the description of the WEM scenario (see Chapter 4.6.1.2 above) will be extended to improve the thermal energy efficiency of the building envelope of existing buildings.

Funding is set at the same level as (or slightly below) climate-effective funds at nominal prices compared to the WEM scenario.

In the WAM scenario, it is assumed that the annual climate-effective funds provided for new buildings (building-related funding only)[30] at nominal prices will increase by 96% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Wohnen und Sanieren'), public investment promotion ('Kommunalinvestitionsgesetz') and fiscal policy measures ('Öko-Investitionszuschlag', 'Öko-Sonderausgabenpauschale'). Subsequently, funding is expected to increase by 103% by 2030, 111% by 2035, 119% by 2040, 141% by 2045 and 164% by 2050 compared to 2023 (see Table 21).

Table 21: Budget of funding programmes for thermal renovation of existing buildings (w/o heating system) – scenario 'with additional measures'.

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2025 to 2050**
Commercial/Institutional buildings	25	134	134	131	127	127	127	**3 378**
Residential buildings	406	709	741	779	817	913	1 009	**21 435**
Total	**431**	**844**	**875**	**910**	**944**	**1 040**	**1 136**	**24 813**

All subsidies for heating systems in existing buildings (with or without thermal renovation of the building envelope) are considered in Chapter 4.6.2.3 Accelerated Replacement of Fossil Fuels in Building Stock (PaM Id°28).

4.6.2.3 Accelerated Replacement of Fossil Fuels in Building Stock (PaM Id°28)

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: regulatory, economic, information

Status: implemented

Start year of implementation: 2023

Implementing entity: federal government, federal provinces

Mitigation impact (against WEM scenario): 2025: -430 kt CO2eq; 2030: 630 kt CO2eq; 2035: 1 824 kt CO2eq; 2040: 2 175 kt CO2eq; 2045: 1 960 kt CO2eq; 2050: 1 841 kt CO2eq

Indicators used to monitor and evaluate progress over time: see Chapter 4.6.1.3.

Description The measures of Replacement of Fossil Fuels in Building Stock (PaM Id°24) underlying the WEM scenario also apply to the WAM scenario.

[30] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of supporting renewable heating systems and improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think 2024) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

The mandatory conversion of the existing building stock to zero-emission buildings until 2050, as outlined in the foreseen 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 are rising compared to the WEM scenario (see Chapters 3.1.4.2 Assumptions and 4.3.2 Carbon pricing of fossil fuels (PaM Id°2)), and adaptations to funding programmes are assumed.

Objectives *Efficiency improvements of buildings*
Efficiency improvement in services/tertiary sector
Efficiency improvement of appliances
Increase in renewable energy in heating and cooling sector

The instruments of the PaM Replacement of Fossil Fuels in Building Stock (PaM Id°24) underlying the WEM scenario also apply to the WAM scenario (adaptations may apply).

OIB Guideline 6 – Energy Savings and Thermal Insulation
('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz')

Funding Programmes for Replacement of Fossil Heating Systems
('Förderprogramme für den Austausch fossiler Heizsysteme')

The following instruments are adapted in the WAM scenario.

4.6.2.3.1 OIB Guideline 6 – Energy Savings and Thermal Insulation ('*OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz*')

Type: EU policy, national policy, regional legislation

EU legislation	National implementation	Start
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)	OIB Guideline 6, 2025 edition (OIB-330.6-005/25) (draft) and its successors	2025 (depending on legislation in the federal provinces)
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	OIB Guideline 6, 2023 edition (OIB-330.6-036/23)	2023 (depending on legislation in the federal provinces)
	National plan according to Art. 9(3) of 2010/31/EU, edition 2018 (OIB-330.6-005/18)	2018

As with previous editions, the 2023 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (released in May 2023) transposes the EU Directive on the energy performance of buildings (Directive 2010/31/EU) into national law for residential and non-residential buildings.

The 2025 edition of the OIB Guideline 6 of the Austrian Institute for Construction Engineering (draft released in January 2025) transposes the current EU Directive on the energy performance of buildings (Directive (EU) 2024/1275) into national law for residential and non-residential buildings.

Due to time constraints, the 2023 edition (but not the draft 2025 edition) of the OIB Guideline 6 is part of the WAM scenario. However, it is considered that the federal provinces fully comply with all obligations set out in Directive (EU) 2024/1275.

The zero-emission standard is defined in the OIB Guideline 6, edition 2025 and its successors, with the level of ambition set to meet the cost-optimal level (update of OIB document 'proof of cost optimality'). The buildings produce zero on-site carbon emissions from fossil fuels and emit either zero or a very low amount of operational greenhouse gas emissions.

All buildings will be zero-emission buildings with zero on-site carbon emissions from fossil fuels by 2050. Exceptions, such as those for historic buildings, may apply.

The mandatory conversion of the existing building stock to zero-emission buildings by 2050 will be outlined in the foreseen national building renovation plan. Interim targets for reducing primary energy consumption (residential buildings), setting out renovation obligations (non-residential buildings) and considering the phase-out of fossil fuel heating systems by 2040 are formulated by the OIB and implemented by all federal provinces.

The introduction of building renovation passports, as defined by the 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 phasing out fossil fuels.

4.6.2.3.2 Funding Programmes for Replacement of Fossil Heating Systems *('Förderprogramme für den Austausch fossiler Heizsysteme')*

Type: national legislation, national policy, regional policy, local policy

EU legislation	National implementation	Start
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)	Federal Law Gazette I No. 31/2024 (and its successors)	2024
Recast of the Energy Performance of Buildings Directive (Directive 2010/31/EU), and as amended by Directive 2018/844	Federal Law Gazette I No. 31/2024	2024
	Federal Law Gazette No. 185/1993	1993

In the WAM scenario, the same funding and national programmes as outlined in the description of the WEM scenario (see Chapter 4.6.1.3 above) will be extended to support the installation of renewable heating systems in existing buildings.

In the WAM scenario, it is assumed that the annual climate-effective funding provided for the replacement of heating systems without new buildings (building-related funding only)[31] at real €2023 prices will increase by 177% by 2025 due to economic policy measures ('Konjunkturpaket Wohn- und Eigentumsoffensive', 'Zukunftsfonds - Umwelt und Klima', 'Heizungsumstiegs-Zweckzuschussgesetz'), public investment promotion ('Kommunalinvestitionsgesetz') and fiscal policy measures ('Öko-Investitionszuschlag', 'Öko-Sonderausgabenpauschale'). Subsequently, funding is expected to increase by 139% by 2030 and 56% by 2035. After that, it is expected to decrease by 6.9% by 2040, 34% by 2045 and 56% by 2050 compared to 2023 (see Table 22).

Table 22: Budget of funding programmes for replacement of heating systems (w/o new buildings) – scenario 'with additional measures'.

Budget, nominal [Million €]	**2023**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**Sum 2025 to 2050**
Commercial/Institutional buildings	48	112	111	111	111	111	111	**2 904**
Residential buildings	469	1 426	1 377	976	616	475	333	**22 303**
Total[32]	**517**	**1 538**	**1 489**	**1 087**	**728**	**586**	**445**	**25 206**

All subsidies for heating systems in new buildings are considered in Chapter 4.6.2.1 Accelerated Path to Climate Neutral New Buildings (PaM Id°26).

All subsidies for the renovation of the building envelope in existing buildings (with or without the exchange of the heating system) are considered in Chapter 4.6.2.2 Accelerated Thermal Renovation of the Building Stock (PaM Id°27).

4.7 Fugitive Emissions from Fuels (CRT Source Category 1.B)

It is assumed that no specific measures will be implemented in this sector.

[31] 'Climate-effective building-related funding only' means that the allocated funding is effective within category *1.A.4.a Commercial/Institutional* or *1.A.4.b Residential* solely for the purpose of supporting renewable heating systems and improving the energy efficiency of space heating and hot water generation. Moreover, only subsidies for cost categories as modelled in the INVERT/EE-Lab model by (e-think 2024) are chosen (windows/external doors, insulating materials for the facade, roof, top and bottom floor ceiling, and as well as for heating systems, but excluding heat distribution or heat release appliances or the cost of disposal). Thus, the amount of funding paid out by the funding body is potentially significantly higher than the values taken into account for modelling.

[32] The estimated funding for heating systems is incorporated into the INVERT/EE-Lab model by (e-think, 2024) for new buildings and existing buildings combined.

4.8 Industrial Processes and Product Use (CRT Source Category 2)

The measures listed here only address F-gas emissions and emissions from product use, as other measures relevant for the industry sector are covered in the energy sector. These measures focus on energy efficiency and the use of renewable energy sources, which also impact GHG emissions from industrial processes.

4.8.1 WEM measures for Industrial Processes and Product Use

4.8.1.1 Decrease emissions from F gases and other product use (PaM Id°29)

With the entry into force of the F-gas Regulation (EU) No. 2024/573 in March 2024, the reduction pathway set out in the previous regulation has been tightened and a complete phase-out by 2050 is planned. This new legislation will therefore make a significant contribution to reducing greenhouse gas emissions by at least 55% by 2030 and to achieving climate neutrality in Europe by 2050.

No additional national measures are planned beyond those specified in the EU regulation.

GHG affected: HFC, PFC, SF_6 and NF_3

Type of policy instrument: regulatory

Status: implemented

Start year of implementation: 2024

Type of policy: regulatory

Implementing entity: federal government

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time: emissions on sub-sector level: 2010: 1876 kt CO_2-eq.; 2015: 2074 kt CO_2-eq; 2020: 2194 kt CO_2-eq.; 2023: 1818 kt CO_2-eq

The following instruments have been taken into account:

4.8.1.1.1 EU F-gas Regulation 2024 (EU) No. 2024/573

4.8.1.1.2 MAC Directive 2006/40/EC

4.9 Agriculture (CRT Source Category 3)

4.9.1 WEM Measures for Agriculture

4.9.1.1 Implementation of EU agricultural policies (PaM Id°30)

Agricultural policy according to CAP-SP, as implemented in 2023. This includes the agri-environmental programme and subsidies for climate-relevant investments.

GHG affected: CO_2, CH_4, N_2O

Type of policy instrument: economic, regulatory

Status: implemented

Start year of implementation: 2023

Implementing entity: federal government

Mitigation impact: not available

Indicator(s) used to monitor and evaluate progress over time: Data from the ÖPUL promotion database:

- amounts of manure applied with low-spreading techniques (in km³): 2015: 2 018 km³; 2020: 3 276 km³; 2022: 5 568 km³; 2023: 7 765 km³;
- amounts of manure separated (in km³): 2019: 157 km³; 2020: 262 km³; 2022: 727 km³; 2023: 1 425 km³.

EU legislation	National implementation	Start
Regulation (EU) 2021/2115 CAP Strategic Plans	implemented	2023

Austria's 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 3.3.1.

Implementing this policy includes, for example, improvements in feeding, covering manure storage facilities, low-loss application of manure and biogas slurry, promotion of organic farming and grazing, and reduced usage of mineral fertilisers.

4.9.1.2 Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022) (PaM Id°31)

National Ammonia Reduction Ordinance, as implemented in 2023 and last amended in 2024. It includes mandatory ammonia abatement measures for the rapid incorporation of liquid and solid manure, as well as the covering of slurry storages and the use of urea fertilisers.

GHG affected: indirect N_2O

Type of policy instrument: regulatory - national policy

Status: implemented

Start year of implementation: 2023

Implementing entity: federal government

Mitigation impact: 2030: 7 kt CO_2eq; 2035: 7 kt CO_2eq; 2040: 7 kt CO_2eq; 2045: 7 kt CO_2eq; 2050: 7 kt CO_2eq

Indicator(s) used to monitor and evaluate progress over time: As the measure aims to reduce agricultural NH_3 emissions and reach the emission ceilings set out in the EU NEC Directive, NH_3 emissions are used as the indicator to monitor progress over time.

4.9.2 WAM Measures for Agriculture

4.9.2.1 Livestock and feeding management (PaM Id°32)

The WAM scenario includes additional measures for animal feeding, such as using methane-reducing feed additives for cattle and implementing N-reduced feeding strategies for cattle and swine.

GHG affected: CH_4, N_2O

Type of policy instrument: economic, voluntary/negotiated agreement, information, education

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces

Mitigation impact: 2030: 90 kt CO2eq; 2035: 151 kt CO2eq; 2040: 210 kt CO2eq; 2045: 203 kt CO2eq; 2050: 195 kt CO2eq

Indicator(s) used to monitor and evaluate progress over time: not available

The following instrument has been taken into account:

4.9.2.1.1 Enhanced promotion and education programmes in the framework of REGULATION (EU) 2021/2115 CAP Strategic Plans

4.9.2.2 Optimised manure management (PaM Id°33)

Optimised manure management includes additional measures for low-emission barn design and manure storage, as well as increased grazing of dairy and suckling cows.

