umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Austria's Annual Greenhouse Gas Inventory 1990–2023

Submission under Regulation (EU) No 2018/1999

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The accreditation scope of the IBE is listed on: akkreditierung-austria.gv.at/overview. The specific underlying standards for the results presented in this report are outlined in Chapter 4.3 of this report.
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VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten der Emissionen von Treibhausgasen (THG) Österreichs. Diese Daten betreffen die Emissionen des Jahres 2023 sowie die aktualisierte Zeitreihe der Jahre 1990 bis 2022. Damit liefert der Bericht Emissionsdaten für das dritte Jahr der Zielperiode 2021-2030 unter der Effort-Sharing-Verordnung (ESR, 2018/842/EU, i.d.F. 2023/857/EU[1]).

Der Bericht wird in Erfüllung der Governance Regulation (EU) 2018/1999[2] erstellt, welche in Artikel 26 („Annual Reporting") sowie in ihrer Durchführungsverordnung (EU) 2020/1208[3] die Anforderungen an Inhalt und Format festlegt. Neben den neuen THG-Emissionsdaten im Format der „Common Reporting Tables" (CRT) sowie des dazugehörigen Berichts werden zur Erfüllung der Berichtspflicht zusätzliche Informationselemente übermittelt, u.a. zur Umsetzung von Empfehlungen aus den Reviews, Unsicherheiten, Indikatoren und Konsistenzchecks. Die Umsetzung der Berichtsanforderungen wird gemäß Artikel 8 (2) bzw. Annex VII der Durchführungsverordnung[3] in Chapter 6 dargestellt.

Eine detaillierte Darstellung der Daten im Format der Common Reporting Tables (CRT) wird der Europäischen Kommission in digitaler Form übermittelt. Die Berichtsanhänge gemäß Durchführungsverordnung[3] sind nicht direkter Bestandteil des vorliegenden Berichts, sondern werden der Europäischen Kommission ebenfalls separat in elektronischer Form übermittelt (EIONET/CDR).

Rechtlicher Hintergrund

Als Vertragsstaat der Klimarahmenkonvention (*Rahmenübereinkommen der Vereinten Nationen über Klimaänderungen* (UN Framework Convention on Climate Change – UNFCCC, BGBl. Nr. 414/1994[4]) ist Österreich verpflichtet, jährlich seine Emissionen und Senken bezüglich der direkten Treibhausgase CO_2, CH_4, N_2O, HFC, PFC, SF_6 und NF_3, sowie der indirekten Treibhausgase NO_x, NMVOC, CO und SO_2 zu erheben und zu berichten. Die dafür anzuwendende Methodik ist in einem umfassenden Regelwerk entsprechend den Beschlüssen der Vertragsstaatenkonferenz der UNFCCC festgelegt. Seit 2024

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[1] VERORDNUNG (EU) 2023/857 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 19. April 2023 zur Änderung der Verordnung (EU) 2018/842 zur Festlegung verbindlicher nationaler Jahresziele für die Reduzierung der Treibhausgasemissionen im Zeitraum 2021 bis 2030 als Beitrag zu Klimaschutzmaßnahmen zwecks Erfüllung der Verpflichtungen aus dem Übereinkommen von Paris sowie zur Änderung der Verordnung (EU) 2018/1999.

[2] VERORDNUNG (EU) 2018/1999 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 11. Dezember 2018 über das Governance-System für die Energieunion und für den Klimaschutz, zur Änderung der Verordnungen (EG) Nr. 663/2009 und (EG) Nr. 715/2009 des Europäischen Parlaments und des Rates, der Richtlinien 94/22/EG, 98/70/EG, 2009/31/EG, 2009/73,/EG, 2010/31/EU, 2012/27/EU und 2013/30/EU des Europäischen Parlaments und des Rates, der Richtlinien 2009/119/EG und (EU) 2015/652 des Rates und zur Aufhebung der Verordnung (EU) Nr. 525/2013 des Europäischen Parlaments und des Rates.

[3] DURCHFÜHRUNGSVERORDNUNG (EU) 2020/1208 DER KOMMISSION vom 7. August 2020 über die Struktur, das Format, die Verfahren für die Vorlage und die Überprüfung der von den Mitgliedstaaten gemäß der Verordnung (EU) 2018/1999 des Europäischen Parlaments und des Rates gemeldeten Informationen und zur Aufhebung der Durchführungsverordnung (EU) Nr. 749/2014 der Kommission.

[4] BGBl. Nr. 414/1994: Rahmenübereinkommen der Vereinten Nationen über Klimaänderungen samt Anlagen. Änderung durch BGBl. III Nr. 12/1999.
http://www.ris.bka.gv.at/Dokumente/BgblPdf/1994_414_0/1994_414_0.pdf
http://www.ris.bka.gv.at/Dokumente/BgblPdf/1999_12_3/1999_12_3.pdf

erfolgt die Berichtspflicht im Rahmen des ‚Enhanced Transparency Framework' (ETF) unter dem Übereinkommen von Paris.

Auch die Europäische Union (EU) ist Vertragsstaat der Klimarahmenkonvention. Die EU Inventur wird aus der Summe der Mitgliedsstaaten-Inventuren errechnet. Deshalb hat die EU mit dem o. g. THG-Überwachungssystem die Anforderungen, die an die EU gestellt werden, an die Mitgliedsstaaten weitergegeben und diese dazu verpflichtet, sämtliche Daten und Informationen, die für die Erstellung der EU Inventur benötigt werden, rechtzeitig zur Verfügung zu stellen. Mit dem vorliegenden Bericht kommt Österreich dieser Berichtspflicht nach.

Die Erhebung der Daten berücksichtigt außerdem die Ergebnisse der jährlichen Überprüfung durch internationale FachexpertInnen im Rahmen der so genannten UNFCCC-Reviews. Eine solche Tiefenprüfung fand zuletzt als Centralized Review von 18.09.-22.09.2023 statt, und wurde erfolgreich abgeschlossen[5]. Auch im Enhanced Transparency Framework (ETF) unter dem Übereinkommen von Paris ist vorgesehen, dass die nationalen Inventuren jährlich im Auftrag des Klimasekretariats der UNFCCC durch externe Expert:innen (Technical Expert Review Team) geprüft werden. Die Tiefenprüfung kann als Desk Review, Centralized Review oder In-Country Review durchgeführt werden, wobei letzterer zumindest zwei Mal in zehn Jahren zu erfolgen hat[6]. In Jahren, in denen kein Biennial Transparency Report (BTR) zu übermitteln ist, werden vereinfachte Überprüfungen (Simplified Reviews) durchgeführt.

Auf EU-Ebene wird die österreichische THG-Inventur zusätzlich jährlich überprüft. 2024 konnten alle der im Rahmen der ‚initial checks' aufgeworfenen Fragen geklärt werden.

Tabelle A: Jährlicher Prozess zur Erstellung und Überarbeitung der THG Inventur.

15. Jänner *(Jahr n)*	Übermittlung der THG-Inventur an die EK (Short-NID und CRTs für die Jahre 1990 bis zum Jahr n-2)
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten (CRT) und des Dokuments zur nationalen Inventur (NID) durch die EEA im Rahmen der „initial QA/QC checks". Ein ‚comprehensive review' gemäß Artikel 38(1) der EU Governance Regulation ist für die Jahre 2025[7], 2027 und 2032 vorgesehen.
15. März *(Jahr n)*	Übermittlung der nationalen THG-Inventur (Dokument zur nationalen Inventur – NID, und CRTs) für die Jahre 1990 bis zum Jahr n-2 an die EK
15. April *(Jahr n)*	Übermittlung der nationalen THG-Inventur (Dokument zur nationalen Inventur – NID, und CRTs) für die Jahre 1990 bis zum Jahr n-2 an die UNFCCC
Juni *(Jahr n)* bis März *(Jahr n+1)*	Überprüfung der Daten durch die UNFCCC: • Stufe 1: Initial Check • Stufe 2: Synthesis and Assessment • Stufe 3: Individual Review
bis 15. Jänner *(Jahr n +1)*	Berücksichtigung der Verbesserungsvorschläge der EK und der UNFCCC bei der Erstellung der neuen THG-Inventur

[5] https://unfccc.int/sites/default/files/resource/arr2023_AUT.pdf

[6] Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session, held in Katowice from 2 to 15 December 2018 (Decision 18/CMA.1, annex. para. 158)

[7] The 2025 comprehensive review will form the basis for the AEAs for the years 2026 to 2030.

Zur Erfüllung der Anforderungen, die sich aus der Klimarahmenkonvention und vor allem dem Inkrafttreten des Kyoto-Protokolls[8] ergeben haben, wurde ein Nationales System eingerichtet. Ziel war es, die Qualität der Inventur sicherzustellen und kontinuierlich zu verbessern. Dazu wurde ein Gesamtkonzept für das Nationale Inventur System Austria (NISA) entwickelt, das auf der *Österreichischen Luftschadstoff-Inventur* (OLI) als zentralem Kern aufbaut. Ein umfassendes Inventurverbesserungsprogramm und ein Qualitätsmanagementsystem entsprechend ISO/IEC 17020 sind ein wesentlicher Teil des NISA[9].

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998[10] erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z.15 unter anderem die Aufgabe übertragen, fachliche Grundlagen zur Erfüllung des Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen zu erstellen. In § 6 (2) Z.20 werden die Entwicklung und Führung von Inventuren und Bilanzen zur Dokumentation des Zustandes und der Entwicklung der Umwelt sowie der Umweltbelastungen und ihrer Ursachen ausdrücklich als besondere Aufgaben des Umweltbundesamtes genannt. Dieser Aufgabe wird mit der Erstellung sowie der jährlichen Aktualisierung der *Österreichischen Luftschadstoff-Inventur* (OLI) gemäß den in den relevanten internationalen Übereinkommen vereinbarten Richtlinien vom Umweltbundesamt nachgekommen. Die OLI deckt sowohl Treibhausgasemissionen, als auch Emissionen sonstiger Luftschadstoffe ab und ist damit u. a. die Datenbasis für die Erstellung des vorliegenden Berichts. Um eine vergleichbare Zeitreihe zur Verfügung zu haben wird die OLI erforderlichenfalls auch für zurückliegende Jahre aktualisiert. Die in diesem Bericht dargestellten Emissionsdaten ersetzen somit die publizierten Daten vorhergehender Berichte.

Tabelle B: Datengrundlage des vorliegenden Berichts.

Inventur	Datenstand	Berichtsformat
OLI 2024	15. Jänner 2025	Common Reporting Tables (CRT)

Hinweis:

Die in diesem Bericht dargestellten Emissionen in t CO_2-Äquivalent wurden mittels Anwendung der Global Warming Potentials („GWPs“) gemäß 5. Sachstandsbericht („AR5“ – „5th Assessment Report“) des Zwischenstaatlichen Ausschusses für Klimaänderungen (IPCC)[11] ermittelt. Damit erfüllt Österreich die ab 2023 geltenden Anforderungen der EU Governance Regulation[12] an THG-Inventuren,

[8] http://unfccc.int/kyoto_protocol/items/2830.php

[9] Umweltbundesamt (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna.

[10] https://www.ris.bka.gv.at/Dokumente/BgblPdf/1998_152_1/1998_152_1.pdf

[11] Klimaänderung 2013: Die physikalischen wissenschaftlichen Grundlagen. Beitrag der Arbeitsgruppe I zum Fünften Sachstandsbericht des Zwischenstaatlichen Ausschusses für Klimaänderungen, Appendix 8.A. https://www.ipcc.ch/assessment-report/ar5/

[12] VERORDNUNG (EU) 2018/1999 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 11. Dezember 2018 über das Governance-System für die Energieunion und für den Klimaschutz, zur Änderung der Verordnungen (EG) Nr. 663/2009 und (EG) Nr. 715/2009 des Europäischen Parlaments und des Rates, der Richtlinien 94/22/EG, 98/70/EG, 2009/31/EG, 2009/73,/EG, 2010/31/EU, 2012/27/EU und 2013/30/EU des Europäischen Parlaments und des Rates, der Richtlinien 2009/119/EG und (EU) 2015/652 des Rates und zur Aufhebung der Verordnung (EU) Nr. 525/2013 des Europäischen Parlaments und des Rates.

die in ihrer Delegierten Verordnung 2020/1044[13] Artikel 2 („Treibhausgaspotentiale") eine Verwendung der in Anhang 1 dieser Verordnung angeführten Treibhausgaspotentiale gemäß AR5 vorschreibt.

[13] DELEGIERTE VERORDNUNG (EU) 2020/1044 DER KOMMISSION vom 8. Mai 2020 zur Ergänzung der Verordnung (EU) 2018/1999 des Europäischen Parlaments und des Rates im Hinblick auf die Werte für Treibhauspotenziale und die Inventarleitlinien und im Hinblick auf das Inventarsystem der Union sowie zur Aufhebung der Delegierten Verordnung (EU) Nr. 666/2014 der Kommission

1 INTRODUCTION

This report presents the latest results from the Austrian greenhouse gas (GHG) inventory, which documents the annual national GHG emissions for the years 1990 to 2023. By documenting annual emissions up to and including the year 2023, the report presents GHG data for the first three years of the target period under the current EU Effort-Sharing-Regulation (ESR, Regulation (EU) 2018/842, as amended (EU) 2023/857[14]) covering greenhouse gas emissions for sectors not covered by the emissions trading system.

The greenhouse gas inventory is submitted to the European Commission by the Austrian Federal Government in fulfilment of Austria's obligations under Article 26 of Regulation (EU) No 218/1999 ("*Governance Regulation*")[15] governing reporting of greenhouse gas inventory data by Member States from 2023 onwards. The purpose of this regulation is to monitor anthropogenic greenhouse gas emissions and to evaluate the progress towards meeting the Union greenhouse gas reduction commitments in accordance with the Paris Agreement.

According to the above mentioned regulation and the reporting requirements, which are in accordance with those under UNFCCC, Member States are obliged to determine their anthropogenic emissions by sources and removals by sinks by applying the methods described in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*[16]. Furthermore, Member States are required to submit information in accordance with the *Reporting Guidelines (Decision 24/CP.19)*[17] established by the Conference of the Parties to the UNFCCC.

The national greenhouse gas inventory has to be submitted to the European Commission (EC) every year no later than 15 January. Member States have to submit elements of their national inventory reports (covering CRTs and a National Inventory Document) and inventory information as listed in Annex V referred to in Article 26(3) on 'Annual Reporting' of the EU Governance Regulation[14].

The 15 January submission includes preliminary data. Finalized data including potential revisions and complemented with a comprehensive national inventory document (NID) will be submitted by 15 March 2025.

