umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Austria's Annual Greenhouse Gas Inventory 1990–2022

Submission under Regulation (EU) No 2018/1999

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

AUSTRIA'S ANNUAL GREENHOUSE GAS INVENTORY 1990–2022

Submission under Regulation (EU) No 2018/1999

REPORT
REP-0892

VIENNA 2024

Since 23 December 2005 the Umweltbundesamt has been accredited as Inspection Body for emission inventories, Type A (ID No. 241), in accordance with EN ISO/IEC 17020 and the Austrian Accreditation Law (AkkG), by decree of Accreditation Austria (first decree, No. BMWA-92.715/0036-I/12/2005, issued by Accreditation Austria / Federal Ministry of Economics and Labour on 19 January 2006).

The information covered refers to the following accreditation scope of the IBE: 2006 IPCC GL for National Greenhouse Gas Inventories, 2006 GL Revised Supplementary KP and 2006 GL Supplement Wet-lands (akkreditierung-austria.gv.at/overview)

Project Manager	Katja Pazdernik
Authors	Michael Anderl, Jérôme Colson, Marion Gangl, Verena Kuschel, Lisa Makoschitz, Bradley Matthews, Merlin Mayer, Simone Mayer, Erwin Moldaschl, Katja Pazdernik, Stephan Poupa, Maria Purzner, Anne Karina Rockenschaub, Michael Roll, Wolfgang Schieder, Carmen Schmid, Günther Schmidt, Barbara Schodl, Elisabeth Schwaiger, Bettina Schwarzl, Gudrun Stranner, Peter Weiss, Manuela Wieser, Andreas Zechmeister
Reviewed and approved by	Michael Anderl
Layout	Thomas Lössl
Title photograph	© Markus Leitner

The authors of this report want to express their thanks to all experts at the *Umweltbundesamt* as well as experts from other institutions involved in the preparation of the Austrian Greenhouse Gas Inventory for their contribution to the continuous improvement of the inventory.

Reporting entity	Reporting entity
Überwachungsstelle Emissionsbilanzen *(Inspection Body for Emission Inventories)* at the **Umweltbundesamt GmbH** Spittelauer Laende 5, 1090 Vienna/Austria	**BMK** *(Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology)* Stubenring 1, 1012 Vienna/Austria
Date 15.01.2024	Responsible for the content of this report  DI Michael Anderl (Head of the inspection body)
Total Number of Pages 54 (including Annex)	

This report is compiled and published as an inspection report in accordance with the Accreditation Law and the international standard ISO/IEC 17020, in fulfilment of and in compliance with the IPCC 2006 Guidelines, the 2006 GL Revised Supplement KP as well as the 2006 GL Supplement Wetlands (scope of accreditation regarding GHG emissions) as well as the UNFCCC Reporting Guidelines.

For further information about the publications of the Umweltbundesamt please go to: http://www.umweltbundesamt.at/

Imprint

Owner and Editor: Umweltbundesamt GmbH
Spittelauer Laende 5, 1090 Vienna/Austria

This publication is only available in electronic format at https://www.umweltbundesamt.at/.

ISBN 978-3-99004-734-7

CONTENTS

VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten der Emissionen von Treibhausgasen (THG) Österreichs. Diese Daten betreffen die Emissionen des Jahres 2022 sowie die aktualisierte Zeitreihe der Jahre 1990 bis 2021. Damit liefert der Bericht Daten für das zweite Jahr der Zielperiode 2021-2030 unter der Effort-Sharing-Verordnung (ESR, 2018/842/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 „Common Reporting Format" (CRF) 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 Common Reporting Format (CRF) 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.

---

[1] VERORDNUNG (EU) 2018/842 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 30. Mai 2018 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) Nr. 525/2013

[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

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 auf EU-Ebene wird die österreichische THG-Inventur jährlich überprüft. 2022 konnten alle der im Rahmen der „initial checks“ [6] aufgeworfenen Fragen geklärt werden, weshalb Österreich nicht Gegenstand einer zweiten Stufe geworden ist.

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

15. Jänner *(Jahr n)*	Übermittlung der THG-Inventur an Europäische Kommission (CRF für die Jahre 1990 bis zum Jahr n-2)
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten durch die EK
15. März *(Jahr n)*	Übermittlung des (endgültigen) nationalen Inventurberichtes (NIR) an die EK
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten (CRF) und des nationalen Inventurberichtes (NIR) 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 2027 und 2032 vorgesehen.
15. April *(Jahr n)*	Übermittlung der THG-Inventur (CRF und NIR) 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 und Überarbeitung der THG-Inventur

Zur Erfüllung der Anforderungen, die sich aus der Klimarahmenkonvention und vor allem aus dem Inkrafttreten des Kyoto-Protokolls[7] am 16. Februar 2005 ergeben haben, wurde entsprechend Artikel 5.1 des Kyoto-Protokolls ein Nationales System eingerichtet. Ziel war es, die Qualität der Inventur sicherzustellen und kontinuierlich zu verbessern. Dazu wurde ein Gesamtkonzept für das

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

[6] Erste Stufe (“Step 1”) der jährlichen Überprüfung der Treibhausgas (THG) Emissionsinventur gemäß Artikel 19(2) der Verordnung (EU) Nr. 525/2013.

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

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[8].

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998[9] 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 2023	10. Jänner 2024	Common Reporting Format (CRF)

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)[10] ermittelt. Damit erfüllt Österreich die ab 2023 geltenden Anforderungen der EU Governance Regulation[2] an THG-Inventuren, die in ihrer Delegierten Verordnung 2020/1044[11] Artikel 2 („Treibhausgaspotentiale“) eine Verwendung der in Anhang 1 dieser Verordnung angeführten Treibhausgaspotentiale gemäß AR5 vorschreibt.

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

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

[10] 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/

[11] 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 2022. By documenting annual emissions up to and including the year 2022, the report presents GHG data for the first two years of the target period under the current EU Effort-Sharing-Regulation (ESR, Regulation (EU) 2018/842[12]) 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*")[13] 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*[14]. Furthermore, Member States are required to submit information in accordance with the *Reporting Guidelines (Decision 24/CP.19)*[15] 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 (NIR) and inventory information as listed in Annex V referred to in Article 26(3) on 'Annual Reporting' of the EU Governance Regulation[13].

The 15 January submission may include preliminary data. Finalized data complemented with a comprehensive national inventory report shall be subsequently submitted by 15 March each year.

The elements of the so-called 'Short-NIR' 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)

[12] REGULATION (EU) 2018/842 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 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 amending Regulation (EU) No 525/2013

[13] 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

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

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

2018/1999[13] (Governance Regulation). In addition to the Governance Regulation, a Commission Implementing Regulation (EU) 2020/1208[16] 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 Format (CRF), including in particular Sectoral Reports, Sectoral Background Tables and the Reference Approach for CO_2 are submitted separately in digital form only[17].

Table 1: Status of the present report.

Reporting Obligation	Format	Inventory	Version
Governance Regulation	Common Reporting Format (CRF)	OLI 2023	January 10th 2024

Geographical coverage is complete. There is no part of the Austrian territory that is not covered by the inventory. Emissions from most sources specified in the CRF have been estimated. Information on sources not estimated ('NE') and emissions included under sources other than those stipulated in the CRF ('IE') are included in CRF 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')[11] of the Intergovernmental Panel on Climate Change (IPCC)[18]. Thus, Austria fulfills the requirements of the EU Governance Regulation on GHG inventories applicable from 2023 onwards, which, by means of its Delegated Regulation 2020/1044[19] Article 2 ('Greenhouse Gas Potentials'), requires the use of the GHG potentials listed in Annex 1 of this Regulation in accordance with AR5.