GHG affected: CH_4, N_2O

Type of policy instrument: economic, voluntary/negotiated agreement, information, education

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces

Mitigation impact: 2030: 8 kt CO2eq; 2035: 12 kt CO2eq; 2040: 16 kt CO2eq; 2045: 16 kt CO2eq; 2050: 16 kt CO2eq

Indicator(s) used to monitor and evaluate progress over time: not available

The following instrument has been taken into account:

4.9.2.2.1 Enhanced promotion and education programmes in the framework of Regulation (EU) 2021/2115 CAP Strategic Plans

4.9.2.3 Optimised fertiliser management (inorganic and organic) (PaM Id°34)

The WAM scenario includes the reduced use of mineral fertilisers due to efficiency improvements and precision farming techniques, among other factors. Furthermore, slightly higher proportions of low-emission spreading and solid-liquid separation are considered for the years beyond 2030.

GHG affected: N_2O

Type of policy instrument: voluntary/negotiated agreement, information, education, research, planning

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces

Mitigation impact: 2030: 156 kt CO2eq; 2035: 153 kt CO2eq; 2040: 151 kt CO2eq; 2045: 149 kt CO2eq; 2050: 146 kt CO2eq

Indicator(s) used to monitor and evaluate progress over time: amounts of manure applied using low-spreading techniques (in m^3), amounts of manure separated (m^3), amounts of mineral fertilisers applied

The following instrument has been taken into account:

4.9.2.3.1 Enhanced promotion and education programmes in the framework of Regulation (EU) 2021/2115 CAP Strategic Plans

4.9.2.4 Increase biogas production from manure (PaM Id°35)

The WAM scenario includes a plan to increase the share of manure treated in biogas plants to 30% of Austria's total manure volume for the relevant livestock categories of cattle, pigs and poultry by 2030 in accordance with the Austrian NECP and NAPCP.

GHG affected: CH_4, N_2O

Type of policy instrument: economic, regulatory, information, planning

Status: planned

Start year of implementation: >2024

Implementing entity: federal government, federal provinces

Mitigation impact: 2030: 205 kt CO2eq; 2035: 211 kt CO2eq; 2040: 225 kt CO2eq; 2045: 229 kt CO2eq; 2050: 232 kt CO2eq

Indicator(s) used to monitor and evaluate progress over time: amount of energy produced in biogas facilities: 2010: 539 GWh; 2015: 558 GWh; 2020: 570 GWh; 2023: 522 GWh

The following instrument has been taken into account:

4.9.2.4.1 Renewable Energy Expansion Act (Erneuerbaren-Ausbau-Gesetz) (Federal Law Gazette I No. 150/2021)

4.10 Land Use, Land-Use Change and Forestry (CRT Source Category 4)

No additional measures since the last projection submission were taken into account for the LULUCF WEM scenario. An ongoing project is developing a WAM scenario for the LULUCF sector, which will include the additional measures mentioned in Chapter 4.10.2.

4.10.1 WEM Measures for LULUCF

Several measures attributed to other sectors also influence emissions and removals in the LULUCF sector. The following measures from the agriculture and energy sectors also affect carbon stocks in the LULUCF sector.

Agriculture

Agriculture is the main sector that overlaps with LULUCF. The measures taken in this sector contribute directly and indirectly to carbon stock changes. In this context, the most relevant measure is Austria's CAP Strategic Plan (see 4.9.1.1Implementation of EU agricultural policies) for the period 2023-2027, which includes several measures to promote the enhancement of carbon stocks in the agricultural environment, especially in soils (e.g. reduced tillage and organic farming).

Energy

The Austrian LULUCF Action Plan lists several other cross-cutting and mainly energy-related measures that are relevant for the LULUCF sector. These include:

- EU Emissions Trading Scheme (ETS) (see 4.3.1)
- Domestic Environmental Support Scheme (see 4.4.1.1.2)
- Austrian Climate and Energy Fund (KLI.EN) (see PAM 4.4.1.1.3)
- Replacement of Fossil Fuels in Building Stock (see 4.6.1.3)
- Increase the share of renewable energy sources in road transport (see 4.5.1.1)

These measures aim to increase the share of renewable energy sources, such as biomass, and to switch to fuels with a lower (fossil) carbon content. This primarily affects the emissions in the energy industries sector, as well as in the housing and transport sector, but also has indirect impacts on LULUCF.

4.10.1.1 Sustainable Forest Management (PaM Id°36)

GHG affected: CO_2

Type of policy: regulatory, financial support, scientific advice

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Regulatory

The overall principles of forest management in Austria are stipulated in Section 1 of the Forest Act (Federal Law Gazette I No. 440/1975, as amended): the preservation of forest areas, the preservation of the productivity of forest sites and their functions, and the preservation of yields for future generations; i.e. sustainable management. The Forest Act also assigns four functions to forests: production (i.e. sustainable timber production), protection (i.e. protection against erosion and natural hazards), welfare (i.e. the protection of environmental goods such as drinking water) and recreation (use for recreation).

With the Forest Act serving as the regulatory basis for forest management in Austria, numerous forest-related measures are regulated or triggered by it, all of which are consolidated within this PAM and listed as follows:

- Guiding principles of forest management
- General ban on forest clearance/deforestation
- General ban on forest destruction
- Immediate re-afforestation after felling
- Ban on forest litter removal
- Forest protection (from fires and pests)
- Provisions for harvest haulage and forest roads
- Sustainable use of forests
- Austrian Forest Dialogue
- Forest cooperatives
- Task Force Renewable Energy
- Protection of wetlands

In 2023, the Forest Act was amended to also include the forest function of "carbon sequestration" in the guiding principles for sustainable forest management. This has already had a significant impact on silvicultural and forest planning.

Financial support (PaM Id°37)

The key financial support instruments for implementing sustainable forest management in Austria are the Common Agricultural Policy (CAP) and the Forest

Fund, which has been endowed with €450 million. Measures focus on strengthening the resilience of forests and adapting them to climate change, and these include:

- Re-afforestation and tending measures after damage events
- Development of climate-fit forests - forest tending
- Compensation for bark beetle damage caused by climate change
- Establishment of deposits for damaged wood
- Mechanical debarking as a forest protection measure
- Measures to prevent forest fires
- Research priority: “Climate-fit forests”

More detailed information can be found here: www.waldfonds.at

Scientific support and advice (PaM Id°38)

The Soil Fertility Advisory Board developed guidelines for soil-friendly harvesting, with the aim of stabilising or increasing carbon stock in the forest soil. Awareness-raising and research programmes on timber and biomass were also evaluated. These guidelines have already been adopted and published for implementation: https://www.bmluk.gv.at/service/publikationen/wald/gesunde-waldboeden.html.

Other key instruments related to sustainable forest management include strategies developed by the federal government and the responsible ministries. These include the Austrian Forest Strategy 2020+, the Biodiversity Strategy, the Austrian Strategy for Adaptation to Climate Change, the Bioeconomy Strategy and the Circular Economy Strategy. In addition, subsidies are available through the Forest Fund and forestry funding offered by the Rural Development Programme.

4.10.1.2 Adaptation, Resilience and Remediation (PaM Id°39)

This measure comprises all different policies and measures that address the impacts of climate change on the forest ecosystems.

The key instrument is the Austrian Strategy for Adaptation to Climate Change (NAS 3.0). The measures adopted in the forestry sector are particularly important for enhancing adaptation in forests.

Several measures of the aforementioned Forest Fund address adaptation to climate change and support preparedness to prevent and alleviate the impacts of extreme events. These include measures to protect forests (m5 Forest Fund), promote "climate-fit" (resilient) forests (m2 Forest Fund), prevent forest fires (m6 Forest Fund, "Wald schützt und!" action programme) and support remediation after extreme events (m1, 3-6 Forest Fund).

It is not possible to provide a LULUCF-specific quantification for the PAMs listed above due to a lack of data and because of overlapping activities.

4.10.2 WAM Measures for LULUCF

4.10.2.1 Expansion of forest area and creation of a carbon pool in the biomass that is as stable as possible (PaM Id°43)

This measure aims to expand the forest area, primarily in regions with low forest cover, provided this is ecologically, economically and socially justifiable. In existing forests, the objective is to ensure a stable carbon pool in the biomass that is adapted to climate change and in compliance with the basic principles of sustainable forest management. This can be achieved by building up and maintaining humus in the forest soil through the selection of tree species that are suitable and adapted to the site and the use of soil-conserving technology. Attention is paid to strengthening resilience to (climate change-related) disturbances in order to maintain and increase carbon storage in the forest stand.

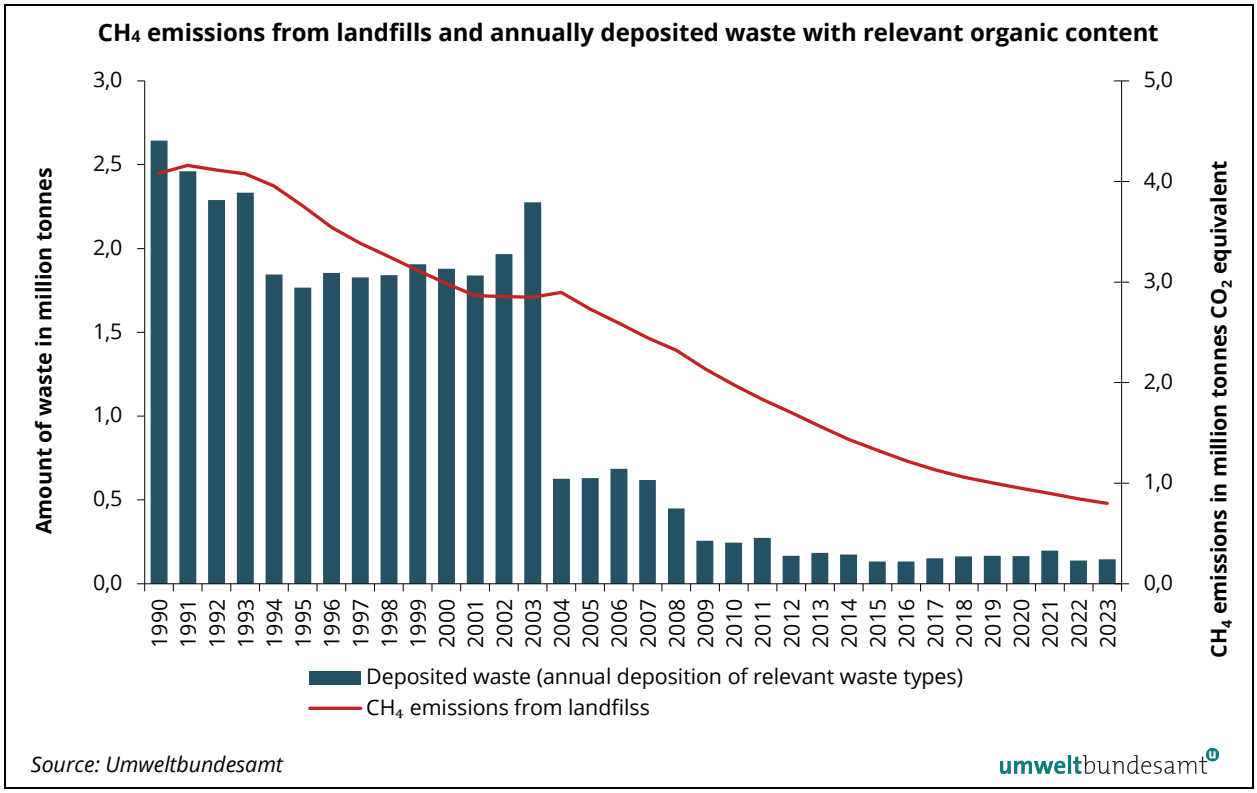
4.10.2.2 Increasing the long-lasting material use of sustainable wood resources (PaM Id°44)

This measure focuses on evaluating and improving the framework conditions for increasing the use of long-lasting material from sustainable domestic wood resources to optimise the substitution of raw materials and materials with higher life cycle GHG emissions in line with the LULUCF targets (including waste wood recycling). This also includes an improved life cycle assessment of buildings and measures to extend the service life and recyclability of wood products.

4.11 Waste (CRT Source Category 5)

In the WEM scenario for waste, the downward trend in the amount of deposited waste (and its respective carbon content) is expected to continue, mainly due to the requirements of the Landfill Ordinance, but also because of the growing importance of waste incineration and other treatment methods. The indicator 'annually deposited waste/CH_4 emissions' also shows this trend (see Figure 38 below).

Figure 38: Methane emissions from landfills and annually deposited waste with relevant organic carbon content.