The elements of the 'Short-NID' are based on the information items referred to in Article 26 (3) and more specifically in Annex V, Part 1 (GHG Inventories Information) of Regulation (EU) 2018/1999[15] (Governance Regulation). In addition to the Governance Regulation, a Commission Implementing

[14] REGULATION (EU) 2023/857 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999

[15] 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, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

[16] http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[17] http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=2
http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf

Regulation (EU) 2020/1208[18] was adopted, specifying the reporting obligations and providing templates. Information demonstrating that Austria's submission fulfils the obligations as included in Articles 9 to 23 Chapter III of the Commission Implementing Regulation (EU) 2020/1208 is provided in chapter 6.

The complete tables of the Common Reporting Tables (CRTs), including in particular Sectoral Reports, Sectoral Background Tables and the Reference Approach for CO_2 are submitted separately in digital form only[19].

Table 1: Status of the present report.

Reporting Obligation	Format	Inventory	Version
Governance Regulation	Common Reporting Tables (CRT)	OLI 2024	January 15th 2025

Geographical coverage is complete. There is no part of the Austrian territory not covered by the inventory. Emissions are estimated for most sources, as specified in the CRT. Information on sources not estimated ('NE') and emissions included under sources other than those stipulated in the CRT ('IE') are included in CRT Table 9 on *Completeness*.

Note:

The CO_2-equivalent emissions presented in this report were calculated by applying the Global Warming Potentials ('GWPs') according to the 5th Assessment Report ('AR5')[20] of the Intergovernmental Panel on Climate Change (IPCC)[21]. Thus, Austria fulfils the requirements of the EU Governance Regulation on GHG inventories applicable from 2023 onwards, which, by means of its Delegated Regulation 2020/1044[22] Article 2 ('Greenhouse Gas Potentials'), requires the use of the GHG potentials listed in Annex 1 of this Regulation in accordance with AR5.

[18] 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 and repealing Commission Implementing Regulation (EU) No 749/2014

[19] http://cdr.eionet.europa.eu/at/eu/AT%20GHG/coluq7lfw/envuq7obg

[20] DELEGIERTE VERORDNUNG (EU) 2020/1044 DER KOMMISSION vom 8. Mai 2020 zur Ergänzung der Verordnung (EU) 2018/1999 des Europäischen Parlaments und des Rates im Hinblick auf die Werte für Treibhauspotenziale und die Inventarleitlinien und im Hinblick auf das Inventarsystem der Union sowie zur Aufhebung der Delegierten Verordnung (EU) Nr. 666/2014 der Kommission

[21] IPCC – Intergovernmental Panel on Climate Change (2013): Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

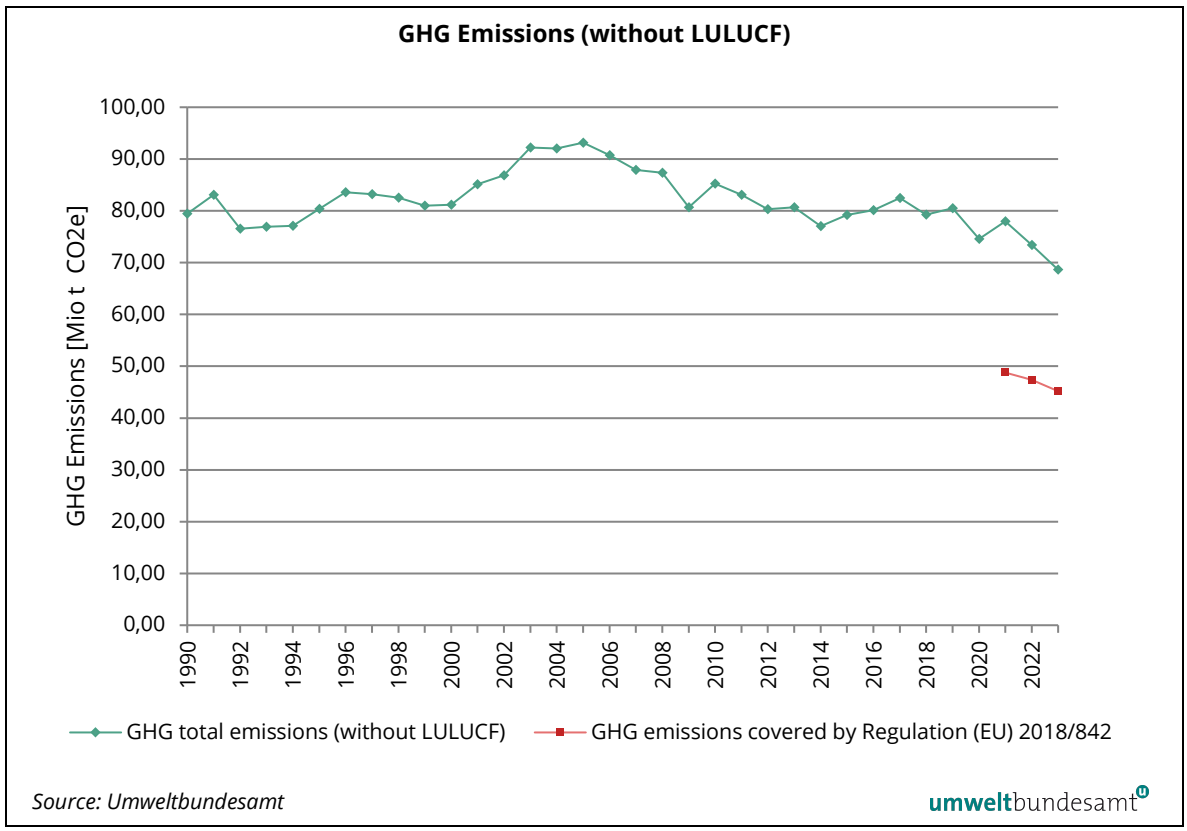
[22] COMMISSION DELEGATED REGULATION (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation (EU) No 666/2014

2 EMISSION TRENDS

2.1 Overview

In 2023 Austria's total greenhouse gas (GHG) emissions (without Land Use, Land Use Change and Forestry – LULUCF) amounted to 68.6 Mt CO_2 equivalents (CO_2e). Compared to the 1990 base year[23], 2023 GHG emissions without LULUCF decreased by 13.6%. Compared to 2022, GHG emissions decreased by 6.5%.

Figure 1: Trend in GHG emissions for 1990-2023 without LULUCF.



Greenhouse gas emissions covered by Regulation (EU) No. 2018/842 ('Effort Sharing Regulation') amounted to 44 191 415 t CO_2 equivalents in 2023, and were thus below the level of the annual emission allocation (AEA) for that year (see Table 2).

[23] Austria's base year under the UNFCCC is 1990. Under the EU Effort Sharing, the base year is 2005 (relates only to emissions not included in the EU Emissions Trading Scheme). Unless otherwise specified, references to the base year in this report refer always to 1990.

Table 2: GHG Emissions (covered by the ESR) and status of ESR-target achievement

t CO_2-Äquivalent (AR5)	**2021**	**2022**	**2023**
Total GHG emissions without LULUCF	77 976 474	73 439 218	68 635 452
Total verified emissions from stationary installations under Directive 2003/87/EC2	28 703 349	26 626 258	24 413 630
Total ESR emissions[24]	49 249 205 *	46 783 324 *	44 191 415 *
Annual Emission Allocations (AEA) pursuant to Article 4(3) of Regulation (EU) 2018/842, as amended 2023/857[25]	48 768 448	47 402 495	45 181 662
Difference between AEA and reported total ESR emissions	−480 757	+619 171	+990 247

* *Defined as: Total greenhouse gas emissions without LULUCF minus total verified emissions from stationary installations under Directive 2003/87/EC ('ETS emissions') minus CO_2 emissions from 1.A.3.a civil aviation.*

Table 2 shows that Austria's ESR emissions in 2023 are around 1 million t CO_2 equivalents below the level of the annual emission allocation (AEA) for that year.

2.2 Trend description

The largest decreases in emissions between 2022 and 2023 took place in the sectors *Energy (CRT 1)* (−3 983 kt CO_2e; −8.2%) and *Industrial Processes and Product Use (CRT 2)* (−698 kt CO_2e; −4.3%).

The main reasons for the emissions decrease in sector *Energy (CRT 1)* were the lower consumption of natural gas in industrial production (category *1.A.2 Manufacturing Industries and Construction)*, the lower natural gas and gasoil consumption in category *1.A.4 Other Sectors* as well as a decrease in diesel sales (category *1.A.3 Transport)*.

The emissions decrease in *Industrial Processes and Product Use (CRT 2)* was mainly due to a decrease in production, in particular in the cement-, and iron and steel production. The main driver for this reduction was the increased energy costs resulting from the geopolitical situation.

Emissions from *Agriculture (CRT 3)* decreased slightly by 1.0% (−78 kt CO_2e) from 2022 to 2023, mainly due to falling emissions from mineral fertilizer application caused by high prices, as well as lower livestock numbers, in particular cattle.

Net removals from *LULUCF (CRT 4)* amounting to −217 kt CO_2e in 2022 turned to a net emission source in 2023 (+7 515 kt CO_2e). However, it should be noted that the annual variations of the

[24] GHG emissions covered by Regulation (EU) 2018/842

[25] as included in Annex II of COMMISSION IMPLEMENTING DECISION (EU) 2023/1319 of 28 June 2023 amending Implementing Decision (EU) 2020/2126 to revise Member States' annual emission allocations for the period from 2023 to 2030.

LULUCF category (both positive and negative) are very high over the entire 1990-2023 time series (refer to section 2.2.4).

The declining emission trend of recent decades continues for the *Waste sector (CRT 5)* with a further decline by 3.8% (−45 kt CO_2e) mainly due to the decreasing carbon content of waste deposited in preceding years.

Table 3: Summary of Austria's anthropogenic greenhouse gas emissions by sector.

GHG source and sink categories	1. Energy	2. IPPU	3. Agriculture	4. LULUCF	5. Waste	6. Other
	CO_2 equivalents (kt)					
1990	52,835	13,641	8,585	-13,768	4,367	NO
1995	54,329	13,631	8,358	-18,401	4,055	NO
2000	55,459	14,454	8,019	-18,052	3,277	NO
2005	66,889	15,651	7,585	-15,228	3,041	NO
2010	59,453	15,965	7,578	-11,767	2,289	NO
2011	57,141	16,161	7,648	-11,051	2,143	NO
2012	54,997	15,728	7,586	-9,166	2,016	NO
2013	55,169	16,096	7,572	-5,020	1,873	NO
2014	51,439	16,171	7,700	-9,830	1,747	NO
2015	53,218	16,610	7,728	-4,115	1,644	NO
2016	54,441	16,321	7,843	-8,138	1,546	NO
2017	56,154	17,077	7,780	-4,429	1,457	NO
2018	54,708	15,499	7,701	1,828	1,381	NO
2019	55,093	16,469	7,616	5,990	1,329	NO
2020	50,142	15,516	7,624	-964	1,278	NO
2021	52,042	17,023	7,681	-3,372	1,230	NO
2022	48,434	16,161	7,670	-217	1,174	NO
2023	44,451	15,463	7,592	7,515	1,129	NO

* *not occurring*

The most important gas in the Austrian GHG balance remains carbon dioxide (CO_2) with a share of 83% of total 2023 emissions (without LULUCF). Emissions of CO_2 primarily result from combustion activities. Methane (CH_4), which mainly arises from livestock farming and waste disposal, contributes 9.8% to total national GHG emissions. Nitrous oxide (N_2O), with agricultural soils as the main source, contributes another 4.6% in 2023. The remaining 2.6% are emissions of fluorinated compounds, which are mostly emitted from the use of these gases as substitutes for ozone depleting substances (ODS) in refrigeration equipment.

Table 4: Austria's anthropogenic greenhouse gas emissions (without LULUCF) by gas.

GHG emissions	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
	CO_2 equivalents (kt)						
1990	62,191	11,566	4,120	2.0	1,063	485	NO,NA
1995	64,063	10,765	4,002	328	75	1,134	6.0
2000	66,204	9,469	4,165	688	80	592	9.8
2005	79,095	8,779	3,508	1,097	150	509	26
2010	72,000	8,187	3,221	1,455	71	346	3.9
2011	69,892	7,954	3,307	1,554	66	317	3.8
2012	67,260	7,818	3,270	1,604	46	321	8.0
2013	67,759	7,696	3,239	1,647	45	315	9.1
2014	64,159	7,535	3,313	1,669	48	324	9.9
2015	66,358	7,447	3,322	1,698	45	319	13
2016	67,219	7,370	3,405	1,700	46	405	5.7
2017	69,602	7,334	3,333	1,736	40	412	11
2018	66,567	7,125	3,308	1,847	30	398	15
2019	67,952	7,002	3,307	1,749	35	450	13
2020	62,180	6,915	3,270	1,699	27	454	14
2021	65,752	6,945	3,319	1,555	24	368	15
2022	61,455	6,841	3,235	1,506	24	362	16
2023	56,909	6,726	3,182	1,402	26	372	18

The dominant sector (excluding LULUCF) causing most GHG emissions in Austria is *1 Energy*, causing 65% of the total national GHG emissions in 2023 (67% in 1990), followed by the sectors *2 Industrial Processes and Other Product Use* (23% in 2023) and *3 Agriculture* (11% in 2023).

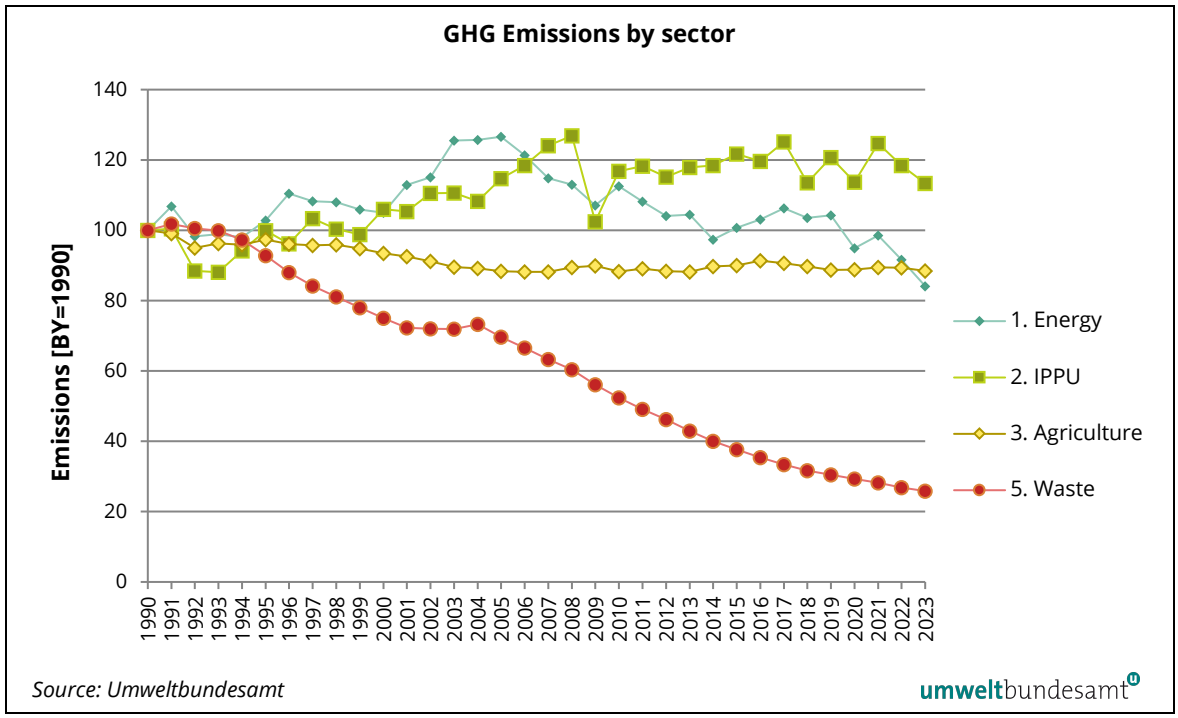
Table 5: Austria's greenhouse gas emissions (without LULUCF) for 1990 and 2023 expressed as aggregate levels and trends, as well as respective sector contributions.