[16] 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

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

[18] 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

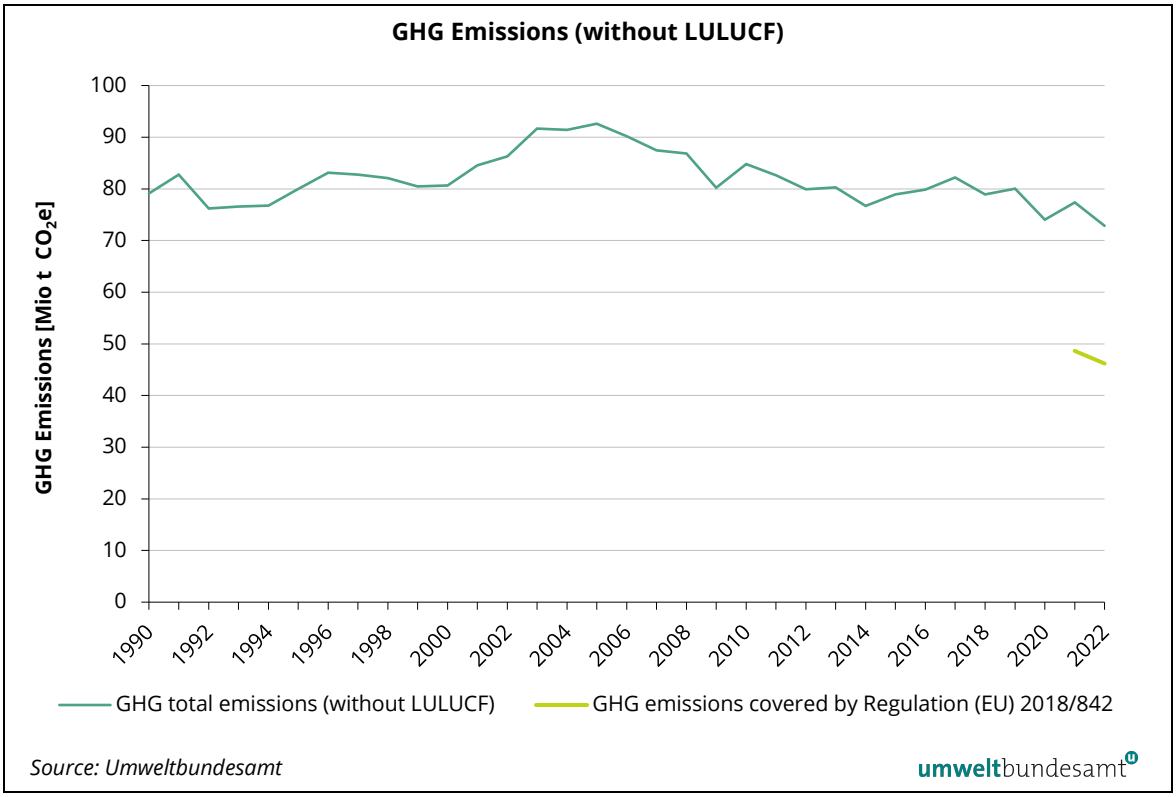
[19] COMMISSION DELEGATED REGULATION (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission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

2 EMISSION TRENDS

2.1 Overview

In 2022 Austria's total greenhouse gas (GHG) emissions (without Land Use, Land Use Change and Forestry – LULUCF) amounted to 72.8 Mt CO_2 equivalents (CO_2e). Compared to the 1990 base year[20], 2022 GHG emissions without LULUCF decreased by 7.9%. Compared to 2021 GHG emissions decreased by 5.8%.

Figure 1: Trend in GHG emissions for 1990-2022 without LULUCF.



Greenhouse gas emissions covered by Regulation (EU) No. 2018/842 ('Effort Sharing Regulation') amounted to 46 188 123 t CO_2 equivalents in 2022, and were thus below the level of the annual emission allocation (AEA) for that year (see Table 2).

[20] 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**
Total GHG emissions without LULUCF	77 359 765	72 844 017
Total verified emissions from stationary installations under Directive 2003/87/EC2	28 703 349	26 626 258
Total ESR emissions[21]	48 632 496*	46 188 123*
Annual Emission Allocations (AEA) pursuant to Article 4(3) of Regulation (EU) 2018/842[22]	48 768 448	47 402 495
Difference between AEA and reported total ESR emissions	+135 952	+1 214 372

* *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 2022 are around 1.2 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 2021 and 2022 took place in the sectors *Energy (CRF 1)* (−3 453 kt CO_2e; −6.7%) and *Industrial Processes and Other Product Use (CRF 2)* (−962 kt CO_2e; −5.7%).

The main reasons for the emissions decrease in sector *Energy (CRF 1)* were the lower natural gas and gasoil consumption in category *1.A.4 Other Sectors* as well as the lower diesel sales (category *1.A.3 Transport)*, especially in fuel exports with heavy duty vehicles.

The emissions decrease in *Industrial Processes and Other Product Use (CRF 2)* was mainly due to a decrease in production, such as iron and steel production, as well as ammonia production. The main driver for this reduction was increased energy costs that were affected by the geopolitical situation.

Net removals from *LULUCF (CRF 4)* show a decrease of 60 % (−6 602 kt CO_2e) from 2021 to 2022, mainly caused by a decreased sink in the soil pool of *4.A.1 Forest land remaining forest land*. However it should be noted, that large annual variations (both positive and negative) in the GHG balance of *Forest land remaining forest land* (and the *LULUCF* sector) occur over the entire 1990-2022 time series. Furthermore, the results of the soil pool of *4.A.1* in 2022 represent an interim extrapolation of the average of the model simulations for the years 2009-2019 until new model results will be available.

Emissions from *Agriculture (CRF 3)* decreased slightly by 0.6 % (−45 kt CO_2e) from 2021 to 2022, mainly due to falling emissions from mineral fertilizer application, caused by high prices.

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

[22] as included in Annex II of COMMISSION IMPLEMENTING DECISION (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council

The declining emission trend of recent decades continues for the sector *Waste (CRF 5)* with a further decline by 4.6 % (−56 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	52 666	13 633	8 416	-11 682	4 367	NO*
1995	54 161	13 625	8 145	-19 334	4 055	NO
2000	55 290	14 417	7 657	-13 958	3 277	NO
2005	66 714	15 653	7 196	-18 099	3 041	NO
2010	59 279	15 938	7 287	-19 439	2 289	NO
2011	56 970	16 130	7 363	-15 035	2 143	NO
2012	54 829	15 732	7 312	-5 443	2 016	NO
2013	55 004	16 122	7 311	-5 911	1 873	NO
2014	51 279	16 248	7 447	-7 286	1 747	NO
2015	53 062	16 750	7 479	-6 234	1 644	NO
2016	54 285	16 437	7 595	-6 667	1 546	NO
2017	55 999	17 191	7 549	-2 930	1 457	NO
2018	54 553	15 535	7 435	5 222	1 381	NO
2019	54 935	16 470	7 324	2 437	1 329	NO
2020	49 994	15 461	7 297	-5 843	1 278	NO
2021	51 916	16 892	7 322	-11 076	1 230	NO
2022	48 464	15 929	7 277	-4 474	1 174	NO

* *not occurring*

The most important gas in the Austrian GHG balance remains carbon dioxide (CO_2) with a share of 84 % of total 2022 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 8.9 % to total national GHG emissions. Nitrous oxide (N_2O), with agricultural soils as the main source, contributes another 4.2% in 2022. The remaining 2.5% 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	62 184	11 321	4 028	2.0	1 063	485	NO,NA
1995	64 061	10 515	3 871	324	75	1 134	6.0
2000	66 177	9 218	3 885	678	80	592	9.8
2005	79 092	8 519	3 200	1 109	150	509	26
2010	72 008	7 917	3 014	1 434	71	346	3.9
2011	69 901	7 684	3 108	1 527	66	317	3.8
2012	67 274	7 551	3 082	1 607	46	321	8.0
2013	67 767	7 431	3 066	1 678	45	315	9.1
2014	64 166	7 274	3 148	1 752	48	324	9.9
2015	66 357	7 188	3 163	1 850	45	319	13
2016	67 217	7 110	3 251	1 828	46	405	5.7
2017	69 598	7 081	3 196	1 857	40	412	11
2018	66 562	6 853	3 156	1 890	29	398	15
2019	67 946	6 711	3 149	1 755	35	450	13
2020	62 176	6 607	3 105	1 650	27	455	11
2021	65 757	6 622	3 143	1 431	23	371	12
2022	61 489	6 498	3 040	1 411	26	365	14

The dominant sector causing most GHG emissions in Austria is *1 Energy*, causing 67 % of the total national GHG emissions in 2022 (67 % in 1990), followed by the sectors *2 Industrial Processes and Other Product Use* (22 % in 2022) and *3 Agriculture* (10 % in 2022).