4.11.1 WEM measures for waste

This chapter lists the WEM measures relevant for the waste sector. The main objective of these measures is to reduce CH_4 emissions from waste treatment. It is not possible to quantify the reduction potentials separately, but the overall effect is included in the "with existing measures" scenario. The largest reductions are expected in the solid waste disposal category, with emissions decreasing from 799 kt CO_2e in 2023 to 486 kt CO_2e in 2035 and 355 kt CO_2e in 2050.

4.11.1.1 Reduce emissions from landfill sites (PaM Id°45)

GHG affected: CH_4

Type of policy instrument: regulatory

Status: implemented

Start year of implementation: 1995, 2008

Implementing entity: national government, federal provinces

Mitigation impact: not available

Indicators: Deposited quantities of waste with organic content (t/a): 2000: 1,052,061 t; 2005: 241,733 t; No organic waste has been deposited since 2009.

Type: EU policy, national policy

EU legislation	National implementation	Start
EU Waste Framework Directive (2008/98/EC) – Source separation of biowaste	Federal Law Gazette No. 68/1992, as amended by Ordinance 456/1994 (Ordinance on the separate collection of biogenic waste)	1995
EU Landfill Directive (1999/31/EC)	Federal Law Gazette No. 164/1996, Federal Law Gazette II No. 39/2008 (Ordinance on landfills)	1997 / 2008

The Austrian Landfill Ordinance is the most effective instrument for reducing emissions in the waste sector. Based on this Ordinance, no untreated biodegradable waste has been permitted in landfills since 2004, with no exceptions since 2008. To reduce the carbon content of waste prior to landfill, alongside the source separation of biowaste, incineration and mechanical-biological treatment (pre-treatment options) of mixed municipal waste have increasingly been applied in Austria. Since 1992, the source separation of biowaste for subsequent processing has been obligatory in Austria according to the Federal Law Gazette No. 68/1992 (as amended 1994).

A planned amendment to the Landfill Ordinance is intended to create the legal possibility of reusing the area of closed landfills, e.g. for photovoltaics. This would mean that fewer green spaces would be (partially) sealed.

Furthermore, emissions from mass landfills are limited by the collection and use of landfill gas as required by the Landfill Ordinance. The provisions stipulated in 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 the detection of leakages and examination of gas collection systems).

Quantification of mitigation impact/projected GHG emissions:

Quantifying this instrument would require several assumptions, leading to a high level of uncertainty. Surveys of gas collection systems conducted in 2014 (UMWELTBUNDESAMT 2014), 2019 (UMWELTBUNDESAMT 2019b) and 2023 (UMWELTBUNDESAMT 2023c) showed that the measures described can lead to higher percentages of landfill gas collected, at least at some landfills. Starting in 1990, the total volume of gas collected was 11.2 million m^3. By 2002, the landfill gas volume had reached a maximum of around 61.2 million m^3. In subsequent years, the amount of landfill gas recorded steadily fell and returned to the 1990 level of around 11.7 million m^3 in 2022.

4.11.1.2 Strengthen waste prevention & increase recycling (PaM Id°46)

GHG affected: CH_4

Type of policy instrument: regulatory, information

Status: implemented

Start year of implementation: 2008

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Indicators: Possible indicators include: packaging placed on the market per packaging material [t/a]; amount of food waste [kg/person/a]; mass of separately collected used textiles [kg/person/a], but no data is available.

Waste prevention is a crucial instrument to reduce future emissions. To this end, (pilot) projects, awareness-raising campaigns and networks have been established to minimise waste and promote its reuse (see the Austrian Waste Prevention Programme 2023 (BMK 2023b)).

Moreover, the EU Single-Use Plastics (SUP) Directive aims to reduce the amounts of plastic packaging waste and sets measures to increase recycling. In addition, the EU Waste Framework Directive sets targets for recycling total municipal waste. A law has been introduced in Austria to ban the sale and distribution of plastic carrier bags, with the aim of reducing the amount of waste. A new Austrian packaging regulation has been in place since February 2025.

A corresponding measure has been included in the 2023 waste prevention programme. In the “Plastics & Packaging” field, the programme will promote unpackaged systems and filling stations. With regard to funding and research, the RTI initiative “Circular Economy” is worth noting, as it supports innovative research and development projects. One objective of the programme is to intensify product use. A funded project on refill stations is currently underway. Another measure involves promoting collection and recycling systems (SVS) in food retail for the installation of take-back systems.

The Waste Management Act has been amended to implement the EU's 2021 circular economy package. The amendment introduces reusable quotas for beverage packaging and a deposit policy for disposable plastic beverage bottles and aluminium beverage cans. The reusable quotas came into force in 2024, and the one-way deposit scheme began in 2025. The Waste Management Act also sets a general reduction target of 20% for single-use plastic packaging by 2025 (compared to 2018 levels). Funding for large sorting facilities is provided through domestic environmental funding, financed by the Austrian recovery and resilience plan.

A (high) recycling rate for construction waste has already been set at EU level. Austria exceeds this requirement (achieving a recycling rate of 85.2% in 2022). The detection of harmful contaminants prior to demolition has also been in force in Austria since 2015. Approaches to the reuse of components, as well as to overall conservation and renovation, are in place and are being strengthened. However, support for these activities is still necessary.

In terms of reducing food waste, the long-term goal is to reduce the amount of avoidable food waste at all stages of the value chain in Austria, i.e. from production to consumption. In accordance with the UN's 2030 Agenda for Sustainable Development, the goal is to halve the per capita amount of avoidable food waste at the retail and consumer levels by 2030, as well as to reduce food losses along the production and supply chain, including post-harvest losses. In addition to the "Food is precious!" initiative, numerous activities have been carried out in Austria to date. These include the voluntary agreement to avoid food

waste in food companies, the introduction of the “Tafelbox” or the “GenussBox” at hospitality and catering events, the establishment of an online platform for food sharing, as well as the development and implementation of the "United Against Waste" platform and the guideline on donating food waste to social institutions.

Measures to reduce textile waste are intended to significantly contribute to increasing the longevity of textiles and the associated reduction of textile waste. This includes promoting slow fashion. Furthermore, it is expected that the general population and public institutions will exhibit significantly reduced consumption, more sustainable and quality-oriented purchasing behaviour, and an extension of the product lifespan, including through the promotion of repair and reuse. Rather than disposing of textiles that are no longer needed in residual waste, they should be recycled.

In the area of reuse, the measures primarily aim to increase the supply of high-quality used products for reuse and the demand for reuse products among the public and in public institutions. In particular, the lifespan of products should be extended by implementing different concepts and encouraging appropriate consumer behaviour. Repair services should gain importance and increasingly replace new purchases. The image of reuse should be improved, and, in the long term, reuse should be further developed from a niche segment to the mainstream. This will minimise overproduction, increase resource efficiency and reduce the amount of waste generated and requiring treatment. In this context, Austria has introduced a repair bonus to support the aforementioned goals.

Type: EU policy, national policy

EU legislation	National implementation	Start
EU Waste Framework Directive (2008/98/EC) – Recycling of total municipal waste	Federal Law Gazette No. 102/2002, as amended by Federal Law Gazette No 200/2021[33] (“Waste Management Act”/”AWG”)	2008
EU Single-Use Plastics (SUP) Directive (2019/904/EC)	Federal Law Gazette No. 102/2002, as amended by Federal Law Gazette No 200/2021[33] (“Waste Management Act/”AWG”)	2022
Packaging and Packaging Waste Regulation (2025/40/EU)	Federal Law Gazette II No. 184/2014, as amended by Federal Law Gazette II No. 597/2021 (“Packaging Ordinance”)	2015

Quantification of mitigation impact/projected GHG emissions:

It is not possible to quantify the effects of these waste prevention measures. This is due to the non-measurable effect on the total waste volume and due to the parallel effects in various disposal and recovery treatment routes (incineration, MBT, composting and biogas plants), which are also partly interconnected (e.g. landfilling of residues from MBTs).

[33] ”AWG“ Amendment - Circular Economy Package

However, the projections assume a certain reduction effect by decoupling population growth and waste generation. While current population forecasts assume a growth of 2.4% by 2030 (compared to 2023), the projections consider a constant amount of treated and landfilled waste (see Chapter 3.5).

4.11.1.3 Reduce emissions from biological treatment by implementing BAT in the waste treatment process (PaM Id°47)

GHG affected: CH_4, N_2O

Type of policy instrument: regulatory

Status: implemented

Start year of implementation: 2009

Implementing entity: federal government, federal provinces

Mitigation impact: not available

Indicators: not available

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". Moreover, the EU report on the best available techniques (BREF Waste Treatment – JRC 2018) provides guidance on preventing emissions from aerobic and anaerobic treatment processes for IED installations. The related legally binding requirements to be incorporated into the permits for the installations are published by EU Implementing Decision 2018/1147.

Austria is currently revising its compost regulations to ensure that the quality requirements for compost and compost soils, the type and origin of the input materials and additives, the production methods, the quality monitoring, the quality classes, the areas of application, the labelling, the documentation and the end of the waste status for compost and compost soils produced are state of the art. The new regulation will benefit controlled process management and reduce emissions from composting.

Type: EU policy, national policy

EU legislation	National Implementation	Start
EU Implementing Decision establishing BAT conclusions for waste treatment (2018/1147)	No national transposition required	2018
-	Guideline on the State of the Art of Composting	2009

Quantification of mitigation impact/projected GHG emissions:

It is not possible to make a separate quantification. The emission factors used in the Austrian greenhouse gas inventory (Umweltbundesamt 2025a) for aerobic waste treatment already align with the current state of the art (Amlinger 2005). A reference scenario is not available.

Regarding anaerobic treatment in biogas plants, it is assumed that emissions will be reduced by applying the best available techniques, taking into account an increased utilisation of gas-tight covers for storage facilities.

5 SCENARIO DEFINITION

The following tables summarise the policies and measures, as well as their instruments, for both scenarios. Further details can be found in Chapter 4 and are also provided in Reportnet3 in the Annex "PaMs attributes and progress" in accordance with Commission Implementing Regulation (EU) 2020/1208, which has been submitted together with this report.

5.1 Scenario "With Existing Measures"

Table 23: PAMs included in the "with existing measures" scenario

Cross-cutting Measures	
PaM Id.1	EU Emissions Trading System (ETS)
PaM Id.2	Carbon pricing of fossil fuels
Energy Industries (CRT 1.A.1) and Manufacturing Industries and Construction (1.A.2)	
PaM Id.3	Increase the share of renewable energy in power supply and district heating
	• Renewable Energy Expansion Act ('Erneuerbaren-Ausbau-Gesetz') • Domestic Environmental Support Scheme ('Umweltförderung im Inland') • Austrian Climate and Energy Fund ('Klima- und Energiefonds')
PaM Id.4	Increase energy efficiency in energy and manufacturing industries
	• Energy Efficiency Act ('Energieeffizienzgesetz') • Domestic Environmental Support Scheme ('Umweltförderung im Inland')
Transport (CRT Source Category 1.A.3)	
PaM Id.9	Increase the share of renewable energy sources in road transport
	• Implementation of Directive 2018/2001 on the promotion of the use of energy from renewable sources ('Umsetzung der Richtlinie Erneuerbare Energieträger / RED II (2018/2001) gemäß Kraftstoffverordnung 2012')

PaM Id.10	Promotion of e-Mobility
	• EU CO_2 reduction targets for PC, LDV and HDV ('CO_2 Grenzwerte für PKW, LNF und SNF') • Promotion of zero-emission HDV ('Förderprogramm zur Umstellung von Busflotten auf emissionsfreie Antriebe' (EBIN) sowie 'Initiative zur Umstellung von Nutzfahrzeugflotten auf emissionsfreie Antriebe' (ENIN)) • Funding programmes for e-mobility (EBIN, ENIN, LADIN)
PaM Id.11	Increase fuel efficiency in road transport
	• Air quality induced speed limits ('Bestehende Tempolimits gemäß Immissionsschutzgesetz-Luft (IG-L)') • EcoDriving initiative ('klimaaktiv mobil Spritsparinitiative')
PaM Id.12	Promotion of klimaaktiv mobil mobility management and active mobility
	• 'klimaaktiv mobil' initiative - Mobility management and awareness ('Mobilitätsmanagement und Bewusstseinsbildung – klimaaktiv mobil Programm')
PaM Id.13	Expanding and increasing the attractiveness of public transport
	• Austrian Federal Railway Framework Plan 2024–2029 - passengers ('ÖBB Rahmenplan 2024–2029 – Personenverkehr') • Nationwide and Regional public transport ticket ('KlimaTicket Österreich" and "KlimaTicket Regional')
PaM Id.14	Modal shift in freight transport
	• Austrian Federal Railways Framework Plan 2024–2029 - freight ('ÖBB Rahmenplan 2024–2029 – Güterverkehr') • Action Plan Danube 2030 ('Aktionsprogramm Donau 2030 des BMK') • Rail Freight Subsidy and Promotion of corporate rail connections and terminals for freight transport ('Schienengüterverkehrsförderung und Anschlussbahn- und Terminalförderung')
PaM Id.15	Greening the truck toll
	• Greening the truck toll ('Ökologisierung der LKW-Maut')
PaM Id.16	SAF in aviation
	• Sustainable Aviation Fuels ('SAF im Flugverkehr')