GHG	1990	2023	Trend 1990–2023	1990	2023
	Emissions [kt CO_2e]			Share [%]	
Total	**79 427**	**68 635**	**−13.6%**	**100%**	**100%**
1 Energy	52,835	44,451	-16%	67%	65%
2 IPPU	13,641	15,463	+13%	17%	23%
3 Agriculture	8,585	7,592	-12%	11%	11%
5 Waste	4,367	1,129	−74%	5.5%	1.6%

Total emissions without emissions from sector LULUCF

The only sector with 2023 GHG emissions above the level in 1990 is *2 Industrial Processes and Other Product Use* (+13%; +1 823 kt CO_2e). All other sectors show decreasing trends in GHG emissions: sector *5 Waste* (−74%; −3 238 kt CO_2e), sector *1 Energy* (–16%; −8 383 kt CO_2e) and sector *3 Agriculture* (−12%; −993 kt CO_2e).

Figure 2: Trend in 1990-2023 emissions by sector in index form (1990 = 100).



A more detailed description and interpretation of emissions trends per sector is given in the following sub-chapters.

2.2.1 Energy

In 2023, greenhouse gas emissions from sector *1 Energy* amounted to 44 451 kt CO_2 equivalents, which corresponds to 65% of total national emissions without LULUCF. Emissions from fuel combustion (*1.A*) contribute 99% of total Energy emissions, while fugitive emissions from fuels (*1.B*) are of minor importance.

The most important **sub-category** of *1.A Fuel Combustion Activities* is *1.A.3 Transport* with a share of 45% in 2023, followed by *1.A.2 Manufacturing Industries and Construction* (22%), *1.A.4 Other Sectors* (16%) and the sub-category *1.A.1 Energy Industries* (16%). The most important **greenhouse gas** is CO_2, contributing 97.3% to total sectoral GHG emissions, followed by CH_4 (1.5%) and N_2O (1.2%).

From 2022 to 2023, emissions from sector *1.A Fuel Combustion Activities* decreased by 8.2% (−3 955 kt CO_2e). The main drivers of the trend were the categories *1.A.2 Manufacturing Industries and Construction* (−1 107 kt CO_2e) due to lower consumption of natural gas and *1.A.4 Other Sectors* (−1 042 kt CO_2e) due to lower gasoil (−24%) and natural gas (−6.0%) consumption.

Between 2022 and 2023, emissions from *1.A.3 Transport* decreased by 4.4% (−924 kt CO_2e), which was mainly due to lower diesel sales (−5.1%).

Emissions of the category *1.A.4 Other Sectors* decreased by 13% mainly due to the replacement of fossil fuel heating systems. Heating degree days in 2023 were 3.1% lower than in 2022.

The overall trend of greenhouse gas emissions of the *Energy* sector shows 16% lower emissions for 2023 compared to 1990 although emissions from *1.A.3.b Road transport* are 46% higher than in 1990. Year to year variations are mainly due to the following factors:

- Weather circumstances in the corresponding years (in particular cold or mild winters, and/or dry or wet summers) which affect the heating demand, and the availability of electricity from hydro and wind power plants
- Economic situation as reflected in the gross domestic product (GDP)
- Change in power generation (switch from coal to gas)

Sub-category trends between 1990 and 2023

In 2023, emissions from sub-category ***1.A.1 Energy Industries*** were 48% below the level in 1990. Emissions from power plants have generally been decreasing since 2005, mainly because of the growing contribution of renewable energy sources, the substitution of solid and liquid fossil fuels by natural gas and biomass, as well as improvements in efficiency.

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 increased from 69% in 1990 to 86% in 2023. Electricity consumption has increased by 44% since 1990 and since 2002 the increase in consumption has largely been covered by electricity imports, with the exception of 2023, when a small net export of electricity occurred.

Energy related GHG emissions from ***1.A.2 Manufacturing Industries and Construction*** increased by 0.2% from 1990 to 2023. 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% in that 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.

The category ***1.A.3 Transport*** showed an increase in GHG emissions since 1990 (+42%) mainly due to an increase of road performance (mileage) of diesel cars and freight transport. In addition to the increase of road performance **within** Austria, the amount of fuel sold in Austria but **used elsewhere** – an effect called "fuel export" mainly caused by a lower fuel tax compared to Austria's neighbouring countries – has increased considerably since 1990. Between 2005 and 2012 total GHG emissions decreased due to lower amounts of fuel sold together with an increased use of biofuels for blending and the gradual replacement with newer vehicles with lower specific fuel consumption. Since then, GHG emissions from transport have been **gradually increasing** with rising traffic volumes. In the pandemic year 2020 a sharp decrease of emissions was observed followed by an increase due to a slight economic recovery in 2021. Since then the GHG emissions show a de-

creasing 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 due to reduced milage of heavy duty vehicles on inland roads and abroad with Austrian fuel (fuel exports).

The variation in demand for heating and hot water generation due to climatic circumstances and the shift in the fuel mix are important drivers for emissions from the category ***1.A.4 Other Sectors***. Emissions in 2023 were 49% lower than in 1990. This reduction is mainly attributable to the displacement 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 decreasing trend in the number of heating degree-days. This development is supported by increased energy performance of buildings (thermal renovation, energy-efficient new buildings). Total fuel consumption of this sub-category has decreased by 24% since 1990.

Emissions from ***1.B Fugitive emissions*** decreased by 57% since 1990. This is mainly due to the progressive closure of coal mines up 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 volumes of crude oil and crude gas produced have declined in recent years.

2.2.2 Industrial Processes and Product Use

In 2023, greenhouse gas emissions from *Industrial Processes and Product Use* amounted to 15 463 kt CO_2 equivalent, which corresponds to 23% of total national emissions.

The most important **categories** of this sector are the *metal industry* and *mineral industry*, generating 66% and 17% of total sectoral emissions, respectively. The most important **greenhouse gas** of this sector is CO_2 with a contribution of 87% to 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% mainly due to a decrease in cement-, (−16% of emissions) as well as 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. Within this period, emissions were at minimum in 1993 then increased until peaking in 2008 followed by a significant dip in 2009. Since then, emissions fluctuated just around the mean of these two years. **Main drivers** for 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 impacts 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 of HFC emissions over the 1990-2018 period from 2 to 1 847 kt CO_2 equivalents.

Sub-category trends between 1990 and 2023

The largest increase in GHG emissions between 1990 and 2023 can be observed in the *metal industry* (+23%) due to an increase in GHG emissions from iron and steel production. In the categories *mineral industry* and *chemical industry*, GHG emissions declined over the same period by 18% and

54%, respectively. Emissions from *non-energy products from fuels and solvent use* dropped by 54%, due to legal measures controlling the solvent content of products and their use.

Emissions of *fluorinated gases* increased by 17% compared to 1990, driven by increasing emissions of HFCs (+326% since 1995) due to HFCs replacing Ozone Depleting Substances (ODSs) as cooling agents. The maximum was reached in 2018; since then emissions are decreasing.

2.2.3 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: in 2023, 74% (8.9 kt N_2O) of total N_2O emissions and 76% (182 kt CH_4) of total CH_4 emissions originated from this sector. Total GHG emissions from the sector *Agriculture* are dominated by CH_4, with a share of 67%, and N_2O, with a share of 31%. CO_2 emissions account for 1.9% of the emissions from this sector.

From 2022 to 2023 GHG emissions decreased slightly by 1.0%, mainly due to falling emissions from mineral fertilizer application (−7.4%). The reasons for this reduction are lower sales volumes due to the pandemic and the war in the Ukraine, which lead to higher energy and raw material prices also affecting the fertilizer market. Additionally, livestock numbers of cattle (−1.4%) fell in 2023 resulting in lower GHG emissions from enteric fermentation. Swine, sheep and goat numbers decreased as well (−5.0%, −2.2% and −2.1%, respectively).

The **overall trend** in GHG emissions from *Agriculture* shows a decrease of 12% from 1990 to 2023. The **main drivers** for this trend are decreasing livestock numbers of cattle and swine as well as lower amounts of N-fertilizers applied on agricultural soils.

2.2.4 Land Use, Land Use Change and Forestry (LULUCF)

In 2023, the LULUCF sector represented a significant net emission source. The *LULUCF* net emissions in 2023 amounted to 7 515 kt CO_2 equivalent, which correspond to 11% of national total GHG emissions (without LULUCF) in the same year.

With regard to the **overall trend**, the net removals from *LULUCF* significantly decreased across time since the 90-ies and even turned to a source of net emissions in single recent years (2018, 2019, 2023) with substantial annual variations over the observed period. According to a regression trend over the time series, the decrease of net removals between 1990 and 2023 is about 100 %. The **main driver** for this trend is the biomass and soil carbon stock changes in *Forest land*. Fluctuations are due to weather conditions, which influence growth rates (e.g. very low increment in years of draughts) as well as decay in forest soils, biomass losses and salvage loggings due to natural disturbances (more wind throws and bark beetle infestations in recent years), timber demand and prices (e.g. very high harvest rates in 2007 and 2008).

The **most important category** is *Forest land (4.A)* with net emissions of 5 399 kt CO_2 equivalent in 2023.

The *LULUCF* sector and the *Forest land* category represent net GHG sources in single years, namely in 2018, 2019 and 2023. The net source values in these years are explained by high harvest rates due to natural disturbances, low increments as well as soil carbon stock losses due to weather conditions. The results of the most recent years are based on an update using intermediate NFI results for these years and an updated YASSO modelling run including also these NFI results for the most recent years. By that, the LULUCF results of the submission 2025, which is relevant for defining the LULUCF budget for the period 2026-2029, should be based on the most recent and representative results for the years 2021 to 2023.

Harvested Wood Products (4.G) is the only sink category in 2023 and contributed –678 kt CO_2 equivalent.

Together, CH_4 and N_2O emissions amounted to 197 kt CO_2 equivalent (including indirect emissions). Total net emissions arising from the other non-forest categories (excluding HWPs) amounted to 2 794 kt CO_2 equivalent in 2023 (including indirect emissions).

2.2.5 Waste

In 2023, greenhouse gas emissions from the sector *Waste* amounted to 1 129 kt CO_2 equivalent, which correspond to 1.6% of total national emissions.

The most important category of *Waste* is *solid waste disposal*, which caused 71% of the emissions from this sector in 2023, followed by *waste water treatment and discharge* (16%) and *biological treatment of solid waste* (13%). The most important greenhouse gas is CH_4 with a share of 80% in emissions, mainly arising from *solid waste disposal*. N_2O accounts for 20% of GHG emissions from this sector.

From 2022 to 2023 GHG emissions continued to decrease (−3.8%) mainly due to the decreasing carbon content of waste deposited in preceding years.

The **overall trend** in GHG emissions from *Waste* is decreasing, with a decrease of 74% from 1990 to 2023. The **main driver** for this trend is the implementation of waste management policies: Waste separation, reuse and recycling activities have increased since 1990 and the amount of disposed waste has decreased correspondingly especially since 2004 when pre-treatment of waste became obligatory (although some exceptions were granted to some Austrian provinces). The legal basis for the reduced disposal of waste as well as the landfill gas recovery is the Landfill Ordinance. Since 2009 all waste with high organic content has to be pre-treated before deposition (without exceptions). Furthermore, methane recovery from landfills was implemented in the 1990s and continues since.

3 RECALCULATIONS

The Austrian greenhouse gas inventory is subject to continuous improvement. An inventory improvement programme is a formal part of the Quality Management System (QMS) of the National Inventory System (see chapter 4). This programme enhances transparency and enables monitoring of findings on the quality of activity data, emission factors, methods and other relevant technical elements of the national inventory raised by the review experts of the EU ESR (formerly ESD) and the UNFCCC, and/or other external expert assessments. Any findings and discrepancies are documented; responsibilities, resources and a time schedule for implementation of measures and improvements (incl. recalculations) are included for each of them in the improvement plan (specified for each sector).

This chapter describes the changes in the emissions estimates made since the last submission to the UNFCCC.

3.1 Implications (level, trend)

Austria's GHG emissions (excl. LULUCF) reported this year in sum differ slightly from the data submitted last year. The national total (excl. LULUCF) for the base year is 0.44% (+345 kt CO_2e) higher, the national total (excl. LULUCF) for 2022 is 0.82% (+595 kt CO_2e) higher than the values submitted last year.

Table 6: Recalculations of Austria's GHG emissions compared to the previous submission.

	National Total GHG emissions without LULUCF			
	OLI 2024	**OLI 2023**	**Recalculation Difference**	
	[kt CO_2e]	**[kt CO_2e]**	**[kt CO_2e]**	**[%]**
1990	79,427	79,083	345	0.44%
1995	80,373	79,986	387	0.48%
2000	81,208	80,640	568	0.70%
2005	93,165	92,605	560	0.60%
2010	85,284	84,793	491	0.58%
2011	83,093	82,607	486	0.59%
2012	80,327	79,889	438	0.55%
2013	80,710	80,310	400	0.50%
2014	77,057	76,721	336	0.44%
2015	79,201	78,935	266	0.34%
2016	80,150	79,863	287	0.36%
2017	82,468	82,195	272	0.33%
2018	79,289	78,903	386	0.49%
2019	80,507	80,058	449	0.56%
2020	74,560	74,030	529	0.72%
2021	77,976	77,360	617	0.80%
2022	73,439	72,844	595	0.82%

National total emissions (excluding LULUCF) for **1990** were revised upwards since last years' submission (+345 kt CO_2e), mainly due to upward revisions in the sectors *1 Energy* and *3 Agriculture*. Under *1 Energy,* a new emission source has been included in the inventory (*1.B.2.b.6 gas post-meter*) leading to higher emissions from this sector over almost the entire time-series. Recalculations for *3 Agriculture* are mainly attributable to the consideration of a recently completed study on livestock feeding, management systems and practices in Austria (PÖLLINGER et al. 2025) affecting emissions from all animal related categories. Furthermore, the 2019 Refinement (IPCC 2019) was applied for the non-key animal categories in *3.A Enteric Fermentation* and for all livestock categories in *3.B Manure Management* having a partly upwards effect on the 1990 emission level.