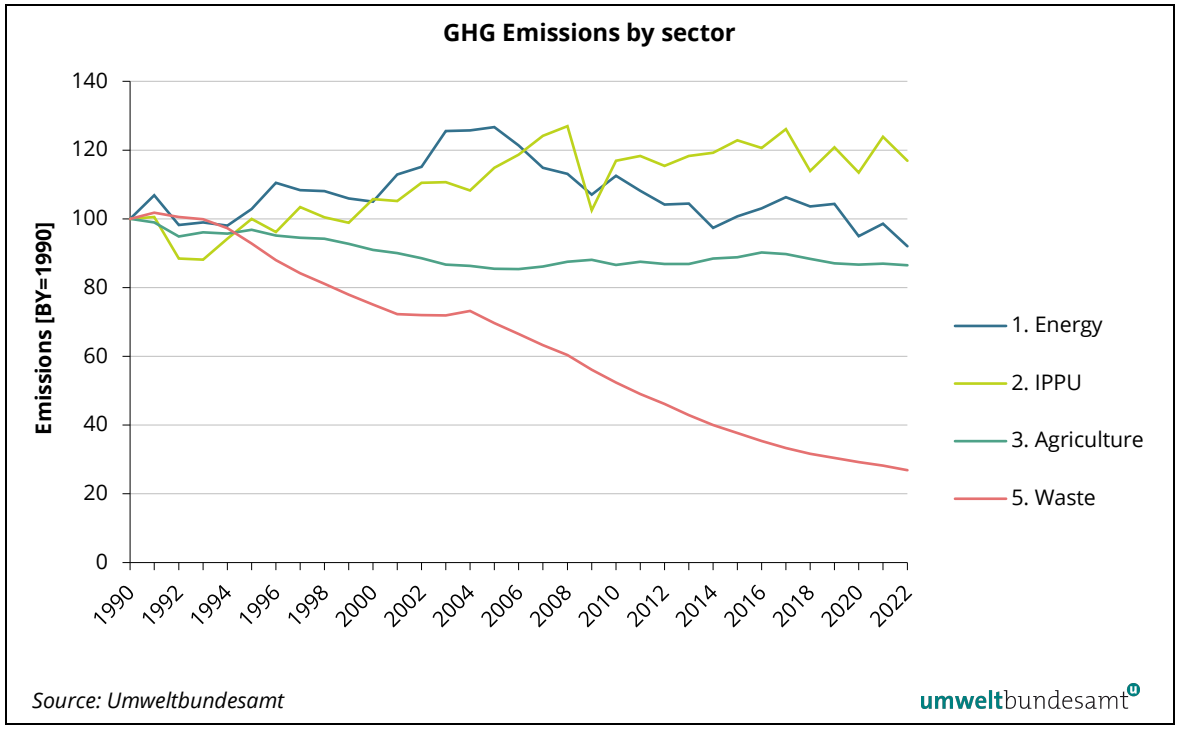
Table 5: Austria's greenhouse gas emissions (without LULUCF) for 1990 and 2022 expressed as aggregate levels and trends, as well as respective sector contributions.

GHG	1990	2022	Trend 1990–2022	1990	2022
	Emissions [kt CO_2e]			Share [%]	
Total	**79 083**	**72 844**	**−7.9%**	**100%**	**100%**
1 Energy	52 666	48 464	−8.0%	67%	67%
2 IPPU	13 633	15 929	+17%	17%	22%
3 Agriculture	8 416	7 277	-14%	11%	10%
5 Waste	4 367	1 174	−73%	5.5%	1.6%

Total emissions without emissions from sector LULUCF

The only sector with 2022 GHG emissions above the level in 1990 is *2 Industrial Processes and Other Product Use* (+17%; +2 296 kt CO_2e). All other sectors show decreasing trends, with the most significant decreases in GHG emissions in the sectors *5 Waste* (−73%; −3 193 kt CO_2e) and *3 Agriculture* (−14%; −1 139 kt CO_2e).

Figure 2: Trend in 1990-2022 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 2022, greenhouse gas emissions from sector *1 Energy* amounted to 48 464 kt CO_2 equivalents, which corresponds to 67% of total national emissions. 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 43% in 2022, followed by *1.A.2 Manufacturing Industries and Construction* (22%), *1.A.4 Other Sectors* (17%) and the sub-category *1.A.1 Energy Industries* (17%). The most important **greenhouse gas** is CO_2, contributing 97.7% to total sectoral GHG emissions, followed by CH_4 (1.2%) and N_2O (1.1%).

From 2021 to 2022, emissions from sector *1.A Fuel Combustion Activities* decreased by 6.7% (−3 432 kt CO_2e). The main drivers of the trend were the categories *1.A.4 Other Sectors* (−1 516 kt CO_2e) due to lower natural gas (-19%) and gasoil (-14%) consumption and *1.A.3 Transport* (−1 210 kt CO_2e) due to lower diesel oil (-5.6%) sales.

Between 2021 and 2022, emissions from *1.A.1 Energy* decreased by 4.9% (−432 kt CO_2e), which was mainly due to lower emissions from *1.A.1.b Petroleum Refining* (−496 kt CO_2e).

Emissions from category *1.A.2 Manufacturing Industries and Construction* decreased by 2.5%, mainly due to lower consumption of natural gas. The category *1.A.4 Other Sectors* emissions decreased by 15% following heating degree days being 13% lower in 2022 than in 2021.

The overall trend of greenhouse gas emissions of the *Energy* sector shows 7% lower emissions for 2022 compared to 1990 although emissions from *1.A.3.b Road transport* are 48% 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 2022

In 2022, emissions from sub-category ***1.A.1 Energy Industries*** were 39% 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 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 1.6% in 1990 to 33% in 2022. The contribution of hydro, wind and photovoltaic power plants to total public electricity production increased from 69% in 1990 to 81% in 2022. Electricity consumption has increased by 49% since 1990; however, since 2002 the increase in consumption has been largely covered by electricity imports.

Energy related GHG emissions from ***1.A.2 Manufacturing Industries and Construction*** increased by 11% from 1990 to 2022, mainly due to increasing emissions from *Off-road vehicles and other machinery (1.A.2.g.7)* as well as the *Chemicals Industry (1.A.2.c)*. Emissions from *Pulp, Paper and Print (1.A.2.d)* and *Other Manufacturing Industries (1.A.2.g.8)* are however decreasing since 1990. Fuel consumption increased by 40% 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 +11%) compared to the increase in fuel consumption.

The category ***1.A.3 Transport*** showed an increase in GHG emissions since 1990 (+48%) 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. **From 2021 to 2022** emissions from sub-category *1.A.3.b Road Transportation* declined by 4.8% due to a drop in diesel sales especially in fuel exports with heavy duty vehicles.

The variation in demand for heating and hot water generation due to climatic circumstances and the shift in the fuel mix are the most important drivers for emissions from category ***1.A.4 Other Sectors***. Emissions in 2022 were 42% 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 (less carbon intensity of overall declining fossil fuel use), 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 19% since 1990.

Emissions from ***1.B Fugitive emissions*** decreased by 60% 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 1990 level (−22%) mainly because volumes of crude oil and crude gas produced declined in the last years.

2.2.2 Industrial Processes and Other Product Use

In 2022, greenhouse gas emissions from *Industrial Processes and Other Product Use* amounted to 15 929 kt CO_2 equivalent, which corresponds to 22% of total national emissions.

The most important **categories** of this sector are *metal industry* and *mineral industry*, generating 65% and 18% of total sectoral emissions, respectively. The most important **greenhouse gas** of this sector is CO_2 with a contribution of 88% to total sectoral emissions, followed by HFCs with 9% and SF_6 with 2.3%, the other GHGs contribute less than 0.4% each.

From 2021 to 2022, overall emissions from this sector decreased by 5.7% mainly due to a decrease in iron and steel production (−6.5% of emissions), in ammonia production (-16% of emissions) and some mineral industry sub categories.

The **overall trend** in GHG emissions from *Industrial Processes and Other Product Use* shows an increase of 17% from 1990 to 2022. Within this period, emissions were at minimum in 1993 then increased until peaking in 2008. Since then, emissions fluctuated just below this maximum. **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 1990-2022 period from 2 to 1 411 kt CO_2 equivalent.

Sub-category trends between 1990 and 2022

The largest increase in GHG emissions between 1990 and 2022 can be observed in the *metal industry* due to an increase in GHG emissions from iron and steel production (+50%). In the categories *mineral industry* and *chemical industry*, GHG emissions declined over the same period by 6.8% and 54%, respectively. Emissions from *non-energy products from fuels and solvent use* dropped by 51%, 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 (+335% 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 2022, greenhouse gas emissions from *Agriculture* amounted to 7 277 kt CO_2 equivalent, which correspond to 10% of total national emissions.

The **most important categories** of this sector are *enteric fermentation* (59%) and *agricultural soils* (24%). *Agriculture* is the largest source of national N_2O and CH_4 emissions: in 2022, 73% (8.3 kt N_2O) of total N_2O emissions and 76% (176 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 68%, and N_2O, with a share of 30%. CO_2 emissions account for 2.0% of the emissions from this sector.