Other Sectors (CRT Source Category 1.A.4) – Stationary combustion (buildings)	
PaM Id.22	Climate Neutral New Buildings
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Oil Boiler Installation Prohibition Act ('Ölkesseleinbauverbotsgesetz – ÖKEVG 2019') • Renewable Heat Act ('Erneuerbare-Wärme-Gesetz – EWG') • Funding Programmes for New Buildings ('Förderprogramme für Neubauten')
PaM Id.23	Thermal Renovation of the Building Stock
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Energy Efficiency Act – Federal buildings ('Bundes-Energieeffizienzgesetz – EEffG') • Funding Programmes for Thermal Renovation ('Förderprogramme für thermische Renovierung') • Act on the Presentation of an Energy Performance Certificate ('Energieausweis-Vorlage-Gesetz 2012 – EAVG 2012')
PaM Id.24	Replacement of Fossil Fuels in Building Stock
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Funding Programmes for Replacement of Fossil Heating Systems ('Förderprogramme für den Austausch fossiler Heizsysteme')
PaM Id.25	Energy Efficiency Measures in Buildings
	• 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 ('Förderprogramme für Energieeffizienzmaßnahmen in Gebäuden')
Fugitive Emissions from Fuels (CRT Source Category 1.B)	
Industrial Processes and Product Use (CRT Source Category 2)	
PaM Id.29	Decrease emissions from F gases and other product use
	• EU F-gas Regulation 2024 (EU) No. 2024/573 • MAC Directive 2006/40/EC

Agriculture (CRT Source Category 3)	
PaM Id.30	Implementation of EU agricultural policies
PaM Id.31	Ammonia Reduction Ordinance (Federal Law Gazette II No. 395/2022)
Land Use, Land-Use Change and Forestry (CRT Source Category 4)	
PaM Id.36	Sustainable Forest Management
PaM Id.39	Adaptation, Resilience and Remediation
Waste (CRT Source Category 5)	
PaM Id.45	Reduce emissions from landfill sites
PaM Id.46	Strengthen waste prevention & increase recycling
PaM Id.47	Reduce emissions from biological treatment by implementing BAT in the waste treatment process

5.2 Scenario "With Additional Measures"

Table 24: PAMs included in the "with additional measures" scenario (in addition to the measures listed in the previous table)

Cross-cutting Measures	
PaM Id.1	EU Emissions Trading System (ETS)
PaM Id.2	Carbon pricing of fossil fuels
Energy Industries (CRT 1.A.1) and Manufacturing Industries and Construction (1.A.2)	
PaM Id.5	Decarbonisation of the industry
	• Transformation of Industry ('Transformation der Industrie') • Energy Efficiency Act ('Energieeffizienzgesetz') • Environmental Support Act • Renewable Gas Act ('Erneuerbares-Gas-Gesetz') • Circular Economy Strategy ('Kreislaufwirtschafts-Strategie')
PaM Id.6	Further enhancement of renewable energy in the electricity sector
	• Renewable Energy Expansion Act ('Erneuerbaren-Ausbau-Gesetz') • Electricity Act ('Elektrizitätswirtschaftsgesetz')
PaM Id.7	Further enhancement of renewable energy through green gas
	• Renewable Gas Act ('Erneuerbares-Gas-Gesetz') • Hydrogen Strategy ('Wasserstoffstrategie')
PaM Id.8	Expansion of geothermal energy and large heat pumps
	• Geothermal energy roadmap ('Roadmap Geothermie')

Transport (CRT Source Category 1.A.3)	
PaM Id.17	Accelerated increase of renewable energy sources in transport
	• RED III ('Erneuerbare-Energien-Richtlinie RED III')
PaM Id.18	Advanced electrification of non-road mobile machinery (NRMM)
PaM Id.19	Enforcement of active mobility and mobility management
PaM Id.20	Enforced attractiveness of public transport incl. a guaranteed minimum service
PaM Id.21	Enforcement of rail freight funding
Other Sectors (CRT Source Category 1.A.4) – Stationary combustion (buildings)	
PaM Id.26	Accelerated Path to Climate Neutral New Buildings
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Funding Programmes for New Buildings ('Förderprogramme für Neubauten')
PaM Id.27	Accelerated Thermal Renovation of the Building Stock
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Energy Efficiency Act – Buildings Owned by Public Bodies ('Energieeffizienzgesetz') • Funding Programmes for Existing Buildings ('Förderprogramme für bestehende Gebäude')
PaM Id.28	Accelerated replacement of Fossil Fuels in Building Stock
	• OIB Guideline 6 – Energy Savings and Thermal Insulation ('OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz') • Funding Programmes for Replacement of Fossil Heating Systems ('Förderprogramme für den Austausch fossiler Heizsysteme')
Agriculture (CRT Source Category 3)	
PaM Id.32	Livestock and feeding management
	• Enhanced promotion and education programmes in the framework of REGULATION (EU) 2021/2115 CAP Strategic Plans
PaM Id.33	Optimised manure management
	• Enhanced promotion and education programmes in the framework of REGULATION (EU) 2021/2115 CAP Strategic Plans
PaM Id.34	Optimised fertilizer management (inorganic and organic)
PaM Id.35	Increase biogas production from manure
	• Renewable Energy Expansion Act (Erneuerbaren-Ausbau-Gesetz) (Federal Law Gazette I No. 150/2021)

Land Use, Land-Use Change and Forestry (CRT Source Category 4)	
PaM Id.43	Expansion of forest area and creation of a carbon pool in the biomass that is as stable as possible
PaM Id.44	Increasing the long-lasting material use of sustainable wood resources

6 RECALCULATIONS: CHANGES WITH RESPECT TO SUBMISSION 2023

According to Article 18(3) of Regulation (EU) 2018/1999, Member States shall communicate any substantial changes to the information reported pursuant to this Article during the first year of the reporting period, by 15 March of the year following the previous report.

Changes with respect to the previous GHG emission projections of 2023 (UMWELTBUNDESAMT 2023a) are influenced by the following main factors:

1. Updates to the underlying data (e.g. GHG inventory, energy balance);
2. Revisions to emission factors and methodologies;
3. Changes to assumptions made for activity scenarios. These changes can be triggered by revised economic or technical scenarios, the inclusion of additional policies and measures, and revisions of policies or measures which become necessary because of amendments to legislation;
4. Changes to the models used for activity or emission scenarios.

The following tables show a comparison of past trends and scenarios for national emission totals and by sector.

Table 25: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – national totals (in kt CO2e), (Umweltbundesamt).

Total – WEM	**1990**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
Projections 2011	78 171	92 916	85 237	86 096	87 333	89 098	90 847			
Projections 2013	78 162	92 880	84 594	82 444	81 640	82 764	84 039			
Projections 2015	78 683	92 496	84 788	79 737	79 067	76 779	75 957	75 677		
Projections 2017	78 805	92 642	85 059	78 851	75 393	72 724	69 767	67 274		
Projections 2019	78 670	92 567	84 753	78 897	79 669	76 637	73 961	72 298		
Projections 2021	78 420	92 147	84 337	78 462	76 885	75 232	72 540	70 719	69 329	
Projections 2023	79 047	92 589	84 693	78 884	73 911	73 358	67 809	62 620	59 044	55 147
Projections 2025	79 621	93 341	85 442	79 359	74 679	69 201	60 688	54 811	49 655	41 551
Difference 2025/2023	+574	+752	+749	+475	+768	-4 158	-7 121	-7 809	-9 390	-13 597

6.1 Energy Industries (1.A.1)

Table 26: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Energy Industries (in kt CO2e), (Umweltbundesamt).

1.A.1 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	13 842	16 184	12 605	10 671	10 910	12 005	12 842			
Projections 2013	13 842	16 359	14 293	12 301	11 416	12 155	12 815			
Projections 2015	13 842	16 364	14 150	10 362	9 896	8 635	8 348	9 362		
Projections 2017	13 838	16 240	13 988	10 928	8 943	8 335	8 081	7 597		
Projections 2019	14 100	16 397	14 028	10 792	9 873	8 169	7 311	6 824		
Projections 2021	14 011	16 032	13 756	10 511	9 873	8 169	7 311	6 824	6 470	
Projections 2023	14 008	16 026	13 747	10 502	8 800	8 097	6 467	5 940	5 706	5 405
Projections 2025	14 008	16 025	13 747	10 458	8 667	7 802	7 069	7 639	8 357	9 012
Difference 2025/2023	0	-1	0	-45	-133	-295	602	1 699	2 651	3 607

The revisions up to 2023 are mainly due to different assumptions about power generation after 2030. Compared to the 2023 projections, the power demand in the 2025 projections is higher. As the expansion of renewable energy is lower than in 2023, power generation from gas plants is higher, thus increasing emissions.

6.2 Manufacturing Industries and Construction (1.A.2) & Industrial Processes & Product Use (2)

Table 27: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Manufacturing Industries and Construction & Industrial Processes & Product Use (in kt CO2e), (Umweltbundesamt).

1.A.2 & 2 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	23 395	27 156	27 436	29 910	32 040	34 189	36 536			
Projections 2013	23 394	27 536	26 626	26 214	27 284	28 747	30 426			
Projections 2015	23 475	27 458	27 386	26 966	27 786	28 284	28 949	28 750		
Projections 2017	23 553	27 408	27 470	27 144	26 189	25 791	25 242	25 337		
Projections 2019	23 562	27 308	27 322	27 058	27 588	27 029	26 796	27 058		
Projections 2021	23 416	27 008	27 044	26 780	25 177	25 962	25 693	25 792	26 044	
Projections 2023	23 225	27 013	27 123	27 004	26 046	27 222	26 856	26 927	27 149	26 886
Projections 2025	23 251	27 014	27 154	26 859	26 282	25 864	22 421	21 588	21 213	19 828
Difference 2025/23	3	-7	-16	-16	-3	-1 082	-1 651	-1 781	-2 038	-3 236

1A2 & 2 Processes

The changes to the 2023 report are mainly due to recessions in recent years, combined with the installation of a carbon price for non-ETS industry and additional funding being provided to support the transition of the ETS industry. Other changes are due to the use of the new energy balance (1990–2023).

2 F gases

Table 28: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – CRT 2 F-gases (in kt CO2e), (Umweltbundesamt).

2 F gases – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	1 600	1 628	1 713	1 734	1 738	1 785	1 804			
Projections 2013	1 600	1 628	1 575	1 501	1 494	1 514	1 533			
Projections 2015	1 656	1 825	1 900	2 135	2 302	1 938	1 606	1 568		
Projections 2017	1 656	1 831	1 901	2 034	1 975	1 468	881	751		
Projections 2019	1 656	1 833	1 904	1 988	1 871	1 327	856	735		
Projections 2021	1 656	1 764	1 761	2 053	2 227	1 441	908	864	847	
Projections 2023	1 550	1 789	1 846	2 273	2 198	1 532	896	798	806	663
Projections 2025	1 550	1 782	1 876	2 074	2 194	1 532	1 222	772	405	194
Difference 2025/23	0	-7	30	-199	-4	0	325	-26	-402	-468

The calculation model for F gases is improved regularly, whenever new information becomes available. The differences between the 2015 projections and subsequent projections are mostly due to the fact that the calculation model for stationary air conditioning has undergone major improvements and is continuously being refined. Furthermore, the projection scenarios before 2015 were not based on the EU F-gas Regulation or on information about new technologies that emerged later. The difference between the 2021 and 2023 projections is due to several improvements to the FC inventory, particularly the more accurate allocation of refrigerant consumption to the different sub-sectors, especially in stationary refrigeration and air conditioning. For the 2025 projections, several major improvements were made. The highest effects were seen with the update of parameters for commercial refrigeration and the improved accounting of total FC use in Austria to sub-categories.

6.3 Transport (CRT Source Category 1.A.3)

Table 29: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Transport (in kt CO2 eq) (Umweltbundesamt).