Emissions for **2022** (without LULUCF) are higher (+595 kt CO_2e) than the values reported in the previous submission, mainly due to revised estimates in the sectors *3 Agriculture* and *2 IPPU*. In sector *3 Agriculture* a new study (PÖLLINGER et al. 2025) was considered, resulting in revised emission data for CH_4 and N_2O in all animal related emission sources. Additionally, the implementation of the 2019 Refinement (IPCC 2019) in the sectors *3.A Enteric Fermentation* (for the non-key animal categories) and *3.B Manure Management (*for all livestock categories) had a partly upwards effect on absolute emissions 2022. In the sector *2 IPPU* the approach of disaggregation of total emissions from iron and steel production in Austria to *1 Energy* and *2 IPPU* was corrected for 2022 resulting in higher emissions reported under *2 IPPU (2.C.1.q)* and lower emissions reported under *1 Energy (1.A.2.a)*. Furthermore, several major improvements in category *2.F* were implemented in this years' inventory, leading to higher emissions for the previous years.

Table 7: Recalculations per sector

	OLI 2024		OLI 2023		Recalculation Difference	
THG	**1990**	**2022**	**1990**	**2022**	**1990**	**2022**
	[kt CO_2e]		**[kt CO_2e]**		**[kt CO_2e]**	
Total*	**79,427**	**73,439**	**79,083**	**72,844**	**+345**	**+595**
1. Energy	52,835	48,434	52,666	48,464	+169	-30
2. IPPU	13,641	16,161	13,633	15,929	+7.5	+232
3. Agriculture	8,585	7,670	8,416	7,277	+168	+393
4. LULUCF	-13,768	-217	-11,682	-4,474	-2,086	+4,256
5. Waste	4,367	1,174	4,367	1,174	–	-0.003

* *without LULUCF*

Estimates for LULUCF were revised for the entire time series (1990: −2 086 kt CO_2e; 2022: +4 256 kt CO_2e) for the following main reasons: The calibration procedure of the YASSO model results for forest soils was further improved and the results of a new study on organic soils in Austria was incorporated. In addition, substantial changes in the LULUCF results of the most recent years were caused by an update of forest biomass increment and drain on the basis of interim results of the national forest inventory for the most recent years.

The following table presents the recalculation difference with respect to last years' submission for each gas (positive values indicate that this years' estimate is higher).

Table 8: Recalculations per gas

	1990 (Base year)	2022
	Recalculation Difference [kt CO_2e]	
Total	**+345**	**+595**
CO_2	+7.5	−35
CH_4	+245	+343
N_2O	+92	+195
HFC, PFC, SF_6, NF_3	–	+92

without LULUCF

For the year 1990 emissions of all gases (CO_2, CH_4 and N_2O) were revised upwards except for the F-Gases. CH_4 shows the strongest increase.

For 2022, emissions of CH_4 and N_2O were revised upwards as well, with methane showing the strongest revision (+343 kt CO_2e) followed by nitrous oxide (+195 kt CO_2e). Emissions of CO_2 however were revised downwards mainly due to energy balance revisions. Revisions in the sector *3 Agriculture* contribute most to the recalculations of the non-CO_2 gas emissions, but also the inclusion of a new emission source category – *1.B.2.b.6 gas post-meter* – in *1.B Fugitive emissions from fuels* has a notable effect on recalculations by increasing CH_4 emissions over the whole time series.

3.2 Sectoral recalculations

The following section provides further explanations for sectoral recalculations. Further background information and a complete description of the recalculations for the period 1990–2022 will be presented in Austria's National Inventory Document 2025 that will be submitted in March 2025.

3.2.1 Energy

3.2.1.1 Stationary sources

Update/Improvement of activity data

Revision of the energy balance

The federal statistics office 'Statistik Austria' revised the energy balance (mainly for the year 2022) with the following **main implications** for energy consumption as used in the inventory and the corresponding CO_2 emissions:

- Natural gas 2022: Gross inland consumption was not revised. The transformation input was revised downwards by 3.7 PJ (−170 kt CO_2 for *1.A.1.a* and −38 kt CO_2 for *1.A.2*) and shifted to final energy consumption. The final energy consumption of *1.A.4.a* and *1.A.4.b* was revised downwards by 0.2 PJ (−13 kt CO_2) and final energy consumption of manufacturing industries was revised upwards by +4.0 PJ (+220 kt CO_2 for *1.A.2*)

- Gas oil 2022: Gross inland consumption was not revised. Around 0.4 PJ (31 kt CO_2) were shifted from the commercial/institutional (*1.A.4.a*) and the residential sector (*1.A.4.b*) to public power and district heating plants (*1.A.1.a*).
- Liquefied natural gas 2022: Around 0.5 PJ (32 kt CO_2) were shifted from manufacturing industries to "non-energy consumption".
- Solid biomass 2022: Final energy consumption was corrected by +5.0 PJ, most of which was allocated to *1.A.4.b*.

Methodological changes

- Natural gas consumption of gas supply companies (reported as transformation input for district heating and already included in public district heating plants *1.A.1.a*) was moved from sector *1.A.1.c* to sector *1.A.2.g* since the year 2011 (approx. 130 kt CO_2 from natural gas in 2022), as the offset quantity had previously been deducted from this sector. This improved consistency with the energy balance at the sector level.
- The revision of process-related CO_2 emissions from steel production (*2.C.1*) for 2022 shifted 134 kt CO_2 from sector *1.A.2.a* to sector *2.C.1*.

1.A.2.g.7 Off-road Industry

Revision 2022: −46.0 kt CO_2e

Update of the stock of non-road mobile machinery (NRMM) in construction and industry from 2016 onwards according to the production index by the federal statistics office 'Statistik Austria'. For 2016 to 2021, this resulted in an average increase in energy consumption of 2.7% per year; for 2022 in a reduction of 3.1%.

Methodological changes

For 1990 to 2022, minor changes in greenhouse gas emissions (CH_4 emissions) of sub-categories *1.A.4.a commercial/institutional* and *1.A.4.b residential* occur because of updated heating stock data and newly allocated shares of combustion technologies per energy carrier (updated energy demand model for space heating).

3.2.1.2 Mobile sources

1.A.3.b Road transport

Revision 2022: +53.2 kt CO_2e

Update/Improvement of activity data

Revision of the energy balance

Update of natural gas and liquefied petroleum gas consumption for the years 2021 and 2022 due to revisions in the current national energy balance by the federal statistics office 'Statistik Austria'.

Update of correction factor (CF) for real-world fuel consumption PC (passenger cars)

The real-world consumption correction factors - when switching from NEDC (New European Driving Cycle) to WLTP (Worldwide harmonized Light vehicles Test Procedure) standard values - have been

updated in the NEMO emissions calculation model for PC. The revision with minor adjustments from 2019 onwards and a solid update from 2021 onwards is based on the national CO_2 monitoring data and data from the new version 5.1 of the Handbook of emission factors (not published yet).

- CO_2-CF for gasoline PC from 2021 onwards = 20%
- CO_2-CF for diesel PC from 2021 onwards = 18%

Methodological changes

Assumptions of specific mileage for **inland/domestic** road transport activity

Starting with the submission 2020 growth rates of the automatic permanent counting stations on the high-level road network were no longer used to annually extrapolate specific mileage from the previous year's level. Instead, data from the central annual "sticker check" (ZBD; in accordance with §57a KFG) have been used for all inland road transport (Austrian and foreign vehicles being operated on the Austrian road network).

Although comparisons with the mileage resulting from the replaced method showed similar results for 2020, an increasing gap in mileage became obvious between the two methods from the pandemic year 2020 onwards. The mileage of foreign vehicles in Austria is obviously growing faster than that of domestic vehicles in Austria. Conversely, this means that by giving priority to the information from the ZBD (only for vehicles registered in Austria), the total mileage on the Austrian road network was systematically underestimated in the recent submissions and too high fuel quantities were attributed to fuel exports.

The finding for this submission and for the future is that it is not permissible to use the specific mileage according to the ZBD for all motor vehicle traffic on Austria's roads.

The method has been changed now back to the previous approach and means a shift in fuel consumption and emissions from fuel exports to domestic consumption for the whole time-series. Total fuel sales have not been revised.

1.A.5 Military

Revision 2022: +0.8 kt CO_2e

The kerosene consumption of military air traffic was updated using actual data for the years 2016, 2017 and 2018 as reported by the Austrian Ministry of Defense. This was done in response to the UNFCCC Review 2023. In previous submissions linear interpolation was necessary. Consequently, the time-series back to 1999 also changed noticeably.

3.2.1.3 Fugitive Emissions

Overall revision 2022: +124 kt CO_2e

1.B.2.a.2 Oil production

Revision 2022: +38 *kt CO_2e*

In previous submissions, emissions from *oil exploration* (*1.B.2.a.1*) and *oil production* (*1.B.2.a.2)* were included in *1.B.2.b.2 Natural gas production* as there is a combined production of oil and gas (incl. oil

gas) in Austria. From this years' submission onwards however, oil production, including oil exploration, is reported separately under *1.B.2.a.2*. This is thus a partly shift in emissions from *1.B.2.b.2* to *1.B.2.a.2* done in response to the UNFCCC Review 2023 (ARR 2023[26], E.2)

1.B.2.b.2 Natural gas production

Revision 2022: −30 *kt CO_2e*

The revision of the whole emission time series in this years' submission is due to separate reporting of oil and gas production data, as mentioned above, done in response to the UNFCCC Review 2023 (ARR 2023, E.2). Moreover for this years' submission activity data (gas produced) was taken from the (more complete) Mineral Oil Report (FVMI[27]), leading to higher emissions for 2022 (+8 *kt CO_2e).*

1.B.2.b.4 Natural gas transmission and storage

Revision 2022: −52 *kt CO_2e*

Emissions of CH_4 were revised over the whole time series due to the consideration of new study results on fugitive emissions from gas transmission, storage and distribution in Austria, conducted by Forschung Burgenland based on a survey among Austrian gas companies (WARTHA 2024[28]). Moreover, verified emissions data on gas transmission became available from the IMEO reporting within the scope of OGMP 2.0 from 2022[29] onwards. Also CO_2 emissions from gas storage were reported for the first time based on the study results (WARTHA 2024). Overall, emissions were revised by −52 *kt CO_2e* in this subsector for 2022, −33 *kt CO_2e* of which can be attributed to gas transmission and −19 *kt CO_2e* to gas storage.

1.B.2.b.5 Natural gas distribution

Revision 2022: −7.4 *kt CO_2e*

Emissions were updated over the whole time series based on the new study on fugitive emissions from the Austrian gas network, covering gas transmission, storage and distribution (WARTHA 2024).

1.B.2.b.6.1 Natural gas post-meter

Revision 2022: +176 *kt CO_2e*

This sub-category was reported for the first time in this years' submission based on the IPCC 2019 Refinement, covering emissions from natural-gas appliances and natural-gas-powered vehicles.

[26] UNFCCC (2023): Report on the individual review of the inventory submission of Austria submitted in 2023. FCCC/ARR/2023/AUT. 9 January 2023

[27] FVMI – Fachverband der Mineralölindustrie (2023): Branchenreport Mineralöl 2023/2024 – Schwerpunkte. Kennzahlen. Positionen

[28] WARTHA, C. (2024): Life Cycle Inventory Gasbereitstellung Österreich 2021. Forschung Burgenland. Pinkafeld, 2024. Unveröffentlichter Endbericht.

[29] UNEP – United Nations Environment Programme (2023): An Eye on Methane. The road to radical transparency: International Methane Emissions Observatory 2023. Nairobi.

3.2.2 Industrial Processes and Product Use

Consideration of additional sources/processes

2.G.4.a Fireworks

CO_2 emissions from fireworks are estimated for the first time in this years' submission (+0.05 kt CO_2 in 2022).

Allocation of emissions between subcategories

2.B.1 Ammonia Production / 2.D.3.d other - Urea used as a catalyst

Updated urea amounts used in road traffic for 2005 onwards led to a redistribution of minor amounts between these two categories (+/−1.25 kt CO_2 in 2022).

Methodological improvements

2.A.4.b Other uses of soda ash

As up-to-date input data for the previously applied methodology for estimating soda ash use is not available, a new methodology was applied for the whole time series. Emissive uses are now estimated directly (previously an indirect approach was applied where non-emissive uses were subtracted from total use). The main source is use in tungsten production, and here tungsten production and a CS value for soda use in tungsten production is used for estimating soda ash use. This results in recalculations of the whole time series (−1.07 kt CO_2 in 2022).

2.C.3.a Aluminium Production

For transparency reasons official data for aluminium production is now used as AD (previously confidential data was used and reported as "C"). The methodology for CO_2 emissions was reassessed, and the general level of emissions was verified. The change in methodology resulted in minor recalculations over the whole time series (−0.4 kt CO_2 in 2022).

2.D.3.a Solvent use

The methodology for estimating emissions from *Solvent Use* was reassessed for industrial and commercial applications and data on domestic use was updated. This resulted in recalculations of the time series from 1996 onwards, with higher emissions for the years 2000 − 2022 (+6.39 kt CO_2 of *2.D.3.1* emissions in 2022).

2.F Refrigeration and Air Conditioning

Compared to last year, several major improvements in Category *2.F* were implemented (details are given below). The total effect of all recalculations over the time series 1990-2022 is −0.3% of total F-Gas emissions reported now compared to last year's submission. The overall trend and the peak of F-Gases in 2018 remained the same. For the years before 2018, emissions reported now are lower than estimated last year, which is mainly due to the re-assessment of total imports and the allocation to sub sectors as well as the implementation of an updated emission factor for commercial refrigeration. Emissions from 2020 onwards are higher, which is mainly due to the revision of lifetime of refrigeration equipment leading to a shift of emissions from decommissioning to later years.

A short description of the recalculations is given below for each sub-category. Additionally, the total consumption of F-gases and the allocation to sub sectors was re-assessed, which affected input

data for commercial and industrial refrigeration (input data for these two sub-categories are residual amounts not consumed by the other categories for which consumption is estimated bottom up).

2.F.1.a Commercial Refrigeration and 2.F.1.c Industrial Refrigeration

Emission factors and lifetime of equipment applied were updated based on actual data from about 1000 units in commercial and industrial refrigeration. The data showed that the applied emission factor for commercial refrigeration other than supermarkets previously was overestimated, and it was changed from 15% for all years to 7.5% in 2020 (interpolated in years in between). This results in lower emissions especially for recent years, but − as a result on the methodology which has refrigerant consumption as the main input parameter − on the other hand increases the stock as less amounts are needed for refilling, so more amounts are left for new installations. Also the updating of the second relevant parameter - lifetime of equipment - had an increasing effect on stock: data showed that the lifetime of equipment was previously underestimated (14 years was changed to 20 years for commercial and from 10 to 20 years for industrial refrigeration). Also, this resulted in a delay of emissions from decommissioning. Overall, the update of the two parameters roughly counterbalanced each other for ex-post emissions.