From 2021 to 2022 GHG emissions decreased by 0.6%, mainly due to falling emissions from mineral fertilizer application (−8.7%). The reason for this is lower sales volumes due to the significant increase in energy and raw material prices, which lead to higher prices on the fertilizer market.

The **overall trend** in GHG emissions from *Agriculture* shows a decrease of 14% from 1990 to 2022. 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 2022, net removals from sector *LULUCF* amounted to −4 474 kt CO_2 equivalent, which correspond to 6.1 % of national total GHG emissions (without LULUCF) in the same year.

With regard to the **overall trend**, the net removals from *LULUCF* are 62% lower in 2022 compared to those in the base year 1990 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 2022 is about 75 %). 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 2003) as well as decay in forest soils, natural disturbances (windthrows and bark beetle infestations), 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 removals of −4 594 kt CO_2 equivalent in 2022 (including indirect emissions).

The *LULUCF* sector and the *Forest land* category represent net GHG sources in single years, namely in 2018 and 2019. The net source values in these years are explained by high harvest rates due to natural disturbances and low increments due to weather conditions. It should be noted that the *Forest land* results for the years 2020 to 2022 are extrapolated using the results of the last NFI 2016/21and relative harvest indices based on the harvest statistics for these years. An update for these most recent years will be reported in the 2025 submission.

Harvested Wood Products (4.G) is the second largest sink category and contributed –2 110 kt CO_2 equivalent in 2022. After the low domestic production and consequently exceptionally low HWP sink in 2020 (due to a huge amount of salvage logged disturbance wood from the years before, as well as low wood prices and the effects of the Corona pandemic), the net sink of the HWP category has increased in 2021 and 2022 again to a typical level as in the last years before 2020.

Together, CH_4 and N_2O emissions amounted to 155 kt CO_2 equivalent (including indirect emissions). Total net emissions arising from the other non-forest categories (excluding HWPs) amounted to 2 230 kt CO_2 equivalent in 2022 (including indirect emissions).

2.2.5 Waste

In 2022, greenhouse gas emissions from the sector *Waste* amounted to 1 174 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 72% of the emissions from this sector in 2022, followed by *waste water treatment and discharge* (15%) and *biological treatment of solid waste* (13%). The most important greenhouse gas is CH_4 with a share of 81% in emissions, mainly arising from *solid waste disposal*, followed by N_2O with 19% and CO_2 with 0.2%.

From 2021 to 2022 GHG emissions continued to decrease (−4.6%) 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 73% from 1990 to 2022. 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 reported this year in sum differ only slightly from the data submitted last year. The national total (excl. LULUCF) for the base year is 0.04% (+35 kt CO_2e) higher than reported last year. The national total (excl. LULUCF) for 2021 is 0.22% (−173 kt CO_2e) lower than the value submitted last year.

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

	National Total GHG emissions without LULUCF			
	OLI 2023	**OLI 2022**	**Recalculation Difference**	
	[kt CO_2e]	**[kt CO_2e]**	**[kt CO_2e]**	**[%]**
1990	79 083	79 047	+35	0.04%
1995	79 986	79 953	+33	0.04%
2000	80 640	80 619	+21	0.03%
2005	92 605	92 589	+16	0.02%
2010	84 793	84 693	+100	0.12%
2011	82 607	82 506	+101	0.12%
2012	79 889	79 788	+101	0.13%
2013	80 310	80 229	+81	0.10%
2014	76 721	76 663	+59	0.08%
2015	78 935	78 884	+50	0.06%
2016	79 863	79 821	+42	0.05%
2017	82 195	82 132	+63	0.08%
2018	78 903	78 854	+49	0.06%
2019	80 058	79 994	+64	0.08%
2020	74 030	73 911	+119	0.16%
2021	77 360	77 532	-173	-0.22%

National total emissions (excluding LULUCF) for **1990** were revised upwards since last years' submission (+ 35 kt CO_2e), mainly due to revised estimates reported for sectors *2 IPPU* and *3 Agriculture*. Under *2 IPPU*, additional processes in pulp and paper production related to limestone or lime use and PCC production were considered in this submission, changing the emissions of *2.A.2 Lime Production* over the entire time series. *Indirect N_2O emissions from Managed Soils (3.D.2)* were revised as updated emission factors from the new EMEP/EEA GB 2023 were applied in the ammonia inventory affecting the indirect N_2O emissions from atmospheric deposition as well.

Emissions for **2021** (without LULUCF) are lower (-173 kt CO_2e) than reported in the previous submission, mainly due to revised estimates in Sector *1 Energy*, particularly the category *1.A.4 Other Sectors* following revisions of the energy balance. Further revisions were reported for *1.A.2.c Chemicals* due to revisions of the energy balance, *1.A.3.b Road transport* (in particular for *heavy duty trucks and busses*) due to model (fuel consumption) updates and *2.F.1 Refrigeration and Air Conditioning* due to QA/QC measures.

In addition, revised values are also reported in categories *3.A Enteric Fermentation* and *5.A Solid Waste Disposal* due to updated activity data.

Table 7: Recalculations per sector

	OLI 2023		OLI 2022		Recalculation Difference	
THG	**1990**	**2021**	**1990**	**2021**	**1990**	**2021**
	[kt CO_2e]		**[kt CO_2e]**		**[kt CO_2e]**	
Total*	**79 083**	**77 360**	**79 047**	**77 532**	**+35**	**-173**
1. Energy	52 666	51 916	52 665	52 142	+0.9	-225
2. IPPU	13 633	16 892	13 615	16 959	+18	-67
3. Agriculture	8 416	7 322	8 400	7 221	+17	+101
4. LULUCF	-11 682	-11 076	-12 207	-10 402	+526	-674
5. Waste	4 367	1 230	4 367	1 211	-	+19

* *without LULUCF*

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)	2021
	Recalculation Difference [kt CO_2e]	
Total	**+35**	**-173**
CO_2	+17	-261
CH_4	+2.0	+123
N_2O	+17	+21
HFC, PFC, SF_6, NF_3	0	-54

without LULUCF

1990-emissions of CO_2, CH_4 and N_2O were revised upwards (+35 kt CO_2e in total), whereas no recalculations were reported for F-gases.

For 2021, CO_2 and F-gas emissions were revised downwards (-261 kt CO_2e and -54 kt CO_2e resp.), whereas CH_4 and N_2O emissions were revised upwards (+ 123 kt CO_2e and + 21 kt CO_2e resp.). Recalculations of CH_4 and N_2O are largely attributable to revisions in sector *3 Agriculture*. Recalculations of CO_2 mainly occur in sector *1 Energy*, in particular in sub-category *1.A.4.b Other sources – Residential (*stationary combustion*)*, following the revisions of the energy balance.

3.2 Sectoral recalculations

The following section provides further explanations for sectoral recalculations. Further background information and a complete description of the recalculation for the period 1990–2021 will be presented in Austria's National Inventory Report 2024.

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 2021) with the following **main implications** for energy consumption as used in the inventory and the corresponding CO_2 emissions:

- Natural gas 2021: Gross inland consumption has not been revised. Transformation input has been revised by +0.6 PJ (+33 kt CO_2 for *1.A.1.a*). Own use of the energy sector has been revised by +0.4 PJ (+21 kt CO_2 for *1.A.1.c*). -1.8 PJ (-97 kt CO_2) of final energy consumption has been subtracted from *1.A.4* and +0.8 PJ (+43 kt CO_2) has been shifted to *1.A.2*.
- Gasoil 2021: Gross inland consumption has been revised by -2.2 PJ (-166 kt CO_2), of which -1.1 PJ final energy consumption for *1.A.2* (-84 kt CO_2) and -1.1 PJ for *1.A.4* (-82 kt CO_2).
- LPG 2021: Minor shifts (0.1 PJ) from *1.A.4* and *Transport* to 'non energy use'.
- Residual fuel oil: 0.7 PJ (59 kt CO_2) has been shifted from *1.A.4* to *1.A.2*.
- Coal 2021: Final energy consumption has been revised by -0.1 PJ which results in -16 kt CO_2 for *1.A.4* and + 6 kt CO_2 for *1.A.2*.
- Solid biomass 2021: Final energy consumption has been revised by +6.9 PJ, which has been mostly allocated to the residential sector (*1.A.4b*).

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

Revision 2021: +11.2 kt CO_2e

Energy consumption for non-road mobile machinery in the industrial sector has been revised for 2021 due to an update of the industrial production index.