1.A.3 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	14 010	24 981	23 308	24 850	24 872	24 684	24 513			
Projections 2013	14 030	25 040	22 452	23 695	23 800	23 931	23 965			
Projections 2015	13 974	24 939	22 379	23 169	23 267	23 261	23 042	22 594		
Projections 2017	13 976	24 934	22 529	22 587	22 708	22 461	21 466	20 228		
Projections 2019	13.975	24.944	22.568	22.676	24.478	24.529	23.669	22.859		
Projections 2021	13 957	24 944	22 585	22 726	24 555	24 605	23 743	22 933	22 095	
Projections 2023	13 952	24 928	22 567	22 702	21 156	21 724	19 413	15 337	12 318	9 658
Projections 2025	13 950	24 930	22 569	22 705	21 122	19 629	17 179	12 397	7 743	2 329
Difference 2025/23	-2	1	2	3	-34	-2 095	-2 234	-2 940	-4 575	-7 330

Regarding 2020, the difference between the 2021 and 2023 projections is due to the slump in activity caused by the pandemic. The 2021 submission for the transport sector included a modelling result that had already been estimated before 2020. Compared to the 2023 projection, the 2025 projection shows no significant difference for 2020.

The differences in the period from 2025 to 2050 in the 2025 submission are due to the enforced CO_2 limit values for new heavy-duty vehicles set out in Regulation (EU) 2024/1610 of the European Parliament and of the Council of 14 May 2024 amending Regulation (EU) 2019/1242 as regards strengthening the CO_2 emission performance standards for new heavy-duty vehicles and integrating reporting obligations, amending Regulation (EU) 2018/858 and repealing Regulation (EU) 2018/956. The decrease in GHG emissions in 1.A.3.b Road Transport is due to changes in the forecasted amount of biofuel consumption following recent developments, such as the introduction of E10 in 2023 and the uptake of pure HVO and plant oil, as a reduced amount of fossil fuels is needed.

6.4 Other Sectors (CRT Source Category 1.A.4 & 1.A.5)

Table 30: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Other Energy Sectors (in kt CO2 eq), (Umweltbundesamt).

1.A.3 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	14 468	14 435	12 089	11 173	10 244	9 161	8 067			
Projections 2013	14 441	13 748	11 448	10 648	9 710	8 678	7 705			
Projections 2015	14 507	13 742	11 506	10 292	9 305	7 966	7 095	6 401		
Projections 2017	14 622	13 684	11 298	8 892	8 436	7 344	6 384	5 518		
Projections 2019	14 269	13 651	11 106	9 061	8 579	7 978	7 364	6 800		
Projections 2021	14 289	13 915	11 263	9 196	8 579	7 978	7 364	6 800	6 340	
Projections 2023	14 322	13 928	11 276	9 199	9 098	8 019	7 419	6 820	6 329	5 988
Projections 2025	14 326	13 922	11 261	9 184	9 094	6 942	5 774	5 046	4 296	2 756
Difference 2025/23	+3	-7	-16	-16	-3	-1 077	-1 644	-1 774	-2 033	-3 232

The changes with respect to the 2023 submission for the years 2025 to 2050 are predominantly due to updated projections for stationary fuel combustion in sectors *1.A.4.a Commercial/Institutional* and *1.A.4.b Residential*, which were calculated using the INVERT/EE-Lab model (e-think 2025). The same reasoning applies to GHG emissions from sector *1.A.4.c.1 Agriculture/Forestry/Fishing* in the years 2025 to 2050, which were recalculated based on the output of the econometric input-output model (MIO-ES).

The INVERT/EE-Lab model was updated with recent statistical data on building stock and thermal building quality. The model was recalibrated against the new energy balance. New measures were introduced to the WEM scenario, resulting in a steeper path of GHG emission reductions from 2025 to 2050 than in the 2023 submission:

- According to the Oil Boiler Installation Prohibition Act ('Ölkesseleinbauverbotsgesetz – ÖKEVG 2019'), the installation of liquid or solid fossil fuel boilers in newly constructed buildings is prohibited as of 2020.
- According to the Renewable Heat Act ('Erneuerbare-Wärme–Gesetz – EWG'), the installation of all heating systems suitable for fossil fuels (and of not quality-assured district heating) in newly constructed buildings is prohibited as of 2024.
- The coordinated funding for replacing fossil fuel heating systems, through the Stepping out of Oil and Gas ('Raus aus Öl und Gas') focus programme, will maintain higher subsidy rates for replacing fossil fuel heating systems until 2027.
- Changes in price assumptions influence decisions regarding the preferred fuels for heating systems in the long term, as well as decisions concerning the quality and quantity of thermal renovation activities.

Minor adjustments to the energy balance (1990–2023) apply to the former years 1990, 2005, 2010, 2015 and 2020, in particular with regard to fossil fuel use for

category *1.A.5 Other*. The difference in 2025 is mainly due to emerging trends in activity data (energy consumption) for the most recent inventory year, 2023.

In particular, emissions of category *1.A.4.a Commercial/Institutional* in the inventory year 2023 are about 425 kt CO_2 lower than projected in the 2021 submission due to mild weather, the ongoing replacement of fossil fuel heating systems and consistently high energy prices. This also applies to category *1.A.4.b Residential*, which in the inventory year 2023 shows emissions of about 680 kt CO_2 lower than projected in the 2021 submission. In addition, higher fossil fuel use in stationary sources from category *1.A.4.c Agriculture/Forestry/Fishing* contributes to an increase of 20 kt CO_2 emissions in 2023.

Decreased fossil fuel consumption in **mobile sources** from category *1.A.4.c Agriculture/Forestry/Fishing* reduces the CO_2 emissions of the 2025 projections by 21 kt in 2030 and by 59 kt in 2050 compared to the 2023 projections. This is due to an increased forecast for biofuel consumption in mobile off-road sources. Furthermore, the grain harvest projection has not changed much compared to the 2023 projections, but the 2025 projection starts at a lower level.

Overall, the differences for the projected years 2025, 2030, 2035, 2040 and 2050 amount to up to -54.0% of the GHG emissions submitted in 2023.

6.5 Fugitive Emissions from Fuels (1.B)

Table 31: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Fugitive emissions (in kt CO2e).

1.B – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	312	440	448	444	431	409	388			
Projections 2013	311	441	516	539	570	582	594			
Projections 2015	702	482	521	560	574	589	604	607		
Projections 2017	702	482	521	477	464	364	306	223		
Projections 2019	702	437	468	424	389	318	275	210		
Projections 2021	702	437	468	424	384	321	282	212	179	
Projections 2023	774	471	502	456	355	328	289	284	258	258
Projections 2025	942	650	687	623	501	401	359	331	284	241
Difference 2025/23	168	179	185	167	145	73	70	47	26	-17

The difference between the 2025 and 2023 projections is mainly due to additional CH_4 emissions resulting from post-meter emissions and lower projected consumption of natural gas.

6.6 Agriculture (CRT Source Category 3)

Table 32: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Agriculture (in kt CO2 eq) (Umweltbundesamt).

3 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	8 558	7 399	7 534	7 625	7 693	7 687	7 663			
Projections 2013	8 558	7 412	7 453	7 654	7 733	7 711	7 687			
Projections 2015	7 959	6 878	6 852	6 874	7 044	7 052	7 063	7 192		
Projections 2017	8 189	7 104	7 094	7 168	7 342	7 347	7 357	7 538		
Projections 2019	8 137	7 038	7 103	7 249	7 467	7 545	7 626	7 721		
Projections 2021	8 120	7 017	7 095	7 274	7 110	7 192	7 272	7 364	7 458	
Projections 2023	8 400	7 181	7 188	7 376	7 197	6 923	6 462	6 493	6 520	6 248
Projections 2025	8 581	7 578	7 574	7 727	7 568	7 357	6 840	6 854	6 864	6 555
Difference 2025/23	181	397	386	351	371	434	378	361	344	307

Emission calculations are based on projected activity data obtained from the PASMA model (WIFO & BOKU 2023) from 2030 onwards. The years between 2023 (and partly 2024, where up-to-date values were available) and 2030 were derived by interpolation.

Austria substantially revised its agriculture inventory within the 2025 inventory submission. The research project 'Animal husbandry and manure management systems in Austria' ('TIHALO I', AMON et al. 2007 and 'TIHALO II', PÖLLINGER et al. 2018) has been followed up by a new investigation ('TIHALO III', PÖLLINGER et al. 2025). As with its predecessors, this project involved conducting 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 the basis for the calculation of Austria's emission inventory for the 2025 submission, resulting in revisions to all animal-related emission sources.

For the first time, CH_4 emissions from *3.A Enteric fermentation* were calculated for sheep, goats, horses, poultry, deer and rabbits, based on the Tier 2 methodology according to IPCC 2019 and country-specific EFs (equation 10.21), using updated activity and nutrition data.

The CH_4 and N_2O emissions of *3.B Manure Management* have been revised using new and updated activities (e.g. AWMS data, feeding and nutrition) and the 2019 Refinement of the IPCC Guidelines for all livestock categories. In particular, implementing the manure management system 'pit storage below animal confinements' resulted in higher CH_4 emissions over the entire time series.

Revisions to the ammonia inventory showed an increasing effect on emission levels of indirect N_2O emissions. Updating the total ammoniacal nitrogen (TAN) values for liquid and solid manure of cattle and swine, which resulted in higher levels of ammonia emissions, had the most significant impact. The TAN values used in previous submissions, which were taken from SCHECHTNER et al.

(1991), were amongst the lowest in European countries. The revised values were derived from measurement data from PÖTSCH (2019) and adjusted with the N-losses provided in the German and Swiss inventories.

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

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

6.7 LULUCF (CRT Source Category 4)

Table 33: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – LULUCF (in kt CO2 eq) (Umweltbundesamt).

4 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	-13 139	-17 332	-4 773	-3 493	-1 823	-1 823	-1 823			
Projections 2013	-10 023	-7 395	-3 611	3 533	5 031	5 031	5 031			
Projections 2015	-9 878	-7 626	-3 894	3 508	5 005	5 005	5 005	5 005		
Projections 2017	-12 153	-10 756	-5 911	-4 848	-7 747	-8 101	-4 608	-4 905		
Projections 2019	-11 988	-10 659	-5 864	-4 551	-4 202	-3 464	-2 671	-3 131		
Projections 2021	-12 196	-10 833	-5 724	-4 163	-4 594	-3 633	-3 129	-3 605	-1 608	
Projections 2023	-12 207	-18 418	-19 759	-6 563	-5 222	-6 331	-6 029	-6 547	-4 608	-2 855
Projections 2025	-13 756	-15 228	-11 734	-4 085	-950	2 064	-4 004	-4 578	-2 852	-1 173
Difference 2025/23	-1 549	3 191	8 025	2 478	4 272	8 395	2 025	1 970	1 756	1 681

The revisions with respect to the projections 2023 are due to the following:

- Updates of historical time series for all categories based on changes in the GHG inventory, which were mainly due to data from an intermediate National Forest Inventory prepared for the 2025 submission, which led to substantial recalculations in the historical years.
- This submission includes emissions from drained organic soils, which were reported for the first time in the National Inventory Document 2025 (UMWELTBUNDESAMT 2025a) and are now also included in the projections (by assuming constant emissions in the future).
- The soil carbon stock changes due to land use changes are now calculated for a soil depth of 0-50 cm and per ecological growth region. This approach was also used for the projections.
- Update of projections activity data for cropland, grassland and settlements to provide a consistent land use matrix. The main revisions include the use of the newest projection data for cropland and grassland, and the update of projections for the total settlement area based on ÖROK (2015) to make them more consistent with the historical trend of settlement development.

6.8 Waste (CRT Source Category 5)

Table 34: Comparison of projections 2011, 2013, 2015, 2017, 2019, 2021, 2023 and 2025 – Waste (in kt CO2 eq) (Umweltbundesamt).

5 – WEM	1990	2005	2010	2015	2020	2025	2030	2035	2040	2050
Projections 2011	3 586	2 322	1 815	1 423	1 144	964	838			
Projections 2013	3 587	2 345	1 806	1 392	1 128	961	847			
Projections 2015	4 226	2 632	1 993	1 515	1 195	992	856	771		
Projections 2017	3 925	2 791	2 158	1 656	1 312	1 083	930	833		
Projections 2019	3 925	2 791	2 158	1 638	1 294	1 069	921	827		
Projections 2021	3 926	2 794	2 125	1 551	1 206	1 005	874	794	742	
Projections 2023	4 367	3 041	2 289	1 645	1 259	1 045	903	819	765	704
Projections 2025	4 565	3 223	2 450	1 803	1 445	1 210	1 053	963	904	834
Difference 2025/23	197	182	161	158	185	165	150	144	139	130

The revision is largely due to the inclusion of additional CH_4 emission sources within category 5.D.1, in particular aerobic centralised wastewater treatment plants, domestic wastewater treatment plants, as well as indirect CH_4 emissions from aquatic environments. This methodological change, implemented in accordance with the IPCC 2019 Refinement, has led to an upward revision of CH_4 emissions from this source over the whole time series (e.g. +164 kt CO_2eq in 2023), and to an opposite trend compared to the previous submissions (1990-2023: -44%).