Also, emissions from commercial refrigeration other than supermarkets are now calculated based on emissions from every refrigerant separately (previously refrigerants were grouped according their GWP), as expected, the deviation of the two approaches is small (about 1%).

The implemented improvements concerning total refrigerant consumption described above, and the improvements made for MACs described below lowered the amounts of refrigerants attributed to the industrial and commercial sector, particularly for the 2010s.

For 2022, emissions from commercial refrigeration are now 18.95 kt CO_2e higher than in the last submission, and those from industrial refrigeration 18.49 kt CO_2e higher.

2.F.1.e Mobile Air Conditioning

In the course of the QA/QC plan an in-depth re-assessment of the methodology for this source category was made, leading to several improvements which resulted in an increase of emissions from this subcategory (+51.72 kt CO_2e for 2022):

- The applied default value for emissions from busses (15%) was updated using data from a sample of about 1 000 buses, which had an average of 25% leakage per year.
- The assumption on average filling of MACs was revised (previously emissions from MACs were calculated based on the assumption that the average filling is only 70% of the nominal filling, which would imply that about half of the MAC units, which need a minimum filling of about 60% to work properly, would not work during their lifetime; now the average filling is assumed to be 90% of the nominal filling and stock). As this increased emissions, this also resulted in an increase of F-Gas need for refilling, which reduces the residual amount assigned to commercial and industrial refrigeration.

Update of activity or emissions data

2.C.1.a Steel

The approach of disaggregation of total emissions from iron and steel production in Austria to Energy and IPPU was corrected for 2022 (one carbon flow was incorrectly transferred to the calculation file), resulting in +134.45 kt CO_2 in *2.C.1.a* in 2022. Additionally one rounded value of 2014 was replaced with the actual value.

2.E Electronics Industry

Reported data was corrected by the producer from 2020 onwards (−0.68 kt CO_2e in 2022).

2.F.1.d Transport refrigeration

For this year's submission, additional data reported for 2020 was incorporated also affecting 2021 and 2022 emissions (+0.69 kt CO_2e in 2022).

2.F.1.f Stationary Air Conditioning

Data was recalculated for 2020 as shares of the different refrigerant used in the different appliances was updated (−0.36 kg CO_2e in 2022).

2.F.3 Fire Protection

Amounts previously reported as refilling (= emissions) in 2022 actually corresponded to new fillings and this was corrected (−1.23 kt CO_2e in 2022).

2.F.4.b Aerosols

The methodology from technical aerosols was reviewed in the course of the QA/QC plan, leading to the correction of a transcription error (+0.13 kt CO_2e in 2022).

2.G.1 Other product manufacture and use - Electrical Equipment

The emission factor for 2022 was corrected (was 2%, should be 1% like in other years; −2.76 kt CO_2e in 2022).

3.2.3 Agriculture

Update of activity data

3.A Enteric Fermentation, 3.B Manure Management, 3.D Agricultural Soils

AWMS data – new survey 'TIHALO III'

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)[30]. In this project, as in its predecessors, a comprehensive survey of the agricultural practices in Austria has been carried out. The results of this study (data on livestock feeding, management systems and practices, application techniques for 2023) were

[30] PÖLLINGER et al. (2025): Erhebung zum Wirtschaftsdüngermanagement aus der landwirtschaftlichen Tierhaltung in Österreich. Surveys on manure management from agricultural livestock farmings in Austria. Abschlussbericht TIHALO III. The final report is currently under preparation and will be published in 2025.

used as the basis for the calculation of Austria's emission inventory in submission 2025 resulting in revisions for CH_4 and N_2O emissions in all animal related emission sources.

The most significant impact to Austria's GHG inventory was the introduction of the manure management system 'pit storage below animal confinements'. The system 'slurry separation' was also implemented as a new manure management system for cattle and swine, mainly affecting ammonia emissions.

Background data for feeding and nutrition of cattle

Due to the updated proportions of grazing for all cattle categories according to the new 'TIHALO III' study as described above, the net energy for activity was revised. The net energy for pregnancy of breeding heifers at 1-2 years of age was also recalculated, as more accurate data on the calving age and days in gestation were used for the entire time series instead of using constant values. These improvements led to revisions of the gross energy intake (GE), $N_{excretion}$ and $VS_{excretion}$ for breeding heifers at 1-2 years of age for the entire time series and for the remaining cattle categories between 2018 and 2022.

Updated feeding and nutrition for sheep, goats, horses, poultry, deer and rabbits

For the non-key livestock categories sheep, goats, horses, poultry, deer and rabbits available feeding and nutrition data was gathered and analysed. Based on that information, Tier 2 methodologies according to the 2019 IPCC Refinement were applied. Consequently, country-specific GE-intake values and updated $VS_{excretion}$ and $N_{excretion}$ values have been generated according to IPCC (2019).

Livestock data – horses and deer

For 2023 new livestock numbers for horses became available (BML 2024)[31]. The years 2018-2022 were determined by interpolation. For deer, the entire time series was revised: data from IACS (INVEKOS)[32] available from 2000 onwards was taken (BML 2024) instead of the numbers previously used based on the farm structure surveys 2010 and 2020. IACS provides annual and more complete data for deer compared to the farm structure surveys. Animal numbers for the years 1990-1999 were determined by trend extrapolation.

Livestock data – rabbits

Rabbits were included for the first time in the inventory as a new animal category. Rabbit livestock numbers based on IACS (INVEKOS) for the years from 2000 onwards were taken as activity data (BML 2024). Animal numbers for the years 1990-1999 were determined by trend extrapolation. Emissions of CH_4 and N_2O from rabbits are for the first time recorded in the source categories *Enteric Fermentation* (*3.A.4.h.i.*), *Manure Management* (*3.B.4.h.i.*) and *Animal manure applied to soils (3.D.1.b.i.)*.

[31] BML (2024): Grüner Bericht 2024. Bericht über die Situation der österreichischen Land- und Forstwirtschaft. Grüner Bericht gemäß § 9 des Landwirtschaftsgesetzes BGBl. Nr. 375/1992. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Wien. www.gruenerbericht.at.

[32] Integrated Administration and Control System (IACS): tool for transparency and accountability in funding payments

Biogas plants

Updated figures for biogas plants for 2018-2022 (E-CONTROL 2024)[33] resulted in slightly revised CH_4 and N_2O emissions with an impact on the source categories *3.B Manure Management, 3.D.1.b.i. Animal manure applied to soils* and *3.D.1.b.iii. Other organic fertilizers applied to* soils for 2018-2022.

Other legumes

Activity data from other legumes, lupines, lentils, chickpeas and vetches were included under source category *3.D.1.d. Crop residues* for the first time.

Organic soils (i.e. histosols)

In previous submissions, organic soils were only reported in the grassland category. In 2024, a new national study on organic soils (UMWELTBUNDESAMT, 2024)[34] was finalized and updated activity data on organic soils became available. According to the study results, organic soils occur on both grassland and arable land. More information is included in chapter 3.2.4 on LULUCF.

3.D.a.2.c Other organic fertilisers

Based on the updated activity data for biogas plants (see above), the N_2O emissions for the years 2018-2022 were slightly revised (+0.00003 kt N_2O for 2022).

3.D.1.e. Mineralization/immobilization associated with loss/gain of soil organic matter (N_2O)

Revisions of activity data in cropland remaining cropland categories (for more information see chapter 3.2.4 on LULUCF) resulted in revised N_2O emissions for the entire time series (+0.01 kt N_2O for 2022).

Improvements of methodologies and emission factors

3.A Enteric Fermentation (CH_4)

For sheep, goats, horses, poultry, deer and rabbits, for the first time emissions were calculated based on the Tier 2 methodology according to IPCC 2019 and country-specific EFs (equation 10.21) using updated activity and nutrition data (AWMS data, feeding and nutrition, livestock data, new emission source rabbits– see above). The improvements resulted in overall higher emission amounts for the entire time series (+1.7 kt CH_4 for 2022).

3.B Manure Management (CH_4, direct and indirect N_2O)

Methane and N_2O emissions have been revised by using new and updated activity (AWMS data, feeding and nutrition, livestock data, new emissions source of rabbits, biogas - see above) and the 2019 Refinement of the IPCC GL for all livestock categories. In particular, the implementation of the manure management system 'pit storage below animal confinements' resulted in higher CH_4 emissions over the entire time series.

[33] E-CONTROL (2024): Herkunftsnachweisdatenbank der E-Control gem. Erneuerbaren Ausbau Gesetz (EAG), § 81 Abs 9. https://anlagenregister.at/. Accessed in December 2024.

[34] UMWELTBUNDESAMT (2024): Erwin Moldaschl, Merlin Mayer, Michael Weiß, Bradley Matthews, Carmen Schmid, Gebhard Banko, Peter Weiss. Organische Böden in Österreich: Ausmaß, Bewirtschaftung und Treibhausgasemission. Rep-0932. Vienna. Organische Böden in Österreich: Ausmaß, Bewirtschaftung und Treibhausgasemissionen

Revisions of the ammonia inventory showed an increasing effect on emission levels of indirect N_2O emissions. The update of the total ammoniacal nitrogen (TAN) values for liquid and solid manure of cattle and swine resulting in higher ammonia emissions had the most significant impact. TAN values used in previous submissions taken from SCHECHTNER et al. (1991)[35] were amongst the lowest in European countries. Revised values were derived from measurement data from PÖTSCH (2019)[36] and adjusted with the N-losses provided in the German and Swiss inventories.
In total, the entire time series of 3.*B Manure Management* was revised upwards (+5.7 kt CH_4 for 2022, +0.4 kt N_2O total for 2022).

3.D Agricultural Soils (N_2O)

3.D.1.b.i Animal manure applied to soils

Due to revised methodologies and activity data used for emission calculations in categories *3.A* and *3.B* (see above) the quantities of animal manure applied to soils were revised for the entire time series. Higher ammonia emissions from manure management resulted in lower N amounts available for application on soils and thus to lower N_2O emissions for the entire time series (-0.2 kt N_2O for 2022).

3.D.1.c. Urine and dung deposited by grazing animals

Livestock related updates (livestock numbers, N excretion values) as well as new data on Austrian agricultural practices from the new TIHALO III-survey as already described before, led to recalculated N_2O emissions from grazed animals. Additionally, updated EFs according to the 2019 IPCC Refinement were applied, resulting in revisions for the entire time series (-0.2 kt N_2O for 2022).

3.D.1.d. Crop residues

In addition to the updated activity data for other legumes (see above), methodological improvements were made in the calculations of cover crops. The above-ground residue dry matter value was taken from a recent national study (ERHART et al. 2021)[37]. The 2019 IPCC default values of grass-clover mix were used for the calculations. These improvements resulted in an overall increase in N_2O emissions for the entire time series (+0.3 kt N_2O for 2022).

3.D.1.f. Cultivation of organic soils (i.e. histosols)

In addition to the updated activity data for organic soils (see above) methodological improvements have been carried out by using the emission factors according to (UMWELTBUNDESAMT 2024). Detailed information is provided in chapter 3.2.4 on LULUCF. The revisions affected the entire time series (-0.02 kt N_2O for 2022).

3.D.b Agricultural Soils (indirect soil emissions – N_2O)

Atmospheric deposition: reasons for revised estimates are the updated activity data (see above) and the improvements made within the ammonia inventory (esp. the updated TAN values for cattle and

[35] SCHECHTNER, G. (1991): Wirtschaftsdünger – Richtige Gewinnung und Anwendung, Sonderausgabe des Förderungsdienst 1991. BMLF: Vienna.

[36] PÖTSCH, E. (2019): Personal communication. Documented in (HÖRTENHUBER 2025)

[37] ERHART, E.; NEUNER, E.; RIEGLER, V. (2021): Entwicklung einer Methode zur Bemessung des Beitrags von Begrünungen zur Kohlenstoffanreicherung in landwirtschaftlichen Böden. Endbericht von StartClim2020.F in StartClim2020: Planung, Bildung und Kunst für die österreichische Anpassung, Auftraggeber: BMK, BMWFW, Klima- und Energiefonds, Land Oberösterreich.

swine). Furthermore, NH_3-emissions from crop residues were calculated for the first time contributing to the indirect N_2O-Emisisons from atmospheric deposition. As a result, the indirect N_2O emissions from atmospheric deposition have been revised upwards for the entire time series (+0.1 kt N_2O for 2022).

N leaching and run-off: updated activity data and methodological improvements affected revised N amounts from animal manure applied to soils, grazing, crop residues and mineralisation resulting in revised emissions for the entire time series (+0.3 kt N_2O for 2022).

3.2.4 Land Use, Land Use Change and Forestry (LULUCF)

4.A Forest land

The increment, drain and dead wood results for recent years were updated on basis of an analysis of intermediate results of the ongoing NFI cycle 2022/27. These new results caused a significant change of the biomass and dead wood results of the most recent years since 2019, but resulted also in minor (before 2009) and intermediate (2009 to 2018) revised biomass and dead wood results of previous years. The forest soil C stock changes were recalculated for the complete time series based on the intermediate results of the ongoing NFI 2022/27 cycle, as well as improved calibration- and spin-up procedures of the model. A detailed and comprehensive study was finalized in 2024 (UMWELTBUNDESAMT 2024[38]), where the area of organic soils in Austria, their land use and drainage status and related emission factors were analysed on basis of various geographic, historic and other data sources. Based on this study, drained organic soils in *Forest land* were identified, for which emissions for the whole time series are estimated for the first time. Together, these improvements caused changes of the annual net removals for the whole time series of the *Forest land* category in the range of -4 903 to +7 071 kt CO_2e per year compared to the last submission in 2024.

4.B Cropland

For area consistency reasons a minor adjustment of the total *Cropland* area was carried out. The *Grassland* biomass stock was updated based on new results for root, stubble and aboveground biomass. These biomass values are used for land-use changes involving *Grassland* and consequently have an impact on the results of the land-use change category *Grassland* to *Cropland*. The land-use changes between all categories are meanwhile estimated on basis of a regionalized assessment of related activity data in five ecological regions and related specific soil carbon stocks for these regions and all land-use categories. In addition, the soil carbon stock changes of all land-use change categories are since current submission 2025 based on the soil carbon stocks for the depth of 0-50 cm instead of 0-30 cm (in previous submission changes in soil carbon stocks between 0 and 50 cm were carried out just for the land-use change categories involving *Forest land*). On basis of the organic soils study (see in chapter 3.2.4 for *Forest land*), drained organic soils in *Cropland* were identified, for which emissions for the whole time series are estimated for the first time. These improvements caused changes of the annual net emissions for the whole time series of the *Cropland* category in the range of 50 to 149 kt CO_2e per year compared to the last submission in 2024.