Methodological changes

For 1990 to 2021, 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

Update/Improvement of activity data

1.A.3.b Road transport

Revision 2021: -10.2 kt CO_2e

Revision of real fuel consumption for PC and LDV PHEV

The energy consumption in vehicle concepts with fuel combustion and electric motor is subject to high uncertainties. The fact is that in reality there are use cases with a high proportion of kilometres driven electrically, but also with the almost exclusive use of the combustion engine (ITNA, 2023[23], p.9). For this reason, a more pessimistic charging behaviour for PHEV vehicles has been assumed, which increased the real fuel consumption of PHEV cars (petrol) and LDV (petrol), especially in 2021.

Correction factor for real-world fuel consumption for LDV

The real-world consumption correction factor - when switching from NEDC (New European Driving Cycle) to WLTP (Worldwide harmonized Light vehicles Test Procedure) standard values - has been reduced in the NEMO emissions calculation model for LDV according to the latest CO_2 monitoring.

Update of specific vehicle mileage per year

Improvement of data evaluation in the central vehicle assessment database (ZBD - annual "sticker check" in accordance with §57a KFG). An update of the relevant input data made it possible to evaluate half-years for 2021 and 2022 and thus define the specific annual mileage of vehicles more precisely. This has led to an increase for LDV and 2-wheelers for 2021 compared to last year's inventory.

In general, data from the ZBD is used to evaluate the specific yearly mileage for vehicle categories PC, LDV, buses and 2-wheelers.

Update of NEMO fleet model

Due to an adjustment of the age distribution in the fleet model, the proportion of more efficient EURO V and EURO VI trucks in total HDV mileage has increased slightly towards the end of the time series. This results in a reduction of fuel consumption in category HDV (domestic trucks/trailers) and consequently in a GHG reduction.

As a result of the retrospective reduction of fuel consumption for domestic HDV (*1.A.3.b.iii*) and the increase in *1.A.3.g.7 off-road industry* and in *1.A.3.b road transport (domestic)* - due to methodological reasons - the energy use in fuel exports must be reduced, as the total amount of fuel sold in 2021 has remained unchanged and may not be changed. It is simply a shift from fuel exports to fuel

[23] SCHWINGSHACKL, M. & REXEIS, M. (2023): Straßenverkehrsemissionen und Emissionen sonstiger mobiler Quellen Österreichs für die Jahre 1990 bis 2022. ITNA – Institut für Nachhaltige Antriebe und Thermodynamik. Erstellt im Auftrag der Umweltbundesamt GmbH. Graz 2023.

used in inland. This is irrelevant for total GHG emissions from road transport given the established "fuel sold" principle in accordance with international reporting requirements.

1.A.4.c.2 Mobile combustion in agriculture and forestry

Revision 2021: +0.08 kt CO_2e

The CH_4 proportions of HC have been updated to exact proportions of 7%, 3.4% and 2.4% per device group according to the EMEP/EEA Guidebook 2023 [1-a-4-non-road Table 3-6, page 37ff]. The overall CH_4 proportions of HC have been revised slightly upwards.

1.A.5 Military

Revision 2021: -2.1 kt CO_2e

Confidential data (fuel consumption) became available from a survey for military off-road vehicles for the year 2021. The evaluation for 2021 and a separate expert assessment helped to refine the trend from 1990 to 2022. Consequently, the entire time series has been recalculated, which led to a reduction of GHG emissions for military non-road mobile machinery by 0.38 kt.

Military air traffic continues to be subject to great uncertainty due to a lack of actual data. The extrapolated value 2021 from the previous inventory has been revised based on an update of the inventory of helicopters and aircraft in the Austrian military available for 2022. This resulted in a reduction of GHG emissions for military aviation by 1.76 kt.

Memo Item International Bunkers - Navigation

Revision 2021: -23.8 kt CO_2e

Due to a linking error in the GEORG "Danube Shipping" module, the value for 2021 was incorrect and has been corrected.

3.2.1.3 Fugitive Emissions

No recalculations are reported for sector *1.B.* in this years' submission.

3.2.2 Industrial Processes and Other Product Use

Consideration of additional sources/processes

2.A.2 Lime Production

For three processes in pulp and paper production reported in the ETS related to limestone production or lime use and PCC production respectively, time series were prepared and emissions and removals were considered in category *2.A.2 Lime Production* (recalculation difference 2021: - 9.41 kt CO_2).

2.F.1.e Mobile Air Conditioning

Following the recommendation of the 2022 UNFCCC review, an estimate for emissions from air conditioning stock for construction site vehicles was included (recalculation difference 2021+12.44 kt CO_2e).

Allocation of emissions between subcategories

2.B.1 Ammonia Production / 2.D.3.ii 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 (–0.02 kt CO_2 2021). Additionally, for the years 1990 – 2019, the recalculation of the time series of CH_4 emissions from *2.B.10.ii Urea Production* described below affected the reported CO_2 emissions from *2.B.1 Ammonia Production*.

Methodological improvements

2.B.10.ii Urea Production

An inconsistency in the time series was corrected: values reported by the company for methane emissions until 2019 were based on an assumed raw gas methane content, whereas from 2020 onwards measured data were used. The measured data showed that the methane content for the years until 2019 had been assumed too low. For this submission, emissions until 2019 are calculated using the average IEF of the years 2020-2022 for which measured raw gas composition is available (recalculation difference 2019: +2.09 kt CO_2e).

2.D.3.i Solvent Use

Data on facility level that is prepared by the operators according to the VOC directive were collected and incorporated. During intensive QC of the data, which included comparison with the data of 2015 and 2019, some corrections of the data for 2015 and 2019 were made, leading to a recalculation for most sub-categories from 2015 onwards. Also, corrections on the top down data were made: besides correction of minor transcription errors for the years 2016ff, non-solvent use of a new company became available which was considered for 2021, leading to a decrease of total solvent use in Austria. As bottom up data is extrapolated to this value, this resulted in lower activity data and thus lower emissions for 2021. Overall, the recalculation difference 2021 in this subcategory is –2.95 kt CO_2e.

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

A previous double-counting error was identified and corrected. During extensive QA/QC it became obvious that amounts of F-gases placed on the Austrian market reported as import were not imported by the company itself, but bought from an importer. The amounts were therefore already included in the reported amounts for F-gas import of the selling company. This led to a reduction of import data for the years 2011 onwards, affecting the two residual sub-categories *2.F.1.a Commercial Refrigeration* and *2.F.1.d Industrial Refrigeration.*

Also, for supermarkets, which are considered separately in the calculation, an allocation error for one specific refrigerant was corrected, which also affected activity data and emissions from these two sub categories.

Overall, the recalculations led to a reduction of emissions of 68.48 kt CO_2e in 2021.

2.F.1.e Mobile Air Conditioning

For trains, refill data has become available for the years 2014ff and was used instead of calculation of emissions assuming a leakage of 5%. As data showed that the leakage factor was higher than the previously assumed value, the average leakage factor of 2014-2022 was applied for the years before 2014 (recalculation difference 2021: +3.97 kt CO_2e).

2.F.2.a Foam Blowing

The emission factor for 2020 and 2021 was corrected, it was a software generated artefact of extrapolating the methodology to the next year (recalculation difference 2021: -3.47 kt CO_2e).

Update of activity or emissions data

2.C.1.b Steel

CH_4 emissions for 2021 that previously were extrapolated have been updated (recalculation difference 2021: - 0.11 kt CO_2e).

2.F.1.d Transport refrigeration

Data for 2021 were updated (recalculation difference 2021: - 0.11 kt CO_2e).

2.F.3 Fire protection

Previously, emissions from stock in fire protection units was extrapolated for 2021, now the actual value is used (recalculation difference 2021: + 1.04 kt CO_2e).

2.G.2 Other uses of SF6 - particle accelerators.

Data for (medical) particle accelerators from 2012 onwards were updated (recalculation difference 2021: + 0.14 kt CO_2e).

3.2.3 Agriculture

Update of activity data

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

Livestock data – cattle < 1 year

The livestock category cattle < 1 year comprises slaughtering calves < 1 year, other male calves and cattle < 1 year, and other female calves and cattle <1 year according to the official statistics (Statistics Austria). The breakdown by type of use is determined by Statistics Austria using model calculations. Methodological improvements resulted in shifts between the cattle < 1 year sub-categories in the years 2003-2021 and thus lead to revised average values for gross energy intake, $N_{excretion}$ and $VS_{excretion}$ for cattle < 1 year.