Only minor revisions were reported for the other categories due to updated historical activity data on deposited and biologically treated waste amounts, N freights and connection rates, as provided in the annual GHG inventory (UMWELTBUNDESAMT 2025a), which slightly changed the basis for extrapolation. Moreover, slightly updated statistics on future population numbers (STATISTIK AUSTRIA 2024c) became available.

ABBREVIATIONS

AEA	Austrian Energy Agency
AWMS	Animal Waste Management Systems
B7	Blended diesel with 7% biodiesel (volumetric)
BEV	Battery Electric Vehicle
BFW	Bundesamt und Forschungszentrum für Wald Austrian Federal Office and Research Centre for Forests
BMLFUW	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft Federal Ministry of Agriculture, Forestry, Environment and Water Management
BMUJF	Bundesministerium für Umwelt, Jugend und Familie Federal Ministry for Environment, Youth and Family (before 2000, Environment is now included with: BMLFUW)
BMNT	Bundesministerium für Nachhaltigkeit und Tourismus Federal Ministry of Sustainability and Tourism
BMWA	Bundesministerium für Wirtschaft und Arbeit Federal Ministry for Economic Affairs and Labour (renamed as BMWFJ)
BMWFJ	Bundesministerium für Wirtschaft, Familie und Jugend Federal Ministry of Economy, Family and Youth (formerly BMWA)
BMWFW	Bundesministerium für Wissenschaft, Forschung und Wirtschaft (formerly BMWFJ)
CHP	Combined Heat and Power
CRT	Common Reporting Table (UNFCCC)
E5	Blended gasoline with 5% ethanol (volumetric)
E10	Blended gasoline with 10% ethanol (volumetric)
EEG	Energy Economics Group
EU	European Union
GDP	Gross Domestic Product
Gg	Gigagramme
GHG	Greenhouse Gas
GWh	Gigawatt hours

GWP	Global Warming Potential
HEV	Hybrid Electric Vehicle
HVO	Hydrotreated Vegetable Oil
IPCC	Intergovernmental Panel on Climate Change
LEAP	Long-range Energy Alternatives Planning System
LTO	Landing/Take-off Cycle
LULUCF	Land Use, Land-Use Change and Forestry – IPCC-CRT Category 5
Mt	Megatonne
NDC	National Determined Contribution
NFI	National Forest Inventory
NIR	National Inventory Report
NRMM	Non-Road Mobile Machinery
OLI	Österreichische Luftschadstoff-Inventur (Austrian Air Emission Inventory)
PAM	Policies and Measures
PHEV	Plug-in Hybrid Vehicle
QA/QC	Quality Assurance/Quality Control
QMS	Quality Management System
SNAP	Selected Nomenclature on Air Pollutants
SVO	Straight Vegetable Oil
Tg	Teragramme
UFI	Umweltförderung im Inland (Domestic Environmental Support Scheme)
UNFCCC	United Nations Framework Convention on Climate Change
WAM	Scenario ‘with additional measures’
WEM	Scenario ‘with existing measures’
WIFO	Österreichisches Wirtschaftsforschungsinstitut (Austrian Institute of Economic Research)

Greenhouse gases

CH_4 ..... methane

CO_2 ..... carbon dioxide

N_2O ..... nitrous oxide

HFC ..... hydrofluorocarbons

PFC ..... perfluorocarbons

SF_6 ..... sulphur hexafluoride

NF_3 ..... nitrogen trifluoride

Notation Keys

According to UNFCCC guidelines on reporting and review (FCCC/CP/2002/8)

'NO' (not occurring)	for activities or processes in a particular source or sink category that do not occur within a country;
'NE' (not estimated)	for existing greenhouse gas emissions by sources and removals by sinks which have not been estimated. Where 'NE' is used in an inventory for emissions or removals of CO_2, CH_4, N_2O, HFCs, PFCs, or SF_6, the Party should indicate why emissions or removals have not been estimated (see Annex III);
'NA' (not applicable)	for activities in a given source/sink category that do not result in emissions or removals of a specific gas. If categories in the CRT for which 'NA' is applicable are shaded, they do not need to be filled in;
'IE' (included elsewhere)	for emissions by sources and removals by sinks of greenhouse gases estimated but included elsewhere in the inventory instead of the expected source/sink category. Where 'IE' is used in an inventory, the Annex I Party should indicate, using the CRF completeness table, where in the inventory the emissions or removals from the displaced source/sink category have been included and the Annex I Party should explain such a deviation from the expected category;
'C' (confidential)	for emissions by sources and removals by sinks of greenhouse gases which could lead to the disclosure of confidential information, given the provisions of paragraph 27 mentioned above.

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ANNEX 1: EMISSIONS

Table 35: CO_2 emissions in 2023 and projections 2025–2050 (Umweltbundesamt).

CO_2 [kt]	2023	2025	2030	2035	2040	2050
Total excluding LULUCF	56 909	57 892	50 460	45 224	40 611	33 273
Total including LULUCF	64 232	59 756	46 273	40 475	37 595	31 930
1.Energy	43 233	44 310	39 599	34 461	29 898	23 744
A. Fuel Combustion	43 159	44 235	39 522	34 382	29 833	23 679
1. Energy Industries	7 182	7 667	6 943	7 519	8 241	8 909
a. Public Electricity and Heat production	4 447	4 768	4 407	4 935	5 529	6 416
b. Petroleum Refining	2 580	2 671	2 391	2 436	2 587	2 368
c. Manufacture of Solid Fuels and Other Energy Industries	155	229	145	147	125	125
2. Manufacturing Industries and Construction	9 499	10 635	10 222	9 933	9 972	9 968
3. Transport	19 597	19 384	16 953	12 227	7 636	2 293
a. Domestic Aviation	30	34	34	30	26	15
b. Road Transportation	19 388	19 028	16 571	11 832	7 223	1 846
c. Railways	73	79	85	81	77	69
d. Domestic Navigation	69	70	72	74	76	79
e. Other Transportation	36	173	190	211	234	284
4. Other Sectors	6 854	6 521	5 376	4 678	3 962	2 497
a. Commercial/Institutional	1 010	1 030	827	676	530	251
b. Residential	5 025	4 663	3 736	3 204	2 647	1 478
c. Agriculture/Forestry/Fisheries	820	829	814	798	785	768
5. Other	27	28	28	25	22	12
B. Fugitive Emissions from Fuels	74	75	77	78	65	65
1. Solid Fuels	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	74	75	77	78	65	65
2. Industrial Processes & Product Use	13 526	13 437	10 711	10 612	10 561	9 382
A. Mineral Products	2 561	2 910	2 885	2 848	2 849	2 816
B. Chemical Industry	589	659	599	602	604	597
C. Metal Production	10 214	9 700	7 061	7 012	6 963	5 827
D. Non-energy products from fuels and solvent use	162	167	166	150	143	143
E. Electronics industry	NO	NO	NO	NO	NO	NO
F. Product uses as substitutes for ODS	NO	NO	NO	NO	NO	NO
G. Other product manufacture and use	0	0	0	0	0	0
3. Agriculture	148	144	148	149	150	145
4. Land Use, Land-Use Change and Forestry	7 323	1 863	-4 187	-4 749	-3 016	-1 343
5. Waste	2	2	2	2	2	2
C. Incineration and open burning of waste	2	2	2	2	2	2

Table 36: CH_4 emissions in 2023 and projections 2025–2050 (Umweltbundesamt).

CH_4 [kt]	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total excluding LULUCF	246.15	238.40	214.38	209.68	205.86	193.39
Total including LULUCF	247.49	239.72	215.70	211.00	207.18	194.71
1. Energy	24.15	24.00	21.66	19.68	17.50	14.06
A. Fuel Combustion Activities	12.26	12.34	11.57	10.65	9.68	7.75
1. Energy Industries	0.96	1.15	1.08	1.04	1.01	0.93
2. Manufacturing Industries and Construction	0.77	0.77	0.83	0.83	0.85	0.88
3. Transport	0.80	0.79	0.68	0.46	0.27	0.09
4. Other Sectors	9.74	9.64	8.98	8.32	7.54	5.85
5. Other	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	11.89	11.66	10.09	9.03	7.82	6.30
2. Industrial Processes & Product Use	2.14	2.14	2.13	2.13	2.14	2.15
B. Chemical Industry	1.89	1.89	1.95	1.96	1.97	1.98
3. Agriculture	181.79	177.27	161.31	161.90	162.48	156.07
A. Enteric Fermentation	153.29	149.14	135.10	135.88	136.67	131.46
1. Cattle	143.70	140.00	127.74	128.91	130.09	126.11
2. Sheep	3.75	3.54	2.57	2.47	2.38	1.96
3. Swine	2.18	2.16	2.02	1.83	1.64	1.21
4. Other	3.67	3.44	2.77	2.67	2.57	2.18
B. Manure Management	28.49	28.13	26.21	26.02	25.81	24.61
1. CH_4 Emissions	28.49	28.13	26.21	26.02	25.81	24.61
1. Cattle	23.74	23.46	21.93	22.13	22.31	22.01
2. Sheep	0.09	0.08	0.06	0.06	0.06	0.05
3. Swine	3.98	3.94	3.67	3.30	2.94	2.13
4. Other	0.69	0.65	0.56	0.53	0.51	0.43
5. Waste	38.08	34.99	29.28	25.96	23.74	21.10
A. Solid Waste Disposal	28.55	25.73	20.64	17.35	15.18	12.69
B. Biological Treatment of Solid Waste	2.74	2.60	2.26	2.28	2.29	2.32
C. Incineration and Open Burning of Waste	0.01	0.01	0.01	0.01	0.01	0.01
D. Waste Water Treatment and Discharge	6.78	6.66	6.38	6.33	6.26	6.08

Table 37: N_2O emissions in 2023 and projections 2025–2050 (Umweltbundesamt).

N_2O [kt]	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total excluding LULUCF	11.61	11.70	11.34	11.11	10.85	10.07
Total including LULUCF	12.25	12.32	11.89	11.61	11.33	10.57
1. Energy	2.05	2.11	2.02	1.78	1.54	1.22
A. Fuel Combustion Activities	2.05	2.11	2.02	1.78	1.54	1.22
1. Energy Industries	0.31	0.39	0.36	0.34	0.33	0.29
2. Manufacturing Industries and Construction	0.42	0.44	0.45	0.46	0.47	0.50
3. Transport	0.84	0.84	0.78	0.59	0.38	0.12
4. Other Sectors	0.47	0.45	0.42	0.39	0.35	0.30
5. Other	0.00	0.00	0.00	0.00	0.00	0.00
2. Industrial Processes & Product Use	0.26	0.24	0.24	0.25	0.25	0.25
B. Chemical Industry	0.10	0.12	0.12	0.12	0.13	0.13
G. Other Product Manufacture and Use	0.15	0.12	0.12	0.12	0.12	0.12
3. Agriculture	8.45	8.49	8.21	8.19	8.17	7.70
B. Manure Management	1.74	1.70	1.54	1.52	1.49	1.36
2. N_2O Emissions	1.74	1.70	1.54	1.52	1.49	1.36
1. Cattle	0.95	0.92	0.84	0.84	0.84	0.80
2. Sheep	0.04	0.03	0.02	0.02	0.02	0.02
3. Swine	0.21	0.22	0.20	0.19	0.17	0.12
4. Other	0.10	0.09	0.07	0.07	0.07	0.06
5. Indirect N_2O Emissions	0.44	0.44	0.41	0.40	0.39	0.36
D. Agricultural Soils	6.71	6.79	6.66	6.68	6.68	6.34
1. Direct N_2O Emissions from Managed Soils	5.29	5.38	5.31	5.32	5.32	5.05
2. Indirect N_2O emissions from Managed Soils	1.42	1.41	1.35	1.35	1.36	1.29
5. Waste	0.86	0.86	0.87	0.88	0.89	0.91
B. Biological Treatment of Solid Waste	0.27	0.27	0.27	0.28	0.28	0.28
C. Incineration and Open Burning of Waste	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste Water Treatment and Discharge	0.58	0.59	0.60	0.61	0.62	0.63

Table 38: HFC, PFC SF_6 and NF_3 emissions in 2023 and projections 2025–2050 (Umweltbundesamt).

HFC [kt CO_2e]	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Total	1 402	1 258	1 102	661	300	102
2. Industrial Processes & Product Use	1 402	1 258	1 102	661	300	102
E. Electronics Industry	1	1	1	1	1	1
F. Consumption of Halocarbons and SF_6	1 400	1 256	1 100	660	299	100
PFC [kt CO_2e]						
Total	26	26	26	26	26	26
2. Industrial Processes & Product Use	26	26	26	26	26	26
E. Electronics Industry	26	26	26	26	26	26
SF_6 [kt CO_2e]						
Total	372	230	76	67	60	49
2. Industrial Processes & Product Use	372	230	76	67	60	49
E. Electronics Industry	13	13	13	13	13	13
G. Other Product Manufacture and Use	357	215	60	54	47	36
NF_3 [kt CO_2e]						
Total	18	18	18	18	18	18
2. Industrial Processes & Product Use	18	18	18	18	18	18
E. Electronics Industry	18	18	18	18	18	18

ANNEX 2: KEY PARAMETERS FOR SECTORAL SCENARIOS

Energy Industries

Table 39: Projected fuel input into main activity power and heat plants – scenario "with existing measures". (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Bituminous/Anthracite coal	0	0	0	0	0
Residual fuel oil	1 942	2 664	2 717	2 234	1 748
Natural gas	57 458	62 917	57 166	67 550	78 703
Waste	9 090	9 147	8 256	8 118	8 021
Biomass	59 509	75 134	69 788	64 556	59 673
Hydropower	145 254	152 988	168 394	162 138	166 063
Wind power	28 932	42 027	60 540	64 713	65 169
Photovoltaics	23 021	24 105	47 087	51 364	52 571
Geothermal	996	2 651	6 771	9 112	11 156

Table 40: Projected fuel input into main activity power and heat plants – scenario "with additional measures". (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Bituminous/Anthracite coal	0	0	0	0	0
Residual fuel oil	1 942	0	0	0	0
Natural gas	57 458	76 177	42 298	33 371	31 665
Waste	9 090	8 609	8 609	8 609	8 609
Biomass	59 509	78 536	95 939	106 430	100 330
Hydropower	145 254	153 702	167 189	170 463	172 922
Wind power	28 932	41 487	68 904	77 945	87 025
Photovoltaics	23 021	29 361	68 916	87 846	106 835
Geothermal	996	607	5 323	6 666	11 041

Manufacturing Industries and Construction

Table 41: Projected fuel input into autoproducer power and heat plants – scenario "with existing measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Bituminous/Anthracite coal	17 822	17 695	12 099	12 009	11 922
Residual fuel oil	7 181	7 596	6 755	5 832	5 154
Natural gas	7 214	8 021	8 671	9 054	9 432
Waste	7 061	7 086	7 104	7 123	7 146
Biomass	21 486	24 435	26 215	28 167	30 077
Hydropower	1 167	1 125	1 125	1 125	1 125
Wind power	0	0	0	0	0
Photovoltaics	0	0	0	0	0
Geothermal	115	139	150	165	181

Table 42: Projected fuel input into autoproducer power and heat plants – scenario "with additional measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Bituminous/Anthracite coal	17 822	19 698	13 813	13 912	6 983
Residual fuel oil	7 181	10 019	10 555	6 673	5 512
Natural gas	7 214	12 483	12 759	13 266	13 843
Waste	7 061	6 524	6 525	6 528	6 530
Biomass	21 486	22 587	23 468	25 135	27 866
Hydropower	1 167	953	953	953	953
Wind power	0	0	0	0	0
Photovoltaics	0	0	0	0	0
Geothermal	115	156	220	243	266

Table 43: Final energy demand of industry – scenario "with existing measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Coal without coke	1 983	2 994	2 212	2 059	2 144
Coke	7 210	6 192	5 201	5 146	5 095
Light fuel oil	3 204	676	711	773	847
Heavy fuel oil	602	2 125	1 779	1 636	1 542
Other petr. products	13 207	11 693	12 639	13 185	13 802
Natural gas	96 552	116 602	111 884	109 623	108 434
Derived gas	4 386	4 248	4 306	4 291	4 276
Waste	10 185	11 890	12 733	11 625	12 090
Biomass	53 554	61 865	67 745	69 575	71 104
Electricity	84 806	100 537	109 675	112 683	115 405
Heat	10 094	11 655	14 551	16 807	18 926
Hydrogen	0	15	996	4 916	4 409

Table 44: Final energy demand of industry – scenario "with additional measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Coal without coke	4 170	4 082	4 022	3 691	3 176
Coke	6 675	6 687	5 839	5 860	3 903
Light fuel oil	1 448	702	644	486	470
Heavy fuel oil	1 617	1 537	1 212	1 521	1 364
Other petr. products	15 096	14 883	14 584	15 655	15 621
Natural gas	106 351	103 299	75 661	59 365	56 569
Derived gas	4 186	4 166	4 118	4 119	4 120
Waste	11 493	10 503	9 124	9 823	9 229
Biomass	57 000	57 571	66 269	68 329	65 989
Electricity	105 948	108 463	106 321	111 554	106 627
Heat	11 621	12 790	29 130	31 403	32 069
Hydrogen	0	0	6 697	4 472	10 066

Transport

Table 45: Energy consumption of mobile sources by fuel – scenario "with existing measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Gasoline fossil	64 673	64 481	59 216	26 442	7 199
Diesel fossil	208 671	227 239	200 007	106 804	54 428
Bioethanol	4 180	3 363	3 089	1 379	375
Biodiesel	14 424	12 967	11 413	6 095	3 106
Vegetable oil	2 122	2 938	2 938	2 938	2 938
HVO – Vegetable oil		848	2 294	10 441	15 226
BIO ETBE	79	542	498	222	61
LPG	1 092	66	42	17	7
Natural gas	25	539	341	136	54
Biogas		17	17	17	17
H2		0	1 490	12 119	20 935
Coal	3	3	3	2	1
Electricity rail	5 173	7 510	8 397	8 814	9 274
Electricity road transport		4 512	14 889	63 169	90 493
Aviation jet fuel	36 903	41 499	40 663	28 725	13 073
e-Fuels		0	303	4 350	15 226

Table 46: Energy consumption of mobile sources by fuel – scenario "with additional measures" (Umweltbundesamt).

Energy [TJ]	2023	2025	2030	2040	2050
Gasoline fossil	64 673	65 577	57 348	40 807	25 815
Diesel fossil	208 671	221 957	171 877	126 491	86 620
Bioethanol	4 180	3 667	2 950	2 149	1 451
Biodiesel	14 424	13 855	12 332	9 238	6 797
Vegetable oil	2 122	4 901	15 596	15 962	17 038
HVO – Vegetable oil		703	2 227	6 494	10 391
BIO ETBE	79	407	328	239	161
LPG	1 092	0	0	0	0
Natural gas	25	234	224	218	221
Biogas		23	23	24	25
H2		0	1 417	4 991	11 155
Coal	3	3	3	3	2
Electricity rail	5 173	8 866	10 298	11 202	11 670
Electricity road transport		5 102	14 757	34 438	56 979
Aviation jet fuel	36 903	34 461	39 499	34 637	29 441
e-Fuels		0	1 519	3 139	4 131

Other Sectors (1.A.4)

Table 47: Final energy demand of 1.A.4 Other Sectors – scenario "with existing measures".

Energy [TJ]	2023	2025	2030	2040	2050
Coal	302	233	142	61	2
Oil	31 988	28 240	21 096	12 600	3 575
Gas	63 954	62 829	52 128	38 621	24 806
Biomass	79 866	75 008	71 911	61 791	50 271
District heat	58 677	67 356	71 253	76 077	76 970
Solar and ambient heat	30 491	29 277	38 005	50 607	66 118
Electricity	122 453	122 712	125 955	135 013	150 962
Fuels for mobile sources	12 626	12 911	12 842	12 666	12 629
Total	**400 356**	**398 566**	**393 332**	**387 436**	**385 334**

Table 48: Final energy demand of 1.A.4 Other Sectors – scenario "with additional measures".

Energy [TJ]	2023	2025	2030	2040	2050
Coal	302	365	95	11	13
Oil	31 988	35 593	22 150	3 759	147
Gas	63 954	60 524	39 101	12 774	505
of which: Natural gas	*63 954*	*60 524*	*38 954*	*12 720*	*482*
of which: Hydrogen	*NO*	*NO*	*147*	*53*	*23*
Biomass	79 866	70 245	77 594	71 269	57 590
of which: Biogas, sewage sludge gas and landfill gas	*NE*	*190*	*2 922*	*2 244*	*5 974*
of which: Other biomass	*79 866*	*70 055*	*74 672*	*69 025*	*51 616*
District heat	58 677	75 852	81 326	85 425	80 855
Solar and ambient heat	30 491	23 614	37 146	58 314	73 961
Electricity	122 453	121 135	120 521	127 488	134 487
Fuels for mobile sources	12 626	13 127	13 043	12 879	12 857
Total	**400 356**	**400 455**	**390 976**	**371 918**	**360 415**

Table 49: Assumptions for energy prices for households and commercial – scenario "with existing measures".

Price, real [€ 2023/MWh]		2023	2025	2030	2040	2050
Coal		83	74	95	93	99
Heating oil and other gas oil		150	135	163	174	178
Natural gas		172	131	140	135	148
Wood logs and wood briquettes	standard	79	73	73	76	80
	cheap	52	48	45	47	49
Wood chips	standard	54	48	56	58	61
	cheap	36	34	35	37	38
Wood pellets		98	86	70	73	77
Electricity		92	77	83	87	91
District heat		58	38	42	44	46

Table 50: Assumptions for energy prices for households and commercial – scenario "with additional measures".

Price, real [€ 2023/MWh]		2023	2025	2030	2040	2050
Coal		83	74	96	107	117
Heating oil and other gas oil		150	152	169	176	188
Natural gas		172	155	148	154	160
Wood logs and wood briquettes	standard	79	73	58	64	70
	cheap	52	48	38	42	46
Wood chips	standard	54	48	42	47	52
	cheap	36	34	30	33	36
Wood pellets		98	86	66	72	80
Electricity		92	77	87	91	90
District heat		58	38	38	39	40

Table 51: Assumptions for the number and size of buildings, and the number of permanently occupied dwellings – scenario "with existing measures".

Assumption	Unit	2023	2025	2030	2040	2050
Number of residential buildings	**[number in 1 000]**	**2 143**	**2 173**	**2 249**	**2 392**	**2 517**
with one or two apartments	[number in 1 000]	1 871	1 897	1 964	2 088	2 197
with three to ten apartments	[number in 1 000]	182	184	191	203	213
with more than ten apartments	[number in 1 000]	91	92	95	101	106
Number of commercial buildings	**[number in 1 000]**	**194**	**195**	**202**	**214**	**228**
Wholesale and retail trade, hotel and restaurant buildings	[number in 1 000]	67	67	69	73	78
Public administration, entertainment, education, hospital or institutional care buildings	[number in 1 000]	36	36	37	39	41
Other non-residential service buildings	[number in 1 000]	59	59	62	65	70
Partially and unheated halls, workshops, etc.	[number in 1 000]	33	33	34	37	39
Gross floor area of residential buildings	**[million m² gross floor area]**	**566**	**575**	**597**	**640**	**679**
with one or two apartments	[million m² gross floor area]	322	327	340	365	387
with three to ten apartments	[million m² gross floor area]	98	99	103	111	117
with more than ten apartments	[million m² gross floor area]	146	148	154	165	175
Gross floor area of commercial buildings	**[million m² gross floor area]**	**182**	**182**	**189**	**200**	**213**
Wholesale and retail trade, hotel and restaurant buildings	[million m² gross floor area]	71	71	73	78	83
Public administration, entertainment, education, hospital or institutional care buildings	[million m² gross floor area]	47	47	49	51	54
Other non-residential service buildings	[million m² gross floor area]	46	47	48	51	55
Partially and unheated halls, workshops, etc.	[million m² gross floor area]	18	18	19	20	21
Number of dwellings	**[number in 1 000]**	**4 841**	**4 910**	**5 082**	**5 405**	**5 686**
Permanently occupied dwellings	[number in 1 000]	4 095	4 145	4 269	4 495	4 682
Secondary residence dwellings (and dwellings w/o residence)	[number in 1 000]	746	765	813	910	1 004

Table 52: Assumptions for the number and size of buildings, and the number of permanently occupied dwellings – scenario "with additional measures".

Assumption	Unit	2023	2025	2030	2040	2050
Number of residential buildings	**[number in 1 000]**	**1 958**	**1 992**	**2 076**	**2 243**	**2 405**
with one or two apartments	[number in 1 000]	1 730	1 760	1 834	1 982	2 124
with three to ten apartments	[number in 1 000]	151	154	160	173	186
with more than ten apartments	[number in 1 000]	77	78	82	88	95
Number of commercial buildings	**[number in 1 000]**	**157**	**160**	**166**	**180**	**195**
Wholesale and retail trade, hotel and restaurant buildings	[number in 1 000]	65	66	69	74	80
Public administration, entertainment, education, hospital or institutional care buildings	[number in 1 000]	25	25	26	29	31
Other non-residential service buildings	[number in 1 000]	43	44	45	49	53
Partially heated and unheated halls, workshops, etc.	[number in 1 000]	25	25	26	28	30
Gross floor area of residential buildings	**[million m² gross floor area]**	**501**	**511**	**535**	**583**	**630**
with one or two apartments	[million m² gross floor area]	295	301	315	344	371
with three to ten apartments	[million m² gross floor area]	82	83	87	95	102
with more than ten apartments	[million m² gross floor area]	124	127	133	145	156
Gross floor area of commercial buildings	**[million m² gross floor area]**	**146**	**149**	**155**	**168**	**182**
Wholesale and retail trade, hotel and restaurant buildings	[million m² gross floor area]	65	66	69	74	80
Public administration, entertainment, education, hospital or institutional care buildings	[million m² gross floor area]	36	36	38	41	44
Other non-residential service buildings	[million m² gross floor area]	34	34	36	39	42
Partially heated and unheated halls, workshops, etc.	[million m² gross floor area]	12	12	13	14	15
Number of dwellings	**[number in 1 000]**	**4 227**	**4 300**	**4 483**	**4 843**	**5 192**
Permanently occupied dwellings	[number in 1 000]	4 084	4 140	4 274	4 527	4 762
Secondary residence dwellings	[number in 1 000]	143	160	208	315	430

Table 53: Final energy demand for heating, – scenario "with existing measures".

Final energy consumption	**Unit**	**2023**	**2025**	**2030**	**2040**	**2050**
Residential buildings	**[kWh/m².a]**	**112**	**112**	**106**	**94**	**84**
with one or two apartments	[kWh/m².a]	125	125	117	102	89
with three to ten apartments	[kWh/m².a]	106	107	102	93	85
with more than ten apartments	[kWh/m².a]	88	89	85	78	71
Commercial buildings	**[kWh/m².a]**	**92**	**91**	**87**	**80**	**73**
Wholesale and retail trade, hotel and restaurant buildings	[kWh/m².a]	103	102	98	90	81
Public administration, entertainment, education, hospital or institutional care buildings	[kWh/m².a]	98	96	93	85	77
Other non-residential service buildings	[kWh/m².a]	84	83	79	73	65
Partially and unheated halls, workshops, etc.	[kWh/m².a]	54	54	52	49	46

Table 54: Final energy demand for heating, – scenario "with additional measures".

Final energy consumption	**Unit**	**2023**	**2025**	**2030**	**2040**	**2050**
Residential buildings	**[kWh/m².a]**	**127**	**126**	**119**	**102**	**89**
with one or two apartments	[kWh/m².a]	135	133	125	105	90
with three to ten apartments	[kWh/m².a]	130	129	122	106	95
with more than ten apartments	[kWh/m².a]	107	106	101	91	83
Commercial buildings	**[kWh/m².a]**	**128**	**123**	**113**	**93**	**77**
Wholesale and retail trade, hotel and restaurant buildings	[kWh/m².a]	129	125	115	96	79
Public administration, entertainment, education, hospital or institutional care buildings	[kWh/m².a]	167	161	147	119	98
Other non-residential service buildings	[kWh/m².a]	117	113	104	87	72
Partially and unheated halls, workshops, etc.	[kWh/m².a]	31	30	28	24	21

Table 55: Thermal renovation rates – scenario "with existing measures".

Thermal renovation rate	Unit	2023	2025	2030	2040	2050
Residential buildings	**[%]**	**0.7**	**0.9**	**1.0**	**1.5**	**1.7**
with one or two apartments	[%]	0.6	0.9	1.0	1.7	1.9
with three to ten apartments	[%]	0.7	0.8	0.9	1.1	1.4
with more than ten apartments	[%]	1.0	1.0	1.1	1.2	1.3
Commercial buildings	**[%]**	**0.3**	**0.3**	**0.4**	**0.7**	**0.8**
Wholesale and retail trade, hotel and restaurant buildings	[%]	0.3	0.3	0.3	0.7	0.8
Public administration, entertainment, education, hospital or institutional care buildings	[%]	0.4	0.5	0.4	0.9	1.0
Other non-residential service buildings	[%]	0.2	0.2	0.2	0.5	0.7
Partially and unheated halls, workshops, etc.	[%]	0.4	0.4	0.6	1.1	1.0

Thermal renovation rate is expressed as the proportion of newly renovated gross floor space to the total gross floor space in the year in which the measures are performed.

Table 56: Thermal renovation rates – scenario "with additional measures".

Thermal renovation rate	Unit	2023	2025	2030	2040	2050
Residential buildings	**[%]**	**0.7**	**1.0**	**1.4**	**1.9**	**1.6**
with one or two apartments	[%]	0.6	1.0	1.4	2.2	1.7
with three to ten apartments	[%]	0.7	1.0	1.3	1.6	1.4
with more than ten apartments	[%]	0.9	1.1	1.3	1.5	1.4
Commercial buildings	**[%]**	**0.6**	**0.9**	**1.2**	**1.4**	**1.3**
Wholesale and retail trade, hotel and restaurant buildings	[%]	0.5	0.9	1.2	1.4	1.2
Public administration, entertainment, education, hospital or institutional care buildings	[%]	1.0	1.3	1.5	1.5	1.4
Other non-residential service buildings	[%]	0.5	0.8	1.0	1.1	1.1
Partially and unheated halls, workshops, etc.	[%]	0.1	0.4	1.0	2.1	1.8

Thermal renovation rate is expressed as the proportion of newly renovated gross floor space to the total gross floor space in the year in which the measures are performed.

Table 57: Boiler exchange rates – scenario "with existing measures".

Boiler exchange rate	Unit	2023	2025	2030	2040	2050
Residential buildings	**[%]**	**4.6**	**4.1**	**1.7**	**2.5**	**2.8**
with one or two apartments	[%]	NE	NE	NE	NE	NE
with three to ten apartments	[%]	NE	NE	NE	NE	NE
with more than ten apartments	[%]	NE	NE	NE	NE	NE
Commercial buildings	**[%]**	**3.6**	**3.1**	**1.1**	**1.8**	**2.2**
Wholesale and retail trade, hotel and restaurant buildings	[%]	NE	NE	NE	NE	NE
Public administration, entertainment, education, hospital or institutional care buildings	[%]	NE	NE	NE	NE	NE
Other non-residential service buildings	[%]	NE	NE	NE	NE	NE
Partially and unheated halls, workshops, etc.	[%]	NE	NE	NE	NE	NE

Boiler exchange rate is expressed as the proportion of the gross floor space with the boiler exchange to the total gross floor space in the year in which the measures are performed.

Table 58: Boiler exchange rates – scenario "with additional measures".

Boiler exchange rate	Unit	2023	2025	2030	2040	2050
Residential buildings	**[%]**	**2.5**	**2.9**	**3.1**	**2.5**	**2.4**
with one or two apartments	[%]	NE	NE	NE	NE	NE
with three to ten apartments	[%]	NE	NE	NE	NE	NE
with more than ten apartments	[%]	NE	NE	NE	NE	NE
Commercial buildings	**[%]**	**1.8**	**2.3**	**2.3**	**1.7**	**2.0**
Wholesale and retail trade, hotel and restaurant buildings	[%]	NE	NE	NE	NE	NE
Public administration, entertainment, education, hospital or institutional care buildings	[%]	NE	NE	NE	NE	NE
Other non-residential service buildings	[%]	NE	NE	NE	NE	NE
Partially and unheated halls, workshops, etc.	[%]	NE	NE	NE	NE	NE

Boiler exchange rate is expressed as the proportion of the gross floor space with the boiler exchange to the total gross floor space in the year in which the measures are performed.

Fugitive Emissions from Fuels

Table 59: Activity data for the calculation of fugitive emissions - scenario "with existing measures".

	2023	2025	2030	2040	2050
Gas pipeline length [km]	7 232	7 236	6 085	5 371	4 799
Gas distribution network [km]	30 655	30 625	25 754	22 735	20 314
Natural gas production [million m³]	543	536	479	320	319
Refinery crude oil input [PJ]	207	174	134	111	93
Natural gas storage [million m³]	351	367	344	283	260

Table 60: Activity data for the calculation of fugitive emissions - scenario "with additional measures".

	2023	2025	2030	2040	2050
Gas pipeline length [km]	7 232	7 236	5 813	4 548	4 098
Gas distribution network [km]	30 655	30 625	24 605	19 250	17 344
Natural gas production [million m³]	543	676	479	320	319
Refinery crude oil input [PJ]	207	167	120	83	71
Natural gas storage [million m³]	351	367	344	283	260

Agriculture

Table 61: Livestock population cattle for 2023 and projections 2025–2050 – scenario "with existing measures" (Umweltbundesamt).

Year	Population size [heads]	
	Dairy (WEM)	Non-Dairy (WEM)
2023	543 032	1 292 437
2025	524 769	1 262 789
2030	469 564	1 155 652
2035	473 797	1 153 340
2040	478 031	1 151 028
2050	461 324	1 093 473

Table 62: Livestock population cattle for 2023 and projections 2025–2050 – scenario "with additional measures" (Umweltbundesamt).

Year	Population size [heads]	
	Dairy (WAM)	Non-Dairy (WAM)
2023	543 032	1 292 437
2025	523 031	1 258 146
2030	459 138	1 127 798
2035	460 099	1 117 581
2040	461 060	1 107 363
2050	434 058	1 023 840

Table 63: Livestock population other animals for 2023 and projections 2025–2050 – scenario "with existing measures" (Umweltbundesamt).

	Population size [heads]					
Year	Swine	Sheep	Goats	Poultry	Horses	Deer
2023	2 233 290	391 868	96 941	19 749 825	140 000	50 502
2025	2 216 271	370 538	88 396	18 759 363	130 432	48 892
2030	2 062 739	268 534	51 323	16 283 209	106 513	44 869
2035	1 850 215	258 588	50 885	15 287 468	101 769	44 477
2040	1 637 691	248 642	50 447	14 291 726	97 025	44 086
2050	1 158 200	205 165	47 553	11 863 542	78 702	41 266

Table 64: Livestock population other animals for 2023 and projections 2025–2050 – scenario "with additional measures" (Umweltbundesamt).

	Population size [heads]					
Year	Swine	Sheep	Goats	Poultry	Horses	Deer
2023	2 233 290	391 868	96 941	19 749 825	140 000	50 502
2025	2 210 047	369 102	88 133	18 587 693	129 733	48 670
2030	2 025 392	259 917	49 746	15 682 363	104 064	44 089
2035	1 807 865	248 426	49 092	14 725 274	98 659	43 484
2040	1 590 338	236 935	48 438	13 768 185	93 255	42 878
2050	1 110 942	190 124	44 211	11 165 375	74 097	39 315

Table 65: Milk production and mineral fertiliser use for 2023 and projections (2025–2050) – scenario "with existing measures" (Umweltbundesamt).

	Ø milk yield per dairy cow (kg/yr)					
Year	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Ø milk yield per dairy cow (kg/yr)	7 287	7 498	8 024	8 393	8 762	9 500
Mineral fertiliser use (t N/year)	93 853	103 490	111 184	114 358	117 532	115 429

Table 66: Milk production and mineral fertiliser use for 2023 and projections (2025–2050) – scenario "with additional measures" (Umweltbundesamt).

	Ø milk yield per dairy cow (kg/yr)					
Year	**2023**	**2025**	**2030**	**2035**	**2040**	**2050**
Ø milk yield per dairy cow (kg/yr)	7 287	7 498	8 024	8 393	8 762	9 500
Mineral fertiliser use (t N/year)	93 853	98 858	83 388	86 979	90 571	89 544

ANNEX 3: USE OF NOTATION KEY "IE"

In the following section, the use of the notation key 'IE' within the submitted 'GovReg_Proj_T1a_T1b_T5a_T5b template is explained.

1B/1B2 (N_2O): allocated to 1 A 1 c Petroleum Refining;

2C/2C1 (CH_4, N_2O): allocated to 1 A 2 a Iron and Steel;

4I/4J (N_2O): all direct and indirect N_2O emissions are reported in the respective land use category.

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This report presents information on greenhouse gas emission projections for Austria and relevant policies and measures, according to reporting obligations as defined in Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action. It includes greenhouse gas projections for the coming years up to 2050 and describes the policies and measures to reduce emissions from each source.

The results include two different scenarios: the scenario “with existing measures” takes into account climate change mitigation measures implemented by 30 June 2024. It shows a decrease of 48 % in greenhouse gases from 1990 to 2050. The scenario “with additional measures” incorporates the planned policies and measures outlined in Austria’s Integrated National Energy and Climate Plan (December 2024). Within this scenario a decrease of 68 % is projected for 2050.

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