[38] UMWELTBUNDESAMT (2024): Erwin Moldaschl, Merlin Mayer, Michael Weiß, Bradley Matthews, Carmen Schmid, Gebhard Banko, Peter Weiss. Organische Böden in Österreich: Ausmaß, Bewirtschaftung und Treibhausgasemission. Rep-0932. Vienna. Organische Böden in Österreich: Ausmaß, Bewirtschaftung und Treibhausgasemissionen

In the final stage of the January 2025 submission a shortcoming in the current IACS based analysis of the land-use conversion areas between *Cropland* (annual and perennial) and *Grassland* was identified and will be corrected for the March 2025 submission. This will lead to revised LULUCF figures, likely in the order of ±10 kt CO_2e per year.

4.C Grassland

For area consistency reasons, a minor adjustment of the total *Grassland* area was carried out. The *Grassland* biomass stock was updated based on new results for root, stubble and aboveground biomass. These biomass values are used for land-use changes to *Grassland* and consequently have an impact on the results of the *Grassland* category. The land-use changes between all categories are meanwhile estimated on basis of a regionalized assessment of related activity data in five ecological regions and related specific soil carbon stocks for these regions and all land-use categories. In addition, the soil carbon stock changes of all land-use change categories are since current submission 2025 based on the soil carbon stocks for the depth of 0-50 cm instead of 0-30 cm (in previous submission changes in soil carbon stocks between 0 and 50 cm were carried out just for the land-use change categories involving *Forest land*). On basis of the organic soils study (see in chapter 3.2.4 for *Forest land*), the area of drained organic soils in *Grassland* and the related emissions were slightly revised. These improvements caused changes of the annual net emissions for the whole time series of the *Grassland* category in the range of 93 to 189 kt CO_2e per year compared to the last submission in 2024.
In the final stage of the January 2025 submission a shortcoming in the current IACS based analysis of the land-use conversion areas between *Cropland* and *Grassland* was identified and will be corrected for the March 2025 submission. This will lead to revised LULUCF figures, likely in the order of ±10 kt CO_2e per year.

4.D Wetlands

For area consistency reasons a minor adjustment of the total *Wetland* area was carried out. The grassland biomass stock was updated based on new results for root, stubble and aboveground biomass. These biomass values are used for land-use changes involving *Grassland* and consequently have an impact on the results of the land-use change category *Grassland* to *Wetlands*. On basis of the organic soils study (see in chapter 3.2.4 for *Forest land*), drained organic soils in *Wetlands* and areas of historic peat extraction were identified, for which emissions for the whole time series are estimated for the first time. These improvements caused changes of the annual net emissions for the whole time series of the *Wetlands* category in the range of 12 to 22 kt CO_2e per year compared to the last submission in 2024.

4.E Settlements

For area consistency reasons a minor adjustment of the total *Settlement* area was carried out. The *Grassland* biomass stock was updated based on new results for root, stubble and aboveground biomass. These biomass values are used for land-use changes involving *Grassland* and consequently have an impact on the results of the land-use change category *Grassland* to *Settlement*. The land-use changes between all categories are meanwhile estimated on basis of a regionalized assessment of related activity data in five ecological regions and related specific soil carbon stocks for these regions and all land-use categories. In addition, the soil carbon stock changes of all land-use change categories are since current submission 2025 based on the soil carbon stocks for the depth of 0-50 cm instead of 0-30 cm (in previous submission changes in soil carbon stocks between 0 and 50 cm were carried out just for the land-use change categories involving *Forest land*). On basis of the organic soils study (see in chapter 3.2.4 for *Forest land*), drained organic soils in *Settlement* were

identified, for which emissions for the whole time series are estimated for the first time. These improvements caused changes of the annual net emissions for the whole time series of the *Settlement* category in the range of 140 to 401 kt CO_2e per year compared to the last submission in 2024.

4.F Other land

In *Other land* there were just minor adjustments in the gains and losses of biomass in the subcategory *Forest land* to *Other land* in the years from 2015 on, caused by the update of biomass calculations in forest land due to revised data from the intermediate results of the ongoing NFI 2022/27 cycle. Due to these changes the emissions of *Other land* are up to -0.08 kt CO_2e per year different for these years compared to the last submission in 2024.

4.G HWPs

The *HWP* production figures for the year 2022 were updated in the most recent FAO statistics and very minor corrections were recorded in the years 2019-2021. Consequently, the HWP figures for this submission had to be updated accordingly. The recalculations in the *HWP* category led to lower removals of this subcategory of 118 kt CO_2e for 2022.

3.2.5 Waste

Update of activity data

5.D Wastewater Treatment and Discharge

For *5.D.2 industrial wastewater* recalculations are reported for 2021 and 2022 (–0.003 kt CO_2e) as updated information on primary and secondary pulp production became available from the latest industry reports (AUSTROPAPIER 2022, 2023[39]).

[39] Austropapier (2023): Papier aus Österreich – Branchenbericht der österreichischen Papierindustrie

4 NATIONAL INVENTORY SYSTEM

The regulations under the UNFCCC and the Kyoto Protocol define the standards for national emission inventories related to transparency, consistency, comparability, completeness and accuracy (TACCC). Above this, each Party shall have in place a national system[40] including all institutional, legal and procedural arrangements made within a Party for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

To meet these requirements Austria has set up the National Inventory System Austria (NISA) covering all aspects from establishing a legal basis for inventory preparation along with defining responsibilities, over availability of data, quality control and quality assurance (QA/QC) to continuous improvement of the inventory.

In Austria, emissions of greenhouse gases are estimated together with emissions of air pollutants in a database based on the CORINAIR (CORe INventory AIR)/SNAP (Selected Nomenclature for sources of Air Pollution) system. This nomenclature is designed to estimate not only emissions of greenhouse gases but all kinds of air pollutants. To comply with the reporting obligations under the UNFCCC, emissions data are transferred according to the IPCC Guidelines into the UNFCCC Common Reporting Tables (CRT).

This section provides a short description of the most important aspects of NISA; a detailed description including all required information as set down in Decision 15/CMP.1, part II ("Reporting of supplementary information under Article 7, paragraph 2", D. National systems in accordance with Article 5, paragraph 1) can be found in the Austrian Initial Report[41], in Austria's NID 2024[42] and in the NISA Implementation Report[43].

Austria has a centralized inventory system, with all the work related to inventory preparation being carried out at a single national entity. The most important legal arrangement is the Austrian Environmental Control Act (Umweltkontrollgesetz, UKG[44]), which defines the Umweltbundesamt (Environment Agency Austria) as the single national entity with the overall responsibility for inventory preparation. To comply with the stringent reporting requirements, the Umweltbundesamt established the 'Inspection Body for Emission Inventories' which is entrusted with the preparation of emission inventories as assigned to the Umweltbundesamt under the UKG.

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[40] 19/CMP.1 Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol; FCCC/KP/CMP/2005/8/Add.3. http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf

[41] BMLFUW (2006): Austria's Initial Report under Article 7, paragraph 4, of the Kyoto Protocol, Federal Ministry of Agriculture and Forestry, Environment and Water Management, Vienna.

[42] UMWELTBUNDESAMT (2024): Austria's National Inventory Document 2024, Submission under the United Nations Framework Convention on Climate Change and under the Paris Agreement. Report REP-0943. Umweltbundesamt, Vienna.

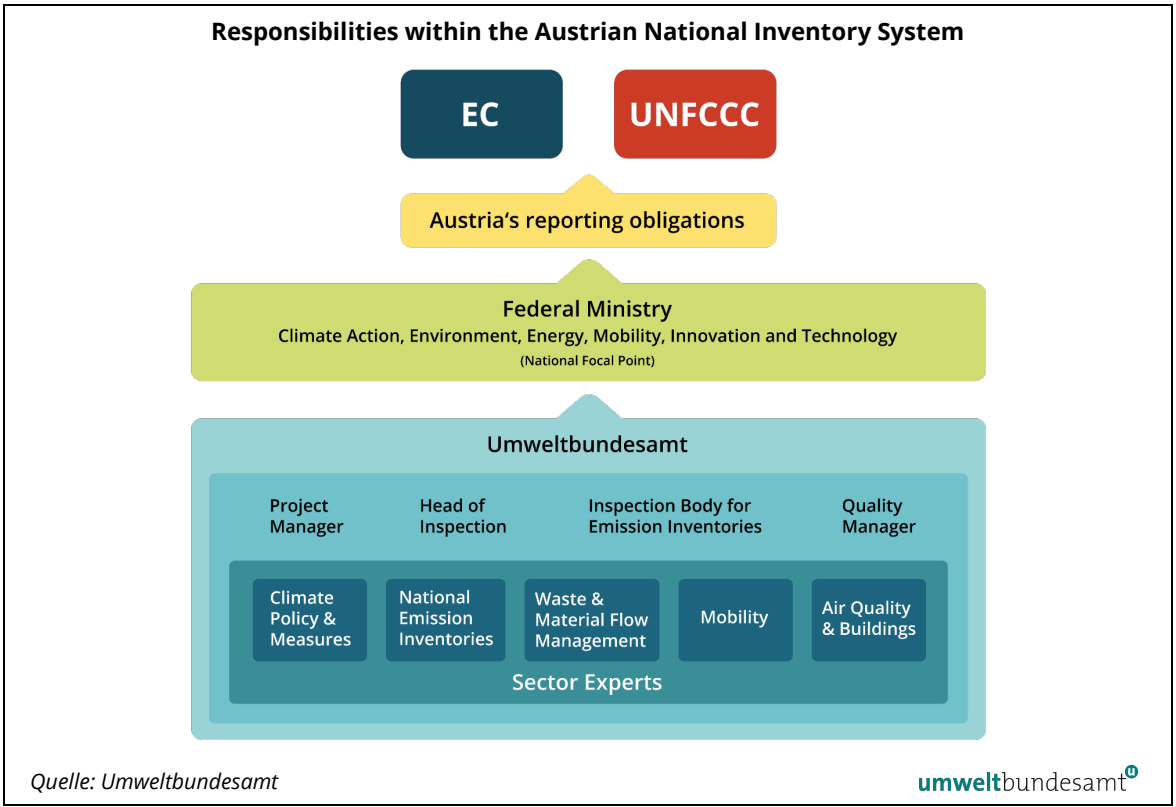
[43] UMWELTBUNDESAMT (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna https://www.umweltbundesamt.at/fileadmin/site/publikationen/rep0004.pdf

[44] „Umweltkontrollgesetz" – Bundesgesetz über die Umweltkontrolle und die Einrichtung einer Umweltbundesamt Gesellschaft mit beschränkter Haftung; Federal Law Gazette I 152/1998 (as amended by Federal Law Gazette I No. 40/2014)

Inspection Body for Emission Inventories
ID No. 0241

Umweltbundesamt GmbH, Environment Agency Austria
DI Michael Anderl (Head of Inspection Body), Mag. Katja Pazdernik (Deputy)
Spittelauer Laende 5
1090 Vienna, Austria

Figure 3: Responsibilities within the Austrian National Inventory System (greenhouse gases).



Quelle: Umweltbundesamt umweltbundesamt

The personnel of the Inspection Body for Emission Inventories (IBE) is made up of staff from various organisational units of the Umweltbundesamt, who in the course of their inspection activity for the IBE are assigned to the IBE and are therefore under the head of the inspection body. The head of the inspection body has the overall responsibility for the maintenance and continual improvement of the QMS.

The national energy balance is the most important data basis for the Austrian Air Emissions Inventory. The Austrian statistical office (Statistik Austria) is required by contract with the competent ministries to annually prepare the national energy balance. The compilation of several other relevant statistics is regulated by law; other data sources include reporting obligations under national and European regulations and reports of companies and associations.

4.1 Legal and institutional arrangements

The Umweltbundesamt is designated as the Single National Entity responsible for inventory preparation including QA/QC.

LEGAL ARRANGEMENT: ENVIRONMENTAL CONTROL ACT[45]

- § 5 (regulates responsibilities of the Umweltbundesamt)
  Regulates responsibilities regarding environmental control in Austria and is also the basis for the outsourcing of the 'Umweltbundesamt GmbH'

- § 6 (regulates tasks of the Umweltbundesamt)
  (2)15 …the *Umweltbundesamt* is obliged to prepare "technical expertise for *compliance* with UNECE/LRTAP convention […] and with the UNFCCC and the Kyoto Protocol, including the preparation of emission inventories, evaluation of the impact of measures, and assistance in preparation of reports regarding climate".
- § 11 (regulates financing of the Umweltbundesamt)
  …ensures financial resources for preparation of tasks as referred to in para 6.
- § 7 (regulates issues related to data security)
  …in processing the legally assigned tasks, the Umweltbundesamt is seen as a public authority and can therefore process (confidential) personal data and can exchange these data with other public authorities.

To ensure the availability of data necessary for the annual compilation of the GHG inventory, further legal and institutional arrangements have been made.

Due to the above mentioned ENVIRONMENTAL CONTROL ACT the following **INSTITUTIONAL ARRANGEMENTS** with data providers were agreed:

1. **Statistik Austria**
   - Statistical yearbook (public)
   - National Energy balance (comprehensive/detailed Energy balance and IEA/Eurostat questionnaire)
     - **Long-term Contract** with the competent ministries
   - Production/Import/Export statistics for solvents, F-gases
     - **Contract on annual basis** with the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)
   - Agricultural statistics (public)
   - Transport statistics (public)
     Procedural arrangement:
     - close cooperation Umweltbundesamt – Statistik Austria on definition of data format and specification

[45] „Umweltkontrollgesetz" – Bundesgesetz über die Umweltkontrolle und die Einrichtung einer Umweltbundesamt Gesellschaft mit beschränkter Haftung; Federal Law Gazette I 152/1998 (as amended by Federal Law Gazette I No. 40/2014)

- Data flow is organised through (encrypted) communication (e-mail) or in case of confidential data through personal handover of CD/DVD
- Harmonisation of data: elimination of discrepancies

2. **Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)**

   The BMK as representative of the Republic of Austria owns (100%) the Umweltbundesamt, which has the legal status of a limited liability company. As superior authority and in the framework of the ENVIRONMENTAL CONTROL ACT the following institutional agreements regarding access to data of different reporting obligations were agreed:

   - Data on emissions and activity data from installations under the EU ETS (Federal law gazette 118/2011 establishing a scheme for greenhouse gas emission allowance trading)
   - Activity data of certain F-gases (Austrian Fluorinated Compounds Ordinance 139/2007 regarding prohibitions and restrictions of HFCs, PFCs, SF_6)
   - Activity data from landfill sites (Austrian Landfill Ordinance No. 39/2008) – EDM (Electronic Data Management)
   - Activity data regarding waste incineration (Austrian Waste Incineration Ordinance No. 35/2013)
   - Emissions data collected in the framework of E-PRTR (Austrian Ordinance No. 380/2007 concerning the establishment of the European Pollutant Release and Transfer Register)
   - Emissions data (SO_2, NO_x, dust) and activity data from steam boiler installations (Federal law gazette 127/2013 establishing integrated pollution prevention and control)
   - Forest fire statistics
     Procedural arrangement: The access to the data is organised for free via the EDM – Electronic Data Management – http://edm.gv.at, which is an information network which allows enterprises and authorities to handle registration and notification obligations in the waste and environment sectors online.
     - EDM is the Federal Ministry's central eGovernment initiative and is operated by the Umweltbundesamt
     - EDM aims at sustainably reducing the administrative burden of enterprises and authorities to efficient, electronic recording and notification systems and to ensure a high level of environmental protection in Austria.

3. **Austrian Research Centre for Forests (BFW)**

   - National Forest inventory
     - **Contract on a regular interval** with the Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML)
   - Forest soil condition survey (of all federal provinces)
   - Forest soil modelling
     Procedural arrangement: close cooperation Umweltbundesamt – BFW on definition of data format and specification

4. **Research institutions:**
   a. **TU Graz (Graz University of Technology)**
      - NEMO – Emission model road (IPCC sector 1.A.3.b): calculation of road emissions
      - GEORG – Emission model of non-road mobile machinery (NRMM): calculation of mobile off-road emissions
        - Contract on annual basis with Umweltbundesamt
          Procedural arrangement: close cooperation Umweltbundesamt – TU Graz

   b. **University of Natural Resources and Life Sciences Vienna (BOKU)**
      - Emissions model for Agriculture: preparation and revisions based on the latest scientific literature
        - Contract on a regular interval with Umweltbundesamt
          Procedural arrangement: close cooperation Umweltbundesamt – BOKU

   c. **HBLFA Raumberg-Gumpenstein Center for Education and Research**
      - Data on animal husbandry and agricultural practice in Austria, expert judgements
        - Joint projects and intensive exchange on a regular interval
          Procedural arrangement: no formal agreements but close cooperation

5. **Austrian Economic Chambers and Associations of the Austrian Industries as well as Individual plant operators/companies**
   - Activity data, emission data and relevant parameters; information on the process and abatement technology
     - No formal agreements were made but it is good practice in Austria to have a good cooperation and exchange of knowledge regarding the requirements of GHG and Air pollutants Inventory on a continuing basis
       Procedural arrangement: close cooperation

6. **AustroControl**
   - Flight movements per aircraft type and airports (non-standard analysis)
     - *Procedural arrangement*: no formal agreement, but close cooperation Umweltbundesamt – AustroControl on definition of data format and specification

4.2 Data Sources

The following table presents the main data sources used for activity data (for unpublished studies a detailed description of the methodologies is given in the NID):

Table 9: Main data sources for activity data.

Sector	Data Sources for Activity Data
Energy	• Energy Balance from Statistik Austria • EU-ETS • Steam boiler database • Small scale combustion market data • Direct information from industry or associations of industry • IMEO Reports (OGMP 2.0)
Transport	• Energy Balance from Statistik Austria • Yearly new vehicle registrations from Statistik Austria • Yearly growth rates of transport performance on Austrian roads from Federal Ministry of Climate Action, Environment, Energy, Mobility, In-novation and Technology (BMK) • ZBD: Zentrale Begutachtungsdatenbank (periodically updated specific mileage, "sticker check" according to §57a KFG) • Yearly flight movements from AustroControl • Yearly FC of airport ground activities at Vienna International Airport
IPPU	• National production statistics • Import/export statistics • EU-ETS • Direct information from industry or associations of industry • Short term statistics for trade and services • Austrian foreign trade statistics • Structural business statistics • Surveys at companies and associations
Agriculture	• National studies • National agricultural statistics obtained from Statistik Austria • National fertilizer statistics, protein content and fat content of milk, obtained from Agrarmarkt Austria (AMA) • National statistics on cattle breeding obtained from Rinderzucht Austria • Distributing company (sales data)
LULUCF	• National forest inventory obtained from the Austrian Research Centre for Forests • National agricultural statistics and land use statistics/layers obtained from Statistik Austria and from the IACS system • Wetland and settlement areas from the Real Estate Database and various geographic layers
Waste	• Federal Waste Management Plan (Data sources: Database on landfills (1998–2007), Electronic Data Management (EDM) in environment and waste management) • EMREG-OW (Electronic Emission Register of Surface Water Bodies) • National studies

The main sources for emission factors are:

- National studies for country specific emission factors
- Plant-specific data reported by plant operators

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[46]
- 2019 Refinement to the 2006 IPCC Guidelines
- EMEP/EEA air pollutant emission inventory guidebooks[47]
- Handbook emission factors for road transport (HBEFA), Version 4.1
- National forest inventory obtained from the Austrian Research Centre for Forests
- Soil inventories by the Federal States and by the Austrian Federal Office and Research Centre for Forests
- Modelling of the forest soil C stock changes Austrian Research Centre for Forests

4.3 QA/QC Plan (QMS of IBE)

A Quality Management System (QMS) has been designed and implemented to fulfil all requirements of *good practice, i.e.* to improve transparency, consistency, comparability, completeness and accuracy as well as confidence in the national inventory. Since December 2005 the inventory team at the Umweltbundesamt has been accredited as an Inspection Body for emission inventores, Type A (ID No. 0241) in accordance with the international standard EN ISO/IEC 17020 and the Austrian Accreditation Law (AkkG)[48] by decree of Accreditation Austria[49]. This standard takes into account standards regarding a QMS as set out in the EN/ISO 9000 series and even goes beyond: It provides a clear statement of requirements regarding competence, as well as independence, impartiality and integrity.

The accreditation scope of the IBE can be found on akkreditierung-austria.gv.at/overview. Relevant for the underlying report are:

- 2006 IPCC GL for National Greenhouse Gas Inventories
- 2006 GL Supplement Wetlands
- 2006 GL Revised Supplementary KP
- 2019 Refinement to the 2006 IPCC GL

The 2006 IPCC GL with its supplements is applied for all sectors except for sector 3 agriculture, where the 2019 Refinement is partly applied.

The implementation of QA/QC procedures as required by the IPCC supports the development of national greenhouse gas inventories that can be readily assessed in terms of quality and completeness. The QMS as implemented in the Austrian inventory includes all elements of the QA/QC sys-

[46] https://www.ipcc-nggip.iges.or.jp/public/2006gl/

[47] Prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections (TFEIP) and published by the European Environment Agency (EEA). Latest update: https://www.eea.europa.eu/publications/emep-eea-guidebook-2023

[48] *„Akkreditierungsgesetz"*; Federal Law Gazette I No. 28/2012 (as amended by Federal Law Gazette I No. 40/2014)

[49] First decree No. BMWA-92.715/0036-I/12/2005, issued by Accreditation Austria / Federal Ministry of Economics and Labour on 19 January 2006, valid from 23 December 2005

tem outlined in IPCC 2006 GL Volume 1 'QA/QC and Verification', and goes beyond. It comprises supporting and management processes in addition to the QA/QC procedures in inventory compilation and thus ensures agreed standards not only within (i) the inventory compilation process and (ii) supporting processes (e.g. archiving), but also for (iii) management processes (e.g. annual management reviews, internal audits, regular training of personnel, error prevention).

As part of the QMS an efficient process is established to ensure transparency when collecting and analyzing findings by UNFCCC review experts or any other issues concerning the quality of activity data, emission factors, methods and other relevant technical elements of inventories. Any findings and discrepancies are documented; responsibilities, resources and a time schedule are attributed to each of these in the improvement plan. Measures, which include possible recalculations, are taken by the sector experts.

The Austrian Quality Management System is described in detail in Austria's NIR 2024, some aspects and improvements compared to the previous submission are described below (QMS activities and improvements 2024).

The Quality Manual can be downloaded at:
https://www.umweltbundesamt.at/klima/emissionsinventur/emi-akkreditierung

Sector Experts

Within the inventory system specific responsibilities for the different emission source/sink categories ('Sector Experts') are defined. There are nine sectors defined (Energy, Buildings, Transport, Fugitive Emissions, Industrial Processes, Product Use, Agriculture, LULUCF and Waste). At least two experts form a sector team with one of them acting as coordinator ('Sector Coordinator'). Sector experts collect activity data, emission factors and finally estimate emissions. The sector experts are also responsible for the choice of methods, data processing, archiving, for contracting studies (if needed), and performing sector-specific Quality Assurance and Quality Control (QA/QC) activities.

In cases which exceed the IBE's resources, the IBE concludes service contracts with qualified institutions (particularly universities or research institutes).

In the course of this the IBE is responsible for

- choice of the contractor i.e. judging his/her expertise with regard to the technical and QMS requirements
- specifying the technical and QMS requirements in the service contract
- performing and documenting a detailed QC check of the results i.e. checking if the specified requirements were fulfilled
- implementation of the results into the emission inventory in line with the technical and QMS requirements particularly the requirement of full reproducibility of the emission inventory

Service contracts have so far been concluded with:

- Technical University Graz (Road and Off-road transport)
- University of Natural Resources and Applied Life Sciences,
  Research Center Seibersdorf (Agriculture)
- Öko-Recherche, Büro für Umweltforschung und -beratung GmbH (F-gases)
- Institute for Industrial Ecology (Product Use)

- Barbara Amon and Stefan Hörtenhuber (Agriculture)
- Laboratorium für Umweltanalytik GmbH (heavy metals and POPs)
- Forschung Burgenland GmbH (Fugitive emissions)

Data Management

The Austrian Inventory is based on the SNAP nomenclature and has to be transformed into the UNFCCC Common Reporting Tables ('CRTs') to comply with the reporting obligations under the UNFCCC. In addition to the actual emission data, the background tables of the CRTs are filled in by the sector experts, and finally QA/QC procedures as defined in the inventory planning process are carried out before the data are submitted to the European Commission and to the UNFCCC.

As part of the QMS's documentation and archiving procedures, a reliable data management system has been established to fulfil the data collecting and reporting requirements. This ensures the necessary documentation and archiving for future reconstruction of the inventory and consequently enables easy access to up-to-date and previously submitted data for the quantitative evaluation of recalculations.

QMS activities and improvements 2024

Until 2024, in the IBE the emissions from private and commercial buildings were calculated by one single person. In 2024 we established a new inventory sector team 'Buildings' that is responsible for the calculation of the corresponding emissions and that is double staffed for security reasons. Another new member joined the inventory sector team AFOLU, so that currently Austria's inventory team consists of 24 members in total.

The new sector experts have to undergo an initial inventory training, that lasts at least one year and ends, after careful consideration of feedback from the mentors, trainers and the trainee, with the official approval as sector experts.

In 2024 two of our experts participated in international inventory reviews, and two staff members passed the UNFCCC review sub-course B.1 'General guidance and cross-cutting issues'.

4.4 Changes in the national inventory system

Member States shall clearly state in the relevant chapters of the national inventory report if there were no changes in the description of their national inventory systems or, if applicable, of their national registries referred to in points (k) and (l) of Part 1 of Annex V to Regulation (EU) 2018/1999 since the previous submission of the national inventory report.

The national inventory system, as described in this chapter (4), is unchanged compared to the description given in the Austrian Initial Report under the Kyoto Protocol[50].

[50] http://unfccc.int/files/national_reports/initial_reports_under_the_kyoto_protocol/application/pdf/at-initial-report-200611-corr.pdf

5 REPORTING UNDER ARTICLE 26(3) GOVERNANCE REGULATION

According to Section 2 'Annual Reporting', Article 26(3) of the Governance Regulation' No 2018/1999[51] from 2023 on, Member States shall determine and report to the Commission final greenhouse gas inventory data by 15 March each year (year X) and preliminary data by 15 January each year, including the greenhouse gases and the inventory information listed in Annex V.

Information on points (a) – (d) of Part I of Annex V is provided in the respective CRF Tables. Emissions of GHG referred to in Article 2(1) of Regulation (EU) 2018/842[52] is additionally provided as separate template 'Art19_AnnexXV_Emissions covered by the ESR_AT'. Chapters 2 and 3 of this report include textual information on the GHG emission trends and recalculations and improvements. Information on indicators (e), concluded transfers (f), steps taken to improve inventory estimates, in particular in areas of the inventory that have been subject to adjustments or recommendations following expert reviews (g), allocation of verified emissions reported under Directive 2003/87/EC (h), uncertainties (m) and intended use of flexibilities (n) are provided to the EU Commission as separate templates via electronic upload (EIONET/CDR):

- Art13_AnnexXI_Indicators_AT
- Art21_AnnexXVII_Concluded transfers for ESR_AT
- Art20_AnnexXVI_Concluded transfers for LULUCF_AT
- Art10_AnnexVIII_Recommendations_AT
- Art14_AnnexXII_Consistency with ETS_AT
- Art12_AnnexX_Uncertainty and completeness_AT
- Art22_AnnexXVIII_Intended use of flexibilities_AT
- Art23_AnnexXIX_Use of revenues_AT

Results of consistency checks (i and j) are summarized in chapter 5.2. Information on changes to Austria's national inventory system, including information on Austria's quality assurance and quality control plans (k, m) and changes in the national registry (l) are provided in chapters 4 and 5.

[51] REGULATION (EU) 2023/857 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999

[52] VERORDNUNG (EU) 2023/857 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 19. April 2023 zur Änderung der Verordnung (EU) 2018/842 zur Festlegung verbindlicher nationaler Jahresziele für die Reduzierung der Treibhausgasemissionen im Zeitraum 2021 bis 2030 als Beitrag zu Klimaschutzmaßnahmen zwecks Erfüllung der Verpflichtungen aus dem Übereinkommen von Paris sowie zur Änderung der Verordnung (EU) 2018/1999.

5.1 Overview of Reporting

In Commission Implementing Regulation (EU) 2020/1208[53] the reporting obligations were further specified. The fulfilment of the obligations as included in Articles 9 to 23 Chapter III of this Regulation is summarized in the following table.

Table 10: Overview of AT reporting on GHG inventories pursuant to Article 8(2) Commission Implementing Regulation (EU) 2020/1208

[Article of] Regulation EU) 2020/1208 (ANNEX VII[54])	**Information to be found:**	**Separate Annex**
Article 9 Reporting on recalculations	CRT Table 8 Short-NID Chapter 3	Not applicable
Article 10 Reporting on implementation of recommendations in Table 1 of Annex VIII	Short-NID Chapter 3.3	Art10_AnnexVIII_Recommendations_AT
Article 10 Reporting on implementation of recommendations in Table 2 of Annex VIII	Short-NID Chapter 3.3	Art10_AnnexVIII_Recommendations_AT
Article 12(1) Reporting on uncertainty	Not applicable	Art12_AnnexX_Uncertainty and completeness_AT
Article 12(2) Reporting on completeness	CRT Table 9	Not applicable
Article 14(1) Reporting on consistency of reported emissions with data from the emissions trading scheme (Annex XII data)	Not applicable	Art14_AnnexXII_Consistency with ETS_AT
Article 14(2) Reporting on consistency of reported emissions with data from the emissions trading scheme (textual information)	Short-NID Chapter 6	Possible (AT: not relevant)
Article 15 Reporting on consistency of the reported data on air pollutants	Short-NID Chapter 6	Possible (AT: not relevant)
Article 16 Reporting on consistency of the data reported on fluorinated greenhouse gases	Short-NID Chapter 6	Possible (AT: not relevant)
Article 17 Reporting on consistency with energy statistics	Short-NID Chapter 6	Possible (AT: not relevant)
Article 18 Reporting on changes in descriptions of national inventory systems or registries	Short-NID Chapter 4 Short-NID Chapter 5	Not applicable

[53] 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 and repealing Commission Implementing Regulation (EU) No 749/2014

[54] Overview of reporting on greenhouse gas inventories pursuant to Article 8(2) of Commission Implementing Regulation (EU) 2020/1208

5.2 Reporting on Consistency

5.2.1 Consistency with EU ETS data (Article 14)

According to Annex V Part 1 point (i), where relevant, the results of the checks performed on the consistency of the emissions reported in the GHG inventories, for the year x-2, with the verified emissions reported under Directive 2003/87/EC, have to be reported.

ETS reports are fully considered in the Austrian greenhouse gas inventory. Consistency of data is thus given and the Article is not relevant for Austria. For details, especially the methodology of consideration of ETS-data ('bottom up' data) see chapter 3.2.9.1 of the National Inventory Document.

5.2.2 Consistency with other reported data

According to Annex V Part 1 point (j), where relevant, the results of the checks performed on the consistency of the data used to estimate emissions in preparation of the GHG inventories, for the year X-2, with:

1. The data used to prepare inventories of air pollutants pursuant to Directive (EU) 2016/2284
2. The data reported pursuant to Article 19(1) of, and Annex VII to, Regulation (EU) No 517/2014
3. The energy data reported pursuant to Article 4 of, and Annex B to, Regulation (EC) No 1099/2008

have to be reported.

5.2.2.1 Data on air pollutants (Article 15)

The Austrian Air Emission Inventory (OLI) covers both, greenhouse gases and air pollutants reported under the NEC Directive (EU) 2016/2284 and CLRTAP. Data basis (activity data and other relevant parameters) is thus consistent for NEC, CLRTAP and reporting under the EU Governance Regulation.

Results of the checks performed for each air pollutant on the consistency of the data, for the year 2023 show no differences of more than +/−5% between the total emissions excluding LULUCF. Minor differences are solely due to different reporting requirements regarding air transport and international navigation.

5.2.2.2 Data on fluorinated greenhouse gases (Article 16)

There are no producers of F-gases in Austria. Almost all amounts are imported from EU member states, only minor amounts are imported from outside the EU.

Until 2018, only main importers that also are the main supplier of bulk refrigerants in Austria applied for a quota for imports from outside the EU. These companies also report for inventory preparation and therefore data is assumed to be consistent. For recent years the quotas and quota-

trading were screened in the course of the QA plan, additional, direct importers are considered for the inventory calculations, thus consistency is ensured.

For recent years the number of companies applying for a quota strongly increased, and inquiries are ongoing to ensure consistency of data.

5.2.2.3 Energy statistics (Article 17)

Checks performed on the consistency of the data used to estimate emissions in preparation of the greenhouse gas inventory for 2023 with the energy data reported pursuant to Article 4 of Regulation (EC) No 1099/2008 show no differences of more than +/−2%.

6 ABBREVIATIONS

BFW ..... Bundesamt und Forschungszentrum für Wald
Austrian Federal Office and Research Centre for Forest

BMLFUW ..... Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft
Federal Ministry of Agriculture, Forestry, Environment and Water Management

BMK ..... Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology

BML ..... Bundesministerium für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft
Federal Ministry of Agriculture, Forestry, Regions and Water Management

BMWA ..... Bundesministerium für Wirtschaft und Arbeit
Federal Ministry for Economic Affairs and Labour

CDR ..... Central Data Repository

COP ..... Conference of the Parties

CRT ..... Common Reporting Tables

EC ..... European Community

EEA ..... European Environment Agency

EIONET ..... European Environment Information and Observation NETwork

EMEP ..... Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

EN ..... European Norm

ESR ..... Effort Sharing Regulation

ETC ..... European Topic Centre

EU ..... European Union

ERT ..... Expert Review Team (in context of the UNFCCC review process)

FAO ..... Food and Agricultural Organisation of the United Nations

FC ..... Fuel Consumption

GHG ..... Greenhouse Gas

GWP ..... Global Warming Potential

IBE ..... Inspection Body for Emission Inventories

IMEO ..... International Methane Emissions Observatory

IPCC..... Intergovernmental Panel on Climate Change

IEA ..... International Energy Agency

ISO..... International Standards Organisation

LULUCF..... Land Use, Land-Use Change and Forestry – IPCC CRT Category 4

NEDC..... New European Driving Cycle

NEMO ..... Network Emission Model (for the Transport Sector)

NFI..... National Forest Inventory

NFR..... Nomenclature for Reporting (Format of Reporting under the UNECE/CLRTAP Convention)

NISA ..... National Inventory System Austria

OGMP ..... Oil and Gas Methane Partnership

OLI..... Österreichische Luftschadstoff-Inventur
Austrian Air Emission Inventory

PC ..... Passenger Car

QA/QC..... Quality Assurance/Quality Control

QMS ..... Quality Management System

SNAP ..... Selected Nomenclature on Air Pollutants

TAN ..... Total ammoniacal nitrogen

TERT ..... Technical Expert Review Team (under the MMR)

UNECE/CLRTAP..... United Nations Economic Commission for Europe,
Convention on Long-range Transboundary Air Pollution

UNFCCC ..... United Nations Framework Convention on Climate Change

WLTP ..... Worldwide Light Vehicle Test Procedure

ZBD ..... Zentrale Begutachtungsdatenbank

ANNEX I: EMISSION TRENDS

This Annex presents emission trends expressed in kt CO_2 equivalents applying the GWPs according to the 5th Assessment Report ('AR5').

This report uses the following UNFCCC notation keys for all tables:

NE (not estimated)..... for existing emissions by sources and removals by sinks of greenhouse gases which have not been estimated.

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.

NO (not occurring)..... for emissions by sources and removals by sinks of greenhouse gases that do not occur for a particular gas or source/sink category.

NA (not applicable)..... for activities in a given source/sink category that do not result in emissions or removals of a specific gas.

C (confidential) ..... for emissions which could lead to the disclosure of confidential information if reported at the most disaggregated level. In this case a minimum of aggregation is required to protect business information.

Table A.I-1: Emission Trends GHG emissions (kt CO_2e in AR5).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total Emissions/Removals with LULUCF	65,659	63,156	77,937	82,248	79,877	77,544	71,191	73,517	72,043	71,162	75,690	67,227	75,085	72,012	78,039	81,117	86,497	73,596	74,604	73,222	76,150
Total Emissions without LULUCF	79,427	81,208	93,165	90,739	87,935	87,347	80,736	85,284	83,093	80,327	80,710	77,057	79,201	80,150	82,468	79,289	80,507	74,560	77,976	73,439	68,635
1. Energy	52,835	55,459	66,889	64,097	60,664	59,709	56,569	59,453	57,141	54,997	55,169	51,439	53,218	54,441	56,154	54,708	55,093	50,142	52,042	48,434	44,451
A. Fuel Combustion (Sectoral Approach)	51,893	54,754	66,239	63,415	59,973	59,056	55,865	58,765	56,463	54,307	54,487	50,797	52,595	53,855	55,535	54,156	54,567	49,641	51,575	47,999	44,044
1. Energy Industries	14,008	12,314	16,025	14,821	13,616	13,447	12,437	13,747	13,354	11,974	10,973	9,353	10,458	10,240	10,852	10,003	10,035	8,667	8,686	8,173	7,292
2. Manufacturing Industries and Construction	9,609	10,023	11,363	11,192	10,753	11,096	10,568	11,189	11,153	11,021	10,766	10,373	10,248	10,583	10,816	10,926	10,994	10,758	11,172	10,740	9,633
3. Transport	13,950	18,792	24,930	23,664	23,888	22,418	21,761	22,569	21,919	21,735	22,914	22,228	22,705	23,537	24,267	24,387	24,439	21,122	21,916	20,765	19,842
4. Other Sectors	14,287	13,582	13,883	13,700	11,680	12,062	11,067	11,231	10,011	9,551	9,810	8,819	9,162	9,472	9,573	8,812	9,071	9,065	9,773	8,292	7,250
5. Other	38	42	38	37	35	33	31	30	28	26	25	23	22	23	28	29	29	29	29	28	28
B. Fugitive Emissions from Fuels	942	705	650	682	691	653	704	687	678	689	682	642	623	586	619	552	525	501	467	435	407
1. Solid Fuels	373	30	0,2	0,2									NO,IE,NA								
2. Oil and Natural Gas	569	675	650	682	691	653	704	687	678	689	682	642	623	586	619	552	525	501	467	435	407
C. CO_2Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2. Industrial Processes and Other Product Use	13,641	14,454	15,651	16,163	16,936	17,324	14,001	15,965	16,161	15,728	16,096	16,171	16,610	16,321	17,077	15,499	16,469	15,516	17,023	16,161	15,463
A. Mineral Industry	3,138	2,775	2,903	3,056	3,272	3,285	2,729	2,673	2,797	2,715	2,730	2,730	2,753	2,797	2,807	2,917	2,825	2,837	3,040	2,917	2,561
B. Chemical Industry	1,464	1,523	922	965	888	983	780	778	782	756	694	808	779	799	741	640	837	779	785	679	670
C. Metal Industry	8,304	8,489	9,800	10,154	10,714	10,962	8,550	10,420	10,430	10,085	10,470	10,409	10,825	10,388	11,159	9,470	10,376	9,518	11,039	10,449	10,223
D. Non-Energy Products from Fuels and Solvent Use	349	217	182	178	179	176	172	171	167	158	155	150	144	146	151	153	153	159	170	178	162
E. Electronics Industry	133	420	342	356	367	349	112	144	113	97	86	93	102	88	87	78	85	57	53	55	58
F. Product Uses as Substitutes for ODS	NO	684	1,092	1,104	1,178	1,236	1,337	1,454	1,552	1,602	1,646	1,668	1,696	1,698	1,732	1,843	1,746	1,696	1,553	1,504	1,400
G. Other Product Manufacture and Use	253	346	410	350	338	334	321	325	319	314	316	313	311	405	399	397	448	470	383	380	389
H. Other (please specify)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	8,585	8,019	7,585	7,573	7,573	7,678	7,717	7,578	7,648	7,586	7,572	7,700	7,728	7,843	7,780	7,701	7,616	7,624	7,681	7,670	7,592
A. Enteric Fermentation	5,082	4,725	4,444	4,422	4,439	4,429	4,491	4,486	4,427	4,391	4,402	4,420	4,423	4,438	4,443	4,388	4,328	4,299	4,316	4,331	4,292
B. Manure Management	1,343	1,195	1,130	1,134	1,157	1,147	1,176	1,183	1,185	1,186	1,195	1,209	1,223	1,233	1,250	1,264	1,279	1,304	1,340	1,367	1,376
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	2,073	2,008	1,914	1,913	1,866	1,975	1,923	1,796	1,910	1,876	1,847	1,938	1,936	2,020	1,936	1,895	1,858	1,871	1,876	1,822	1,776
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
F. Field Burning of Agricultural Residues	1.1	1.0	0.9	0.8	0.9	0.8	0.8	0.7	0.5	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.0	NO	NO	NO
G. Liming	46	43	54	58	62	72	72	69	77	81	75	75	83	84	86	97	99	99	99	99	95
H. Urea application	9.6	19	22	25	28	26	31	29	27	31	30	34	35	39	38	32	27	25	23	26	30
I. Other carbon-containing fertilizers	31	27	20	20	20	27	23	15	21	22	22	24	27	29	26	26	25	25	27	24	22
J. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Land Use, Land-Use Change and Forestry	-13,768	-18,052	-15,228	-8,491	-8,057	-9,802	-9,545	-11,767	-11,051	-9,166	-5,020	-9,830	-4,115	-8,138	-4,429	1,828	5,990	-964	-3,372	-217	7,515
A. Forest Land	-13,532	-18,648	-14,512	-7,414	-5,650	-7,836	-11,136	-12,031	-11,069	-9,806	-6,578	-11,137	-5,528	-9,725	-5,459	1,067	4,711	-3,623	-4,317	-1,073	5,399
B. Cropland	341	140	33	19	-68	50	-29	-20	-8.6	-12	10	25	48	127	203	216	237	287	377	408	360
C. Grassland	821	611	859	864	869	873	709	708	700	698	701	702	724	706	690	665	664	664	657	659	670
D. Wetlands	66	58	69	61	62	72	104	104	108	105	131	106	95	111	95	95	92	92	91	91	91
E. Settlements	1,144	1,257	1,417	1,425	1,425	1,454	1,427	1,417	1,401	1,400	1,352	1,344	1,294	1,272	1,249	1,239	1,229	1,215	1,183	1,160	1,140
F. Other Land	514	419	366	357	348	339	507	506	505	504	503	502	505	509	512	515	519	522	526	530	533
G. Harvested Wood Products	-3,122	-1,889	-3,461	-3,803	-5,045	-4,755	-1,126	-2,452	-2,687	-2,055	-1,138	-1,372	-1,254	-1,137	-1,719	-1,969	-1,462	-122	-1,889	-1,992	-678
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	4,367	3,277	3,041	2,906	2,762	2,636	2,449	2,289	2,143	2,016	1,873	1,747	1,644	1,546	1,457	1,381	1,329	1,278	1,230	1,174	1,129
A. Solid Waste Disposal on Land	4,081	2,987	2,730	2,591	2,446	2,322	2,138	1,978	1,831	1,701	1,566	1,435	1,328	1,221	1,135	1,060	1,003	950	898	846	799

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
B. Biological Treatment of Solid Waste	35	81	116	123	128	129	130	134	136	140	132	138	141	146	144	144	148	150	153	149	149
C. Incineration and Open Burning of Waste	29	13	13	11	8.5	6.4	4.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
D. Waste Water Treatment and Discharge	223	196	182	181	179	178	176	175	174	173	172	171	173	176	176	175	176	176	176	177	178
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

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In the 'Austria's Annual Greenhouse Gas Inventory 1990–2023' report, the Umweltbundesamt presents updated greenhouse gas (GHG) emissions in Austria. In 2023, total GHG emissions amounted to 68.6 Mt CO_2e (without LULUCF). This corresponds to a 13.6% decrease compared to 1990 and a 6.5% decrease compared to 2022. Key drivers for the development 2022–2023 were the lower natural gas and gasoil consumption, as well as lower diesel oil sales in category Transport.

Emissions of GHG covered by EU Regulation No. 2018/842 ('Effort Sharing Regulation') amounted to around 44.2 Mt CO_2e in 2023 and were thus below the annual emission allocation for that year. Content and format of this report are in accordance with the obligations under the Governance Regulation (EU) No. 218/1999.

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