Background data for feeding and nutrition of dairy and suckling cows

New figures for the protein and fat content of milk for the year 2021 became available (AMA 2023[24]). This update resulted in minor revisions of the values for gross energy intake, $N_{excretion}$ and $VS_{excretion}$ of dairy and suckling cows.

Biogas plants

New data on input materials for Austria's biogas plants became available from the compost and biogas association (Kompost- und Biogasverband[25]). The update resulted in slightly revised CH_4 and

[24] AMA (2023): https://www.ama.at/marktinformationen/milch-und-milchprodukte/rohmilchqualitaet

[25] KOMPOST- UND BIOGASVERBAND (2023): https://www.arbeitskreise.at/biogas-downloads/, accessed in November 2023

N_2O emissions with an impact on the source categories *3.B Manure Management, 3.D.a.2.a Animal manure applied to soils* and *3.D.a.2.c Other organic fertilizers applied to* soils for 2020 and 2021.

3.A Enteric Fermentation (CH_4)

This category has been revised due to updated activity and nutrition data (GE-intake; revision in category cattle <1 year – see above). The improvements resulted in updated emission amounts for the years 2003-2021 (+2.8 kt CH_4 for 2021).

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

Methane and N_2O emissions have been revised for the years 2003-2021 (+0.3 kt CH_4 for 2021, +0.004 kt N_2O for 2021), because of updated activity and nutrition data (see above).

3.D.a.2.a Animal Manure Applied to Soils

Updates and improvements as described above resulted in revised emissions from animal manure application for the years 2003-2021 (+0.01 kt N_2O for 2021).

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

As a result of updated activity data on input materials for biogas plants, N_2O emissions have been revised for the years 2020 and 2021 (-0.003 kt N_2O for 2021).

3.D.a.3 Urine and dung deposited by Grazing Animals

Livestock related updates as already described before, led to recalculated N_2O emissions for the years 2003-2021 (+0.002 kt N_2O for 2021).

3.D.a.5 Mineral Soils (N_2O)

Revisions of activity data (perennial cropland remaining perennial cropland, perennial cropland converted to annual cropland, annual cropland remaining annual cropland; for more information see chapter 3.2.4 on LULUCF) resulted in slightly revised N_2O emissions for the entire time series (-0.00001 kt N_2O for 2021).

Improvements of methodologies and emission factors

3.D Agricultural Soils (N_2O)

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

Atmospheric deposition: the main reasons for revised emissions are the application of updated Tier 2 NH_3 EF for mineral fertilisers and the update of the NH_3 EF for grazed sheep and deer according to the EMEP/EEA GB 2023 in the ammonia inventory as well as the adjusted activity data ($N_{excretion}$ values for cattle and biogas). As a result, the indirect N_2O emissions from atmospheric deposition have been revised upwards for the entire time series (+0.04 kt N_2O for 2021).

N leaching and run-off: reasons for the minor recalculations are the revised amounts of animal manure applied to soils (+0.001 kt N_2O for 2021).

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

4.A Forest land

The soil carbon stocks of land-use changes from/to settlement were updated on basis of an updated sealing ratio, which caused minor changes for the land-use change subcategory *Settlement* to *Forest land* for the whole time series in the range of -4.0 and 3.5 kt CO_2e per year compared to the last submission in 2023. The *Forest land* results for the years 2020 to 2022 are extrapolated using the results of the last NFI 2016/21and relative harvest indices based on the harvest statistics for these years. By introduction of a new reported year, the relative harvest indices for the years since 2020 and the biomass losses due to harvest changed accordingly. Therefore, the *Forest land* results for the years 2020 and 2021 of this submission differ from those of the 2023 submission by -941 kt CO_2e (2020) and -1 031 kt CO_2e (2021).

4.B Cropland

The land-use and land-use change assessment for the *Settlement* and *Wetland* subcategories for this submission was improved by integrating various geographically specific data sources, specifically for the years 2016 to 2022, but also consistently backwards to 1990. For area consistency reasons this improvement caused changes in the areas of the *Cropland* and *Grassland* categories and related land-use changes. These area improvements caused changes of the annual net emissions for the whole time series of the *Cropland* category in the range of 14 to 25 kt CO_2e per year compared to the last submission in 2023.

4.C Grassland

The land-use and land-use change assessment for the *Settlement* and *Wetland* subcategories for this submission was improved by integrating various geographically specific data sources, specifically for the years 2016 to 2022, but also consistently backwards to 1990. For area consistency reasons this improvement caused changes in the areas of the *Cropland* and *Grassland* categories and related land-use changes. In addition, wildfires at *Grassland* (and *Cropland* included in the *Grassland* figures) were estimated for the first time for submission 2024. On the basis of a comprehensive new study on *Grassland* mineral soils, the previous Tier 2 default estimate method for the mineral soil carbon stock changes of the *Grassland remaining Grassland* subcategory was removed from the category inventory model and exchanged by the Tier 1 assumption of no carbon stock changes for the whole time series. These improvements caused changes of the annual net emissions for the whole time series of the *Grassland* category in the range of 11 to 13 kt CO_2e per year compared to the last submission in 2023.

4.D Wetlands

The land-use and land-use change assessment for the *Settlement* and *Wetland* subcategories for this submission was improved by integrating various geographically specific data sources, specifically for the years 2016 to 2022, but also consistently backwards to 1990. In addition, updated activity data on wildfires at *Wetlands* (reeds) were included in the inventory for the 2024 submission. These improvements caused changes of the annual net emissions for the whole time series of the *Wetland* category in the range of -10 to 1 kt CO_2e per year compared to the last submission in 2023.

4.E Settlements

The land-use and land-use change assessment for the *Settlement* and *Wetland* subcategories for this submission was improved by integrating various geographically specific data sources, specifically for the years 2016 to 2022, but also consistently backwards to 1990. Furthermore, the results of a new comprehensive study on biomass stocks and growth rates of settlement trees and shrubs were included the inventory for the 2024 submission. Cadastral data on urban trees of several Austrian towns and new nationwide results of an assessment of the (crown) cover of trees, shrubs, low vegetation and sealing in settlement using GIS layers were used for improved estimates of the biomass and soil carbon stock changes of the *Settlement* category. These improvements caused changes of the annual net emissions for the whole time series of the *Settlement* category in the range of 275 to 498 kt CO_2e per year compared to the last submission in 2023.

4.F Other land

No changes

4.G HWPs

No changes

3.2.5 Waste

Update of activity data

5.A Solid Waste Disposal

Revisions are reported for the years 2018-2022 (2021: +20 kt CO_2e) as updated data on landfill gas recovery from a national study were made available (Umweltbundesamt 2023[26]). In the previous submissions, results from the preceding study (2019[27]) were used to derive assumptions on recovered amounts for the years 2018-2021.

5.C Incineration and Open Burning of Waste

In previous inventories, a share of 3% was assumed for the area of vineyards burnt for the entire time series according to an expert judgement from the Federal Association of Viniculture in 2001 (Bundesweinbauverband Österreich). According to current information from the Federal Association of Viniculture, the area of vineyards burnt has decreased over time and is assessed to be no more than 1 % of the total vineyard areas for the years 2010 onwards. The burning of vine is either prohibited or only permitted to a very limited extent in the relevant federal provinces. The area of vineyards burnt between 2001 and 2010 were determined by linear interpolation between the two, respective expert judgement estimates. This improvement resulted in revised emissions for the years 2002-2021 (-0.3 kt CO_2e).

[26] Umweltbundesamt (2023): Deponiegaserfassung 2018-2022 bei österreichischen Massenabfalldeponien. Grundlagenstudie für die Österreichische Luftschadstoff-Inventur (Sektor Abfallwirtschaft). https://www.umweltbundesamt.at/fileadmin/site/publikationen/rep0878.pdf

[27] Umweltbundesamt (2019): Deponiegaserfassung 2013–2017. https://www.umweltbundesamt.at/fileadmin/site/publikationen/rep0679.pdf

5.D Wastewater Treatment and Discharge

For *5.D.1 domestic wastewater* recalculations were carried out for 2021 (–0.4 kt CO_2e) as information on the connection rate for 2022 became available, affecting 2021 due to interpolation between 2020 and 2022.

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[28] 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 Format (CRF).

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[29], in Austria's NIR 2023[30] and in the NISA Implementation Report[31].

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[32]), 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.

---

[28] 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

[29] 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.

[30] UMWELTBUNDESAMT (2023): Austria's National Inventory Report 2023, Submission under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol. Report REP-0852. Umweltbundesamt, Vienna.

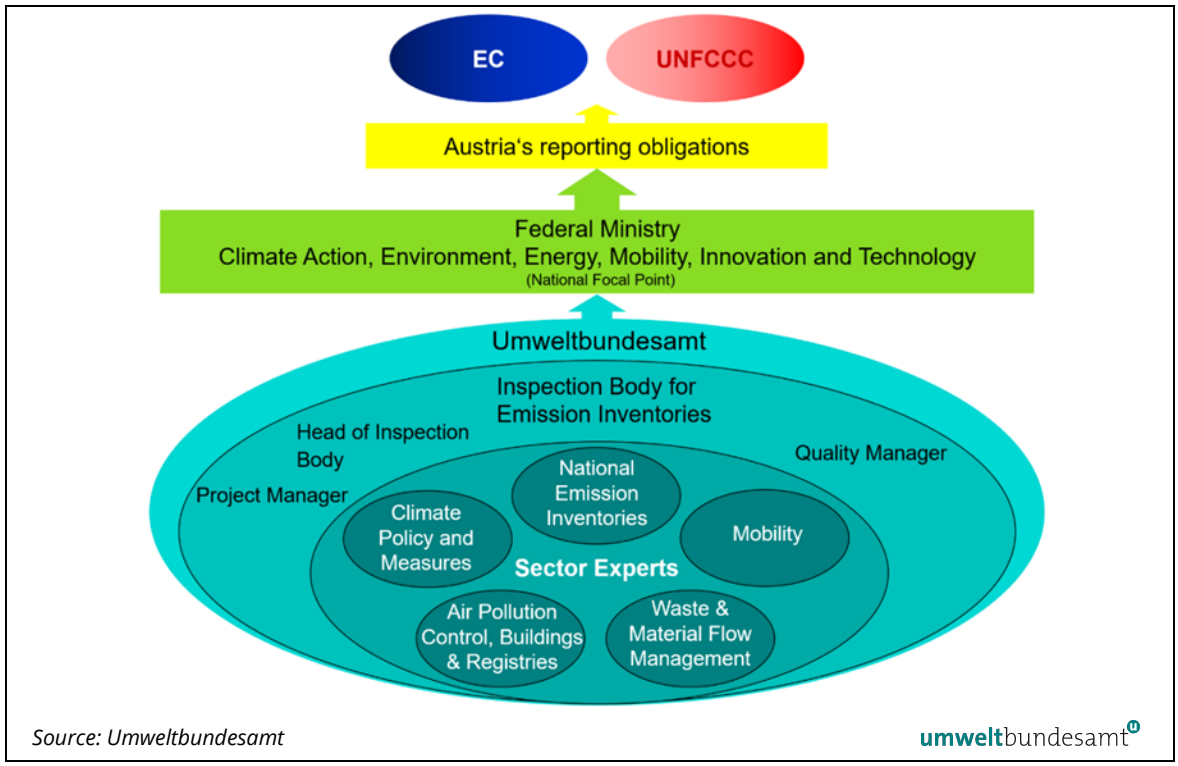
[31] UMWELTBUNDESAMT (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna https://www.umweltbundesamt.at/fileadmin/site/publikationen/rep0004.pdf

[32] „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).



Source: 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[33]

- § 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

[33] „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) / Leibniz Institute for Agricultural Engineering Potsdam-Bornim (ATB)**
      - Agricultural model: calculation of emissions
        - Contract on a regular interval with Umweltbundesamt
          Procedural arrangement: close cooperation Umweltbundesamt – BOKU

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 NIR):

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
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 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[34]
- 2019 Refinement to the 2006 IPCC Guidelines
- EMEP/EEA air pollutant emission inventory guidebooks[35]
- 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 (ID No. 0241) in accordance with the international standard EN ISO/IEC 17020 and the Austrian Accreditation Law (AkkG)[36] by decree of Accreditation Austria[37]. 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 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 system 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

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

[35] 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

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

[37] 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

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 2023, some aspects and improvements compared to the previous submission are described below (QMS activities and improvements 2023).

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 8 sectors defined (Energy, 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 Format ('CRF') to comply with the reporting obligations under the UNFCCC. In addition to the actual emission data, the background tables of the CRF 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 2023

In the 2023 inventory cycle, several improvements concerning the personnel of the inventory team have been made: The number of sector experts of the agriculture team was raised to three; for LULUCF to five. The new sector experts 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.

Currently, the IBE team consists of 25 persons and each position is at least double-staffed.

Procedures were adapted to update inventory-working practises since the pandemic, where a lot of work is now done remotely/from home. This also contributes to reducing print outs and saving paper.

Four of our experts participated in the international inventory reviews in 2023.

An audit by the accreditation body was successfully passed in June 2023.

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[38].

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

5 CHANGES IN THE NATIONAL REGISTRY

According to Commission Implementing Regulation (EU) 2020/1208[16] Member States shall clearly state in 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[13] since the previous submission of the national inventory report.

The following changes to the national registry of Austria have occurred in 2023.

Note that there is no SIAR report for 2023 due to the simplified process during and after the CP2 true-up period. This process foresees a comparison of the submitted SEF files with data of the International Transaction Log. No recommendations have been made in this context.

Table 10: Changes to the national registry of Austria in 2023.

Reporting Item	Description
15/CMP.1 annex II.E paragraph 32.(a) Change of name or contact	The name and contact of the registry administrator as an institution has not changed.
15/CMP.1 annex II.E paragraph 32.(b) Change regarding cooperation arrangement	No change of cooperation arrangement occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(c) Change to database structure or the capacity of national registry	Regular updates were performed to the Union Registry in order to keep it technically up to date. But no specific changes have been implemented in the National Kyoto-Protocol part of the registry. Therefore no changes were applied to the database. No change to the capacity of the national registry occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(d) Change regarding conformance to technical standards	Regular updates were performed to the Union Registry in order to keep it technically up to date. But no specific changes have been implemented in the National Kyoto-Protocol part of the registry. Therefore no change in the registry's conformance to the technical standards occurred for the reported period.
15/CMP.1 annex II.E paragraph 32.(e) Change to discrepancies procedures	No change of discrepancies procedures occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(f) Change regarding security	No changes regarding security occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(g) Change to list of publicly available information	No change to the list of publicly available information occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(h) Change of Internet address	No change to the registry internet address occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(i) Change regarding data integrity measures	No change of data integrity measures occurred during the reporting period.

Reporting Item	Description
15/CMP.1 annex II.E paragraph 32.(j) Change regarding test results	No change during the reported period.

6 REPORTING UNDER ARTICLE 26(3) GOVERNANCE REGULATION

According to Section 2 'Annual Reporting', Article 26(3) of the Governance Regulation' No 2018/1999[12] 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[1] 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 6.2. 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.

6.1 Overview of Reporting

In Commission Implementing Regulation (EU) 2020/1208[16] 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 11: 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[39])	**Information to be found:**	**Separate Annex**
Article 9 Reporting on recalculations	CRF Table 8, Short-NIR Chapter 3	Not applicable
Article 10 Reporting on implementation of recommendations in Table 1 of Annex VIII	Short-NIR Ch. 3.3	Art10_AnnexVIII_Recommendations_AT[40]
Article 10 Reporting on implementation of recommendations in Table 2 of Annex VIII	Short-NIR Ch. 3.3	Art10_AnnexVIII_Recommendations_AT[40]
Article 12(1) Reporting on uncertainty	Not applicable	Art12_AnnexX_Uncertainty and completeness_AT
Article 12(2) Reporting on completeness	CRF 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-NIR Ch. 6	Possible (AT: not relevant)
Article 15 Reporting on consistency of the reported data on air pollutants	Short-NIR Ch. 6	Possible (AT: not relevant)
Article 16 Reporting on consistency of the data reported on fluorinated greenhouse gases	Short-NIR Ch. 6	Possible (AT: not relevant)
Article 17 Reporting on consistency with energy statistics	Short-NIR Ch. 6	Possible (AT: not relevant)
Article 18 Reporting on changes in descriptions of national inventory systems or registries	Short-NIR Ch. 4 Short-NIR Ch. 5	Not applicable

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

[40] The final review report from the latest 2023 UNFCCC Review was not published in time to be considered for this submission. Thus, the content of this template still refers to the status and implementation of recommendations as set in the 2022 UNFCCC Review ("ARR 2022"). For the final submission in March 2024, the template will be updated accordingly taking the ARR 2023 as basis.

6.2 Reporting on Consistency

6.2.1 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 Report.

6.2.2 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.

6.2.2.1 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 2022 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.

6.2.2.2 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 number of companies applying for a quota strongly increased, and inquiries are ongoing to ensure consistency of data.

6.2.2.3 Energy statistics (Article 17)

Checks performed on the consistency of the data used to estimate emissions in preparation of the greenhouse gas inventory for 2022 with the energy data reported pursuant to Article 4 of Regulation (EC) No 1099/2008 show no differences of more than +/−2%.

7 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

BMDW ..... Bundesministerium für Wirtschaft und Arbeit
Federal Ministry for Digital and Economic Affairs (former BMWA)

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

CDR ..... Central Data Repository

COP ..... Conference of the Parties

CRF ..... Common Reporting Format

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

FMRL ..... Forest Management Reference Level

GHG ..... Greenhouse Gas

GWP ..... Global Warming Potential

HDV ..... Heavy Duty Vehicle

IBE ..... Inspection Body for Emission Inventories

IPCC ..... Intergovernmental Panel on Climate Change

IEA ..... International Energy Agency

IED ..... Industrial Emissions Directive

ISO ..... International Standards Organisation

LDV ..... Light Duty Vehicle

LULUCF ..... Land Use, Land-Use Change and Forestry – IPCC CRF 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

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

PC ..... Passenger Car

PHEV ..... Plug-in Hybrid Electric Vehicle

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

QMS ..... Quality Management System

SNAP ..... Selected Nomenclature on Air Pollutants

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
Total Emissions/Removals with LULUCF	67 401	66 683	74 506	81 441	82 070	74 785	72 484	65 354	67 572	74 446	74 399	69 436	72 701	73 196	79 265	84 125	82 495	68 187	66 284	68 370
Total Emissions without LULUCF	79 083	80 640	92 605	90 193	87 430	86 841	80 223	84 793	82 607	79 889	80 310	76 721	78 935	79 863	82 195	78 903	80 058	74 030	77 360	72 844
1. Energy	52 666	55 290	66 714	63 921	60 488	59 531	56 389	59 279	56 970	54 829	55 004	51 279	53 062	54 285	55 999	54 553	54 935	49 994	51 916	48 464
A. Fuel Combustion (Sectoral Approach)	51 892	54 753	66 244	63 421	59 982	59 066	55 876	58 777	56 475	54 319	54 499	50 808	52 606	53 862	55 537	54 153	54 561	49 638	51 585	48 153
1. Energy Industries	14 008	12 314	16 026	14 821	13 622	13 447	12 437	13 747	13 409	11 975	11 006	9 387	10 502	10 287	10 903	10 054	10 170	8 800	8 908	8 476
2. Manufacturing Industries and Construction	9 609	10 023	11 361	11 192	10 748	11 096	10 568	11 188	11 098	10 993	10 733	10 339	10 204	10 515	10 722	10 833	10 818	10 589	10 892	10 619
3. Transport	13 949	18 791	24 928	23 663	23 887	22 416	21 759	22 567	21 917	21 733	22 911	22 226	22 702	23 554	24 305	24 423	24 472	21 156	21 922	20 712
4. Other Sectors	14 287	13 582	13 883	13 700	11 680	12 062	11 067	11 231	10 011	9 579	9 810	8 819	9 162	9 472	9 573	8 812	9 071	9 065	9 834	8 318
5. Other	38	43	44	45	45	46	45	43	42	40	39	37	36	34	33	32	30	29	28	28
B. Fugitive Emissions fr Fuels	774	537	471	500	506	465	513	502	495	510	505	471	456	423	462	400	374	355	331	311
1. Solid Fuels	373	30	0.2	0.2	NO,IE,NA																	
2. Oil and Natural Gas	401	506	470	500	506	465	513	502	495	510	505	471	456	423	462	400	374	355	331	311
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

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
2. Industrial Processes and Other Product Use	13 633	14 417	15 653	16 181	16 930	17 307	13 973	15 938	16 130	15 732	16 122	16 248	16 750	16 437	17 191	15 535	16 470	15 461	16 892	15 929
A. Mineral Industry	3 131	2 766	2 901	3 055	3 270	3 285	2 727	2 671	2 794	2 718	2 732	2 731	2 752	2 796	2 807	2 918	2 825	2 838	3 041	2 918
B. Chemical Industry	1 464	1 523	922	965	888	983	779	778	782	756	693	808	779	799	741	640	836	779	784	677
C. Metal Industry	8 304	8 489	9 800	10 154	10 714	10 962	8 550	10 420	10 429	10 082	10 468	10 407	10 823	10 387	11 159	9 469	10 375	9 518	11 039	10 315
D. Non-Energy Products from Fuels and Solvent Use	349	198	174	188	192	188	167	169	168	160	151	146	135	136	144	147	149	155	162	172
E. Electronics Industry	133	420	342	356	367	349	112	144	113	97	86	93	102	88	87	78	85	54	53	55
F. Product Uses as Substitutes for ODS	NO	674	1 105	1 114	1 162	1 207	1 317	1 432	1 525	1 605	1 676	1 751	1 848	1 827	1 854	1 886	1 752	1 648	1 428	1 409
G. Other Product Manufacture and Use	252	346	409	350	338	334	321	325	319	314	315	313	311	405	399	397	448	470	383	382
H. Other (please specify)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	8 416	7 657	7 196	7 185	7 250	7 366	7 411	7 287	7 363	7 312	7 311	7 447	7 479	7 595	7 549	7 435	7 324	7 297	7 322	7 277
A. Enteric Fermentation	5 055	4 692	4 410	4 390	4 406	4 398	4 459	4 454	4 395	4 359	4 370	4 388	4 390	4 402	4 408	4 351	4 288	4 258	4 271	4 284
B. Manure Management	1 141	994	932	943	971	971	1 003	1 017	1 028	1 038	1 054	1 075	1 095	1 112	1 137	1 120	1 108	1 099	1 102	1 101
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	2 134	1 881	1 758	1 748	1 762	1 872	1 822	1 703	1 814	1 782	1 759	1 851	1 848	1 929	1 854	1 809	1 777	1 791	1 799	1 743
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

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
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
G. Liming	46	43	54	58	62	72	72	69	77	81	75	75	83	84	86	97	99	99	99	99
H. Urea application	9.6	19	22	25	28	26	31	29	27	31	30	34	35	39	38	32	27	25	23	26
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
J. Other	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*	-11 682	-13 958	-18 099	-8 752	-5 360	-12 056	-7 739	-19 439	-15 035	-5 443	-5 911	-7 286	-6 234	-6 667	-2 930	5 222	2 437	-5 843	-11 076	-4 474
A. Forest Land**	-11 049	-13 906	-16 745	-7 051	-2 377	-9 440	-8 718	-19 074	-14 405	-5 439	-6 833	-7 964	-7 039	-7 630	-3 329	5 071	1 767	-7 879	-11 390	-4 596
B. Cropland**	196	-5.2	-106	-103	-119	-70	-108	-106	-110	-118	-102	-73	-8.2	48	100	127	157	207	298	338
C. Grassland**	724	515	766	765	761	751	578	572	567	564	564	562	556	530	509	492	487	481	472	470
D. Wetlands**	48	40	52	42	44	56	85	86	90	87	118	88	75	94	73	73	73	73	70	70
E. Settlements**	995	856	1 017	1 028	1 015	1 050	1 031	1 016	992	1 001	963	960	918	907	912	901	883	861	825	812
F. Other Land**	513	418	365	356	347	338	506	505	504	503	502	501	504	508	511	514	518	521	525	528
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	-2 110
H. Other	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
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

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
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
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
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
E. Other	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

* *including indirect N_2O emissions*

** *excluding indirect N_2O emissions*

umweltbundesamt

Umweltbundesamt GmbH
Spittelauer Laende 5
1090 Vienna/Austria

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

office@umweltbundesamt.at
www.umweltbundesamt.at

In the 'Austria's Annual Greenhouse Gas Inventory 1990–2022' report, the Umweltbundesamt presents updated greenhouse gas (GHG) emissions in Austria. In 2022, total GHG emissions amounted to 72.8 Mt CO_2e. This corresponds to a 7.9% decrease compared to 1990 and a 5.8% decrease compared to 2021. Key drivers for the development 2021–2022 were the lower natural gas and gasoil consumption, as well as lower diesel oil sales especially in fuel exports with heavy duty vehicles in category Transport.

Emissions of GHG covered by EU Regulation No. 2018/842 ('Effort Sharing Regulation') amounted to around 46.2 Mt CO_2e in 2022 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.

EMAS
VERIFIED
ENVIRONMENTAL
MANAGEMENT
AT-000484

ISBN 978-3-99004-734-7