umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Austria's Annual Air Emission Inventory 1990–2023

Emissions of SO_2, NO_x, NMVOC, NH_3 and $PM_{2.5}$

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REPORT
REP-0962

VIENNA 2025

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The information covered refers to the following accreditation scope of the IBE: EMEP 2019 (akkreditierung-austria.gv.at/overview)

Akkreditierung Austria
A
0241
ISO/IEC 17020

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Type setting Neo Eibeck

Title photograph © Irene Oberleitner

The authors of this report wish to express their thanks to all experts at the Umweltbundesamt as well as to the experts from other institutions involved in the preparation of Austria's Annual Air Emission Inventory for their contribution to the continuous improvement of the inventory.

Reporting entity

Überwachungsstelle Emissionsbilanzen
(*Inspection Body for Emission Inventories*)
at the Umweltbundesamt GmbH
Spittelauer Lände 5, 1090 Vienna/Austria

Date

10.03.2025

Total Number of Pages

56

Responsible for the content of this report

DI Michael Anderl
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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 EMEP/EEA air pollutant emission inventory guidebook (scope of accreditation for air pollutants) as well as Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants (NEC Directive).

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

Imprint

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

The Environment Agency Austria prints its publications on climate friendly paper.

ISBN 978-3-99004-809-2

INHALTSVERZEICHNIS

ZUSAMMENFASSUNG

Die aktuellen Ergebnisse der Österreichischen Luftschadstoff-Inventur zeigen im Jahr 2023 gegenüber 2022 rückläufige Emissionen über alle Schadstoffe (SO_2, NO_x, NMVOC, NH_3 und $PM_{2,5}$).

Die folgende Analyse bezieht sich auf die nationale Emissionsmenge inklusive Kraftstoffexport (berechnet auf Basis der verkauften Treibstoffmenge). Seit dem Bericht 2022 sind für das nationale Monitoring unter der NEC-Richtlinie (siehe Kapitel 2.2) die Emissionsmengen aus Kraftstoffexport nicht mehr von der Gesamtemissionsmenge abzuziehen.

- Die SO_2-Emissionen nahmen im Jahr 2023 gegenüber 2022 um 1,5 % ab, was vor allem auf technologische Verbesserungen der Abluftreinigung in der Erdölraffinerie zurückzuführen ist. Eine weitere Reduktion erfolgte durch den verringerten Einsatz von Biomasse in der Holzverarbeitenden Industrie. Bei den Haushalten sind die Emissionen überwiegend auf Grund des geringeren Einsatzes von Kohle und Biomasse gegenüber dem Vorjahr gesunken.
- Die NO_x-Emissionen haben verglichen mit 2022 im Jahr 2023 um 5,4 % abgenommen. Hauptverantwortlich für den NO_x-Ausstoß ist der Straßenverkehr, wobei die wesentliche Ursache für die Abnahme im geringeren Dieselabsatz bei schweren Nutzfahrzeugen liegt. Weiters kam es zu einer Abnahme der NO_x-Emissionen aus der Mineralverarbeitenden Industrie auf Grund einer gesunkenen Produktion. Der NO_x-Rückgang bei den Haushalten ist auf den verringerten Einsatz von Öl und Gas als Folge der zunehmenden Umstellung auf klimafreundliche Heizungssysteme, der milderen Witterung sowie auf die anhaltend hohen Energiepreise zurückzuführen.
- Von 2022 bis 2023 sind die NMVOC-Emissionen um 1,9 % gesunken. Diese stammen überwiegend aus dem Lösemittelsektor, der Landwirtschaft und der Bereitstellung von Raumwärme und Warmwasser in Haushalten. In allen diesen Sektoren haben die Emissionen abgenommen. Die Reduktion im Lösemittelsektor beträgt 0,7 %, jene der Landwirtschaft 2,7 % und bei den Haushalten kam es zu einer Abnahme um 3,4 % im Vergleich zum Jahr 2022. Die Gründe dafür sind der rückläufige Verbrauch an Desinfektionsmitteln im Haushaltsbereich bei den Lösemitteln, abnehmende Tierbestände (insbesondere Rinder) in der Landwirtschaft und der geringere Biomasseeinsatz als Folge der milderen Witterung im Haushaltssektor.
- Die NH_3-Emissionen stammen nahezu ausschließlich aus dem Sektor Landwirtschaft (94 %). Im Jahr 2023 sind sie um 2,4 % gegenüber 2022 gesunken, wofür maßgeblich der abnehmende Viehbestand (v.a. der Rinder) sowie die verstärkte Anwendung bodennaher Techniken zur Wirtschaftsdüngerausbringung verantwortlich sind.
- Von 2022 auf 2023 haben die Feinstaubemissionen ($PM_{2,5}$) um 3,9 % abgenommen, hauptsächlich auf Grund des witterungsbedingt verringerten Biomasseeinsatzes in privaten Haushalten zur Bereitstellung von Raumwärme und Warmwasser.

Die vorliegenden Ergebnisse zeigen, dass die geltenden Reduktionsverpflichtungen für die anthropogenen Emissionen von NO_x, SO_2, NMVOC, NH_3 und Feinstaub ($PM_{2,5}$) entsprechend der Richtlinie (EU) 2016/2284 über die Reduktion der nationalen Emissionen bestimmter Luftschadstoffe („NEC-Richtlinie") bzw. dem Emissionsgesetz-Luft 2018 (EG-L 2018; BGBl. I Nr. 75/2018) seit 2020 für alle genannten Luftschadstoffe eingehalten werden.

1 EINLEITUNG

Dieser Bericht beinhaltet eine Zusammenfassung des aktuellen Stands der Emissionen von Schwefeldioxid (SO_2), Stickstoffoxiden (NO_x), flüchtigen Kohlenwasserstoffen ohne Methan (NMVOC) und Ammoniak (NH_3) sowie der Feinstaubfraktion $PM_{2,5}$. Es werden die Emissionsdaten, die am 15. Februar 2025 an die Europäische Kommission übermittelt wurden, die wichtigsten Trends sowie die wesentlichen methodischen Änderungen gegenüber dem Vorjahr dargestellt.

- Annex 1 beinhaltet die Emissionen der Schadstoffe SO_2, NO_x, NH_3, NMVOC und $PM_{2,5}$ basierend auf dem inländischen Kraftstoffabsatz (Emissionen auf Basis „fuel sold").
- Annex 2 enthält die Emissionstrends dieser Schadstoffe abzüglich der Emissionsmengen aus preisbedingtem Kraftstoffexport in Fahrzeugen (Emissionen auf Basis „fuel used").

Die sektorale Gliederung der im Anhang präsentierten Überblickstabellen hält sich an die Berichtsnomenklatur (Nomenclature For Reporting, NFR) der United Nations Economic Commission for Europe (UNECE). Der vollständige Datensatz wurde in diesem Format an die Europäische Kommission übermittelt.

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes (BGBl. Nr. 152/1998) erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z. 19 unter anderem die Aufgabe übertragen, an der Erfüllung der Berichtspflichten an die Europäische Kommission gemäß Richtlinien und Entscheidungen der EU mitzuwirken. In § 6 (2) Z. 20 werden die Erstellung 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.

Das Umweltbundesamt führt jährlich die Berechnung der Österreichischen Luftschadstoff-Inventur (OLI) durch, die als Grundlage für die Erfüllung der nationalen und internationalen Berichtspflichten herangezogen wird. Die OLI wird erforderlichenfalls auch für zurückliegende Jahre aktualisiert, um eine konsistente Zeitreihe zur Verfügung zu stellen. Die in diesem Bericht publizierten Emissionsdaten ersetzen somit die publizierten Daten und Zeitreihen vorhergehender Berichte.

Stand der Daten und das Berichtsformat der vorliegenden Publikation:

Tabelle 1: Datengrundlage des vorliegenden Berichts.

Inventur	Datenstand	Berichtsformat
OLI 2024	13. Februar 2025	NFR-Format der UNECE

2 EMISSIONSTRENDS

In folgender Tabelle werden die aktuellen Ergebnisse der Österreichischen Luftschadstoff-Inventur (OLI) für die Emissionen von SO_2, NO_x, NH_3, NMVOC und $PM_{2,5}$ dargestellt.

Tabelle 2: NEC-Emissionen Österreichs, 1990–2023. (Quelle: Umweltbundesamt).

	Emissionen Österreichs [Kilotonnen]				
	SO_2	**NO_x**	**NMVOC**	**NH_3**	**$PM_{2,5}$**
1990	73,70	215,86	337,97	89,83	27,36
1995	47,30	199,19	252,47	86,32	26,00
2000	31,52	212,62	192,50	81,55	24,47
2005	25,89	247,73	163,49	78,68	23,13
2010	15,98	205,82	140,97	79,91	20,32
2011	15,16	197,83	134,55	79,18	19,13
2012	14,78	193,25	131,83	79,17	18,64
2013	14,35	193,69	128,73	78,82	18,13
2014	14,51	186,67	122,11	79,67	16,53
2015	14,05	184,03	120,25	80,34	16,35
2016	13,25	176,54	119,20	81,16	15,99
2017	12,79	167,32	118,15	81,17	15,79
2018	11,58	155,10	113,60	79,57	14,73
2019	11,17	145,85	112,17	77,91	14,52
2020	10,44	124,42	112,76	77,27	13,64
2021	10,84	123,12	114,58	77,37	14,73
2022	10,74	114,99	105,69	75,91	13,40
2023	10,58	108,76	103,71	74,11	12,87

Demnach nahmen im Jahr 2023 gegenüber dem Vorjahr 2022 alle Luftschadstoffemissionen ab.

2.1 Beschreibung der Emissionstrends ab 1990

2.1.1 SO_2-Emissionen

2023 betrugen die SO_2-Emissionen 10,6 kt. Seit 1990 (73,7 kt) konnte der SO_2-Ausstoß um 86 % reduziert werden. Seit 2005 gab es einen Rückgang um 59 %. Diese Entwicklung ist vorwiegend auf den Ersatz von Kohle und Heizöl durch schwefelärmere Brennstoffe, wie z. B. Erdgas, die Absenkung des Schwefelan-

teils in Mineralölprodukten und Treibstoffen (gemäß Kraftstoffverordnung) sowie den Einbau von Entschwefelungsanlagen in der Industrie und in Kraftwerken in den 1980er- und 1990er-Jahren (gemäß Luftreinhaltegesetz für Kesselanlagen) zurückzuführen.

Den größten Beitrag zu den SO_2-Emissionen lieferte 2023 die Industrie in der Summe aus pyrogenen Emissionen (NFR Sektor *1.A.2*) und Prozessemissionen (NFR Sektor *2*) mit insgesamt 79 %, wobei hier klar die Eisen- und Stahlproduktion mit 48 % dominiert. 8,1 % stammten aus der Energieversorgung (*1.A.1*) und 10 % aus Verbrennungsprozessen beim Kleinverbrauch (*1.A.4*, überwiegend Haushalte). Im Jahr 1990 waren Letztere mit 44 % noch Hauptverursacher. Hier konnten durch die Umstellung von Kohle und Heizöl auf schwefelärmere Brennstoffe oder andere Energieträger die größten absoluten Reduktionen erreicht werden.

Von 2022 auf 2023 sind die SO_2-Emissionen um 0,2 kt (-1,5 %) gesunken. Vor Allem die Emissionen der Erdölraffinerie (*1.A.1.b*) sind gegenüber dem Vorjahr stark zurückgegangen (-60 %), aufgrund von technologischen Verbesserungen an der SNOx – Anlage (kombinierte Rauchgasentschwefelungs- und Rauchgasentstickungsanlage). Eine weitere Abnahme erfolgte durch den reduzierten Biomasseeinsatz in der Holzverarbeitenden Industrie. Bei den Haushalten (*1.A.4.b*) sind die Emissionen überwiegend auf Grund des geringeren Einsatzes von Kohle und Biomasse gegenüber dem Vorjahr gesunken. Der verringerter Heizöl- und Gaseinsatz durch die Umstellung auf klimafreundliche Heizsysteme, die anhaltend hohen Energiepreise und die wärmere Witterung trugen ebenfalls zu dieser Entwicklung bei. Teilweise kompensiert wurde der Rückgang der SO_2-Emissionen durch die gestiegenen Prozessemissionen (+9,4 %) aus der Eisen und Stahlerzeugung (*1.A.2.a*).

2.1.2 NO_x-Emissionen

Für das Jahr 2023 wurde ein Ausstoß von rund 108,8 kt NO_x berechnet. Im Jahr 1990 betrugen die NO_x-Emissionen 215,9 kt. Seither gingen sie um rund 50 % zurück. Seit 2005 wurde eine Emissionsreduktion um rund 56 % erzielt.

Der Rückgang der NO_x-Emissionen ab 2005 ist überwiegend auf den Straßenverkehr *(1.A.3.b)* zurückzuführen. Technische Fortschritte in der Abgasnachbehandlung für schwere Nutzfahrzeuge und zu einem geringeren Anteil auch bei Pkw (*1.A.3.b.1*) zeigten ihre Wirkung. Auch der generell stark rückläufige Einsatz von Heizöl und Kohle, der Umstieg auf modernere schadstoffarme Heizungssysteme und Fernwärme in Haushalten und Dienstleistungsbetrieben sowie Minderungsmaßnahmen bei den großen Kohle- und Ölkraftwerken (*1.A.1.a*) und in der Industrie (*1.A.2*) trugen zur Emissionsabnahme bei. Die COVID-Pandemie war hauptverantwortlich für die deutliche Reduktion der NO_x-Emissionen von 2019 auf 2020.

Der Großteil der nationalen NO_x-Emissionen entsteht bei der Verbrennung von Brenn- und Kraftstoffen, wobei der größte Anteil an den NO_x-Emissionen im Jahr 2023 mit 43 % auf den Straßenverkehr entfiel. 2005 erreichten die NO_x-

Emissionen des Straßenverkehrs einen Höchstwert und gingen seither kontinuierlich zurück. Seit 2005 konnten sie um 70 % reduziert werden, wobei besonders die Emissionen des Schwerverkehrs durch Fortschritte in der Abgasnachbehandlung schwerer Nutzfahrzeuge (Lkw und Busse) deutlich vermindert werden konnten. Die kontinuierliche Flottenerneuerung mit neuesten Abgasstandards sowie der leicht zunehmende Anteil von Elektrofahrzeugen an der Gesamtfahrleistung machen sich u.a. auch 2023 bemerkbar.

Von 2022 auf 2023 kam es zu einer Abnahme der österreichweiten NO_x-Emissionen um 6,2 kt oder 5,4 %, wobei knapp die Hälfte der Reduktion auf den Straßenverkehr zurück zu führen ist (-2,9 kt bzw. -5,8 %). Hauptverantwortlich dafür ist der Rückgang der Aktivität schwerer Nutzfahrzeuge im Inland (-1,2 kt) sowie im Kraftstoffexport (-1,1 kt) kombiniert mit verbesserten spezifischen NO_x-Emissionen je Fahrzeugkilometer (bezogen auf den Flottendurchschnitt).

Die NO_x-Emissionen der Mineralverarbeitenden Industrie (*1.A.2.f*), vor allem der Zement- und Ziegelindustrie, waren auf Grund der gesunkenen Produktion ebenfalls rückgängig. Die Verbrennungsemissionen im Kleinverbauch (*1.A.4*, überwiegend Haushalte) sind auf Grund des geringeren Einsatzes von Öl und Gas in Folge der zunehmenden Umstellung auf klimafreundliche Heizungssysteme, der milderen Witterung sowie der anhaltend hohen Energiepreise gegenüber dem Jahr 2022 um 7,1 % gesunken.

2.1.3 NMVOC-Emissionen

Die NMVOC-Emissionen betrugen im Jahr 2023 103,7 kt und im Jahr 1990 338,0 kt. Das entspricht einer Reduktion um 69 %. Seit 2005 konnten die NMVOC-Emissionen um 37 % reduziert werden. Von 2022 auf 2023 ist die Emissionsmenge um 2,0 kt (-1,9 %) gesunken.

Die größten Reduktionen seit 1990 konnten im Verkehrssektor erzielt werden, im Wesentlichen durch den verstärkten Einsatz von Katalysatoren und Diesel-Kfz. Aktuell nimmt der Straßenverkehr (*1.A.3.b*) nur mehr einen Anteil von 3,5 % an den gesamten NMVOC-Emissionen ein.

Im Lösemittelsektor (*2.D.3*) konnten aufgrund gesetzlicher Regelungen (Lösungsmittelverordnung sowie VOC-Anlagen-Verordnung) beachtliche Reduktionen erzielt werden. 2023 verursachte dieser Sektor rund 33 % der gesamtösterreichischen NMVOC-Emissionen. Die gegenüber dem Vorjahr leichte Verringerung um 0,7 % resultiert aus dem nach der Pandemie wieder rückläufigen Verbrauch an Desinfektionsmitteln im Haushaltsbereich.

Einen wesentlichen Anteil an den NMVOC-Emissionen hatte 2023 auch der Sektor Landwirtschaft (*3*) mit 32 %, wobei diese Emissionen mit erheblichen Unsicherheiten verbunden ist. Der überwiegende Anteil der NMVOC-Emissionen der Landwirtschaft kommt aus der Rinderhaltung, wobei die Fütterung mit Silage ein bedeutender Faktor ist. Weitere Emissionsquellen mit deutlich geringeren Emissionen sind der Anbau von Feldfrüchten (Ackerpflanzen und Grünlandbe-

wuchs). Im Vergleich zum Jahr 2022 ging das Emissionsniveau 2023 in der Landwirtschaft zurück (-2,7 %), was vorwiegend auf die rückläufigen Tierbestände (v.a. Rinder) zurückzuführen ist.

Die Bereitstellung von Raumwärme und Warmwasser in privaten Haushalten (*1.A.4.b.1*) nimmt 2023 einen Anteil von 20 % der gesamten NMVOC-Emissionen ein. Maßgeblich verantwortlich für die Emissionsabnahme der Haushalte um 3,4 % gegenüber dem Vorjahr ist der in Folge milderer Witterung gesunkene Einsatz von Biomasse.

2.1.4 NH_3-Emissionen

Für das Jahr 2023 wurde eine Emissionsmenge von rund 74,1 kt NH_3 berechnet. Von 1990 bis 2023 nahmen die NH_3-Emissionen um 18 % ab. Seit 2005 ist eine Reduktion um 5,8 % zu verzeichnen.

Die Landwirtschaft ist mit einem Anteil von 94 % (2023) Hauptverursacher der österreichischen Ammoniak-Emissionen. Innerhalb des Sektors entstanden 2023 etwa 48 % der Emissionen aus dem Wirtschaftsdüngermanagement (*3.B*) und rund 52 % aus Landwirtschaftlichen Böden (*3.D*). Die Emissionen aus der Landwirtschaft gingen seit 1990 um 20 % zurück. Neben dem rückläufigen Viehbestand wirkten sich die effizientere Fütterung der Tiere, der verstärkte Einsatz bodennaher Wirtschaftsdüngerausbringungstechniken (u. a. Schleppschlauch, Schleppschuh, rasche Einarbeitung von Gülle und Mist) sowie die abnehmenden Mineraldüngermengen günstig auf das Emissionsniveau aus.

Im Vergleich zu 2022 verringerten sich die NH_3-Emissionen Österreichs im Jahr 2023 um 1,8 kt (-2,4 %). Hauptursache sind die reduzierten Emissionen aus der Wirtschaftsdüngerausbringung, einerseits aufgrund abnehmender Tierbestände, andererseits durch die verstärkte Nutzung bodennaher Wirtschaftsdüngerausbringungstechniken.

Die von 2022 auf 2023 sinkenden Viehzahlen (Rinder -1,4 %, Schweine -5,0 %, Schafe -2,2 %, Ziegen -2,1 %) führten auch im Wirtschaftsdüngermanagement (Stall, Laufhof, Lager) zu geringeren Emissionen. Die NH_3-Emissionen aus der Mineraldüngerausbringung nahmen ebenfalls zwischen 2022 und 2023 um 1,6 % leicht ab. Die Mineraldüngermenge wurde insgesamt in diesem Zeitraum beträchtlich reduziert (-7,4 %), wobei aber der starke Anstieg der Harnstoffdüngermengen (+39 %) der sonst noch deutlicheren Emissionsreduktion entgegenwirkte.

2.1.5 $PM_{2,5}$-Emissionen

Seit 1990 nahmen die $PM_{2,5}$-Emissionen um 53 %, von 27,4 kt auf 12,9 kt, ab. Die Reduktion seit 2005 beträgt 44 %. Die größten Abnahmen seit 1990 gab es bei der Bereitstellung von Raumwärme und Warmwasser in privaten Haushalten

(*1.A.4.b.1*) wegen des stark reduzierten Kohleverbrauchs und beim Straßenverkehr (*1.A.3.b*) durch Verbesserungen bei den Antriebs- und Abgasnachbehandlungstechnologien (z. B. Partikelfilter).

Von 2022 auf 2023 gingen die $PM_{2,5}$-Emissionen um 0,5 kt (-3,9 %) zurück, hauptsächlich auf Grund des witterungsbedingt verringerten Biomasseeinsatzes in den privaten Haushalten (*1.A.4.b.1*).

Die Bereitstellung von Raumwärme und Warmwasser in privaten Haushalten (*1.A.4.b.1*, inklusive $PM_{2.5}$ aus Grillkohle) nimmt 2023 mit rund 42 % den größten Anteil an den $PM_{2,5}$-Emissionen Österreichs ein. Effizienzverbesserungen durch thermische Sanierung und die höheren Anteile moderner Biomasseheizungen (Verbesserung der Verbrennungstechnologie) spielen für die Abnahme seit 2005 ebenfalls eine Rolle. Veraltete Scheitholzfeuerungen („Allesbrenner") verursachen in diesem Sektor weiterhin hohe Emissionen.

2.2 Emissionsreduktionsverpflichtungen ab 2020

Die nationalen Emissionsreduktionsverpflichtungen für die anthropogenen Emissionen von NO_x, SO_2, NMVOC, NH_3 und Feinstaub ($PM_{2,5}$) sind in der EU-Richtlinie über die Reduktion der nationalen Emissionen bestimmter Luftschadstoffe (kurz NEC-Richtlinie)[1] bzw. dem Emissionsgesetz-Luft 2018[2] festgelegt und gelten für den Zeitraum von 2020 bis 2029 sowie ab 2030. Basisjahr für die Berechnungen der Emissionsreduktionsverpflichtungen ist das Jahr 2005.

Die Mitgliedstaaten sind verpflichtet, diesen Emissionsreduktionsverpflichtungen jährlich nachzukommen und die Emissionen dieser fünf Schadstoffe entsprechend zu begrenzen.

In folgender Tabelle sind die ab 2020 geltenden Emissionsreduktionsverpflichtungen Österreichs dargestellt.

[1] Richtlinie (EU) 2016/2284 des Europäischen Parlaments und des Rates vom 14. Dezember 2016 über die Reduktion der nationalen Emissionen bestimmter Luftschadstoffe, zur Änderung der Richtlinie 2003/35/EG und zur Aufhebung der Richtlinie 2001/81/EG, Anhang II. Nach der englischen Bezeichnung *National Emission Reduction Commitments Directive* bzw. der Bezeichnung der Vorgängerrichtlinie (*National Emission Ceilings Directive*) wird sie auch kurz NEC-Richtlinie genannt.

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

Tabelle 3: Nationale Emissionsreduktionsverpflichtungen gemäß NEC-Richtlinie für Österreich (Quelle: EG-L 2018, BGBl. I Nr. 75/2018).

	Nationale Emissionsreduktionsverpflichtungen gemäß NEC-Richtlinie	
Luftschadstoff	**Reduktion gegenüber 2005 in jedem Jahr zwischen 2020 und 2029**	**Reduktion gegenüber 2005 in jedem Jahr ab 2030**
NO_x	-37 %	-69 %
SO_2	-26 %	-41 %
NMVOC	-21 %	-36 %
NH_3	-1 %	-12 %
$PM_{2,5}$	-20 %	-46 %

Die Emissionen von NO_x und NMVOC aus Tätigkeiten, die unter die Kategorien 3.B (Düngewirtschaft) und 3.D (Landwirtschaftliche Böden) fallen, sind im Rahmen der Reduktionsverpflichtungen nicht zu berücksichtigen und sind daher im Zielvergleich von den jeweiligen Gesamtemissionen abzuziehen.

Entsprechend Artikel 5 der NEC-Richtlinie werden den Mitgliedsstaaten gewisse Flexibilitätsregelungen und Anpassungsmöglichkeiten eingeräumt. Diese werden von Österreich im vorliegenden Bericht nicht angewandt.

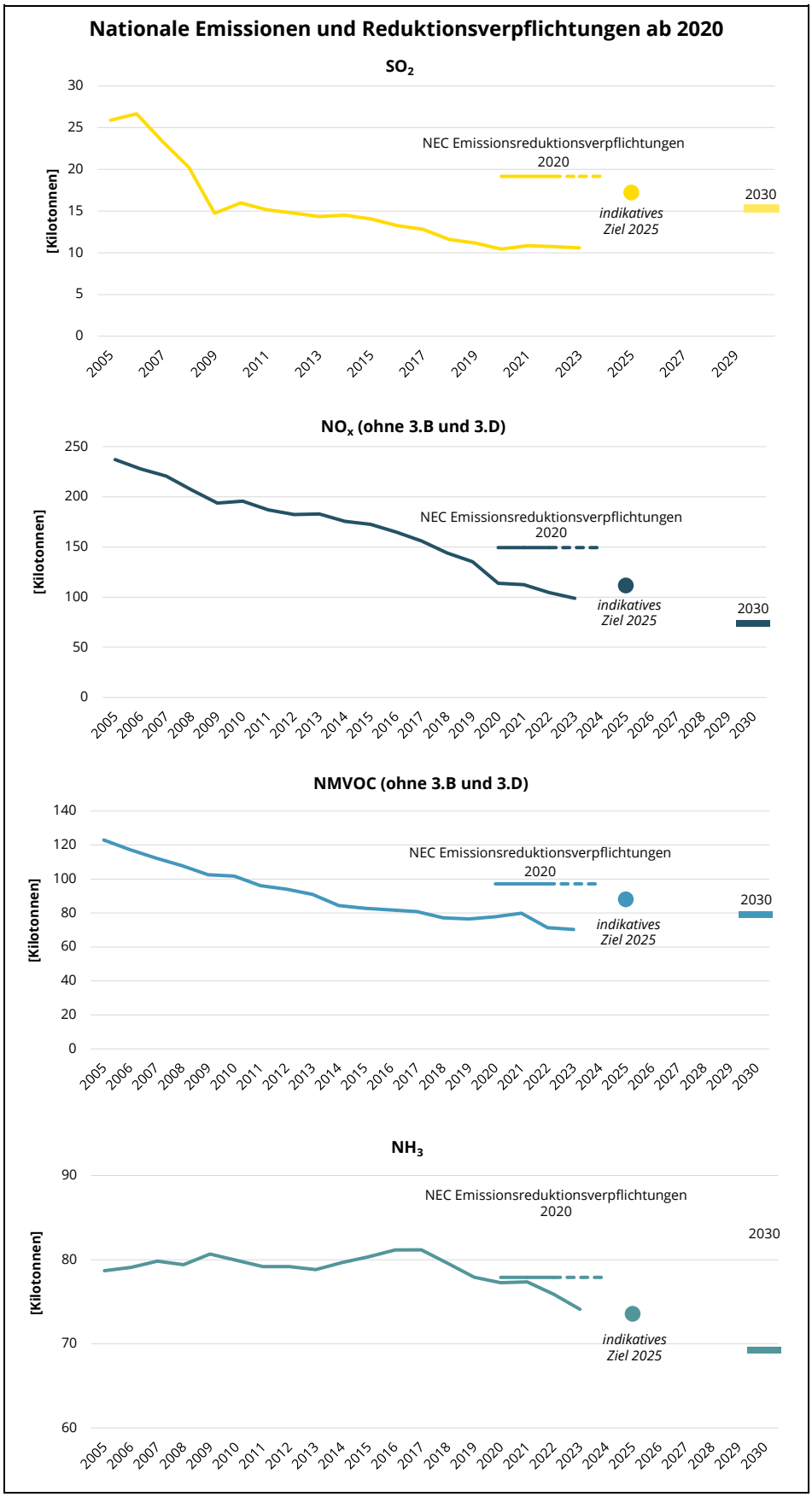
Auf Basis der NEC-Emissionsberichterstattung 2025 stellt sich der Zielvergleich wie folgt dar:

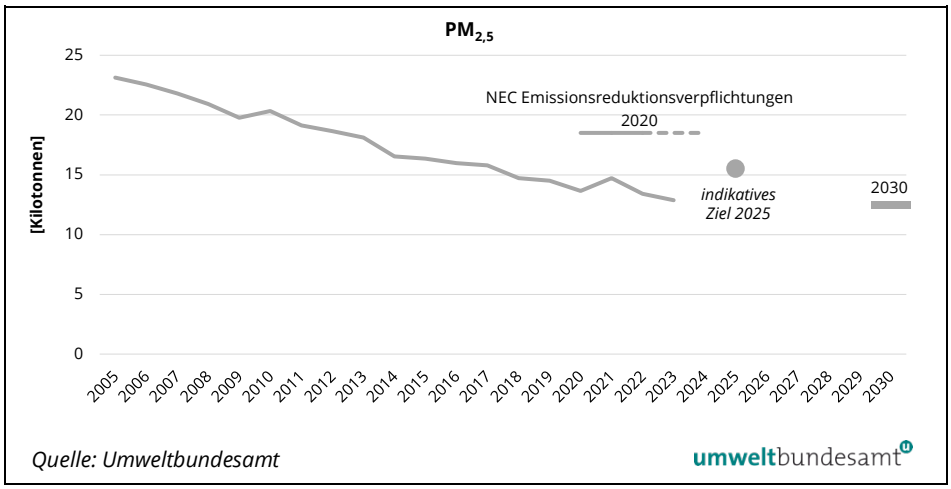
- Im Jahr 2023 werden in Österreich für alle relevanten Luftschadstoffe die nationalen Emissionsreduktionsverpflichtungen eingehalten.

Tabelle 4: Emissionen und prozentuelle Änderung von 2005 bis 2023 (Quelle: Umweltbundesamt).

	2005	**2023**	**2005–2023**
NO_x (ohne 3.B und 3.D)	237,02	98,80	-58,3 %
NMVOC (ohne 3.B und 3.D)	122,96	70,28	-42,8 %
SO_2	25,89	10,58	-59,2 %
NH_3	78,68	74,11	-5,8 %
$PM_{2,5}$	23,13	12,87	-44,4 %

Abbildung 1: Gegenüberstellung der Emissionen und der Emissionsreduktionsverpflichtungen ab 2020.





Quelle: Umweltbundesamt umweltbundesamt

2.3 Kraftstoffexport

Die Emissionsberechnungen für den Straßenverkehr basieren auf der in Österreich verkauften Treibstoffmenge. Allerdings wird nicht die gesamte Menge davon in Österreich verfahren, sondern ein Teil wird in den Fahrzeugtanks über die Landesgrenzen hinaus exportiert. Dieser Effekt wird „Kraftstoffexport" genannt.

Gründe für diesen Effekt sind strukturelle Gegebenheiten (Binnenland mit hohem Exportanteil in der Wirtschaft) sowie Unterschiede im Kraftstoffpreisniveau zwischen Österreich und seinen Nachbarländern.

Methodisch lassen sich die über die Grenzen verschobenen Kraftstoffmengen aus der Differenz zwischen Kraftstoffabsatz in Österreich und dem berechneten Inlandsverbrauch ermitteln. Davon können die Fahrleistungen (Kfz-km) von Pkw und schweren Nutzfahrzeugen abgeleitet werden und in weiterer Folge die zugehörigen Emissionen für den „Kraftstoffexport in Kraftfahrzeugen".

Nachstehende Tabelle zeigt die Emissionsmengen, die auf den Kraftstoffexport in Fahrzeugtanks zurückzuführen sind. Für NO_x sind dies beispielsweise 4,0 kt im Jahr 2023, was rund 3,7 % der NO_x-Gesamtemissionen Österreichs bzw. 8,5 % des NO_x-Ausstoßes im Straßenverkehr (*1.A.3.b)* entspricht.

Ab Ende der 1990er-Jahre kam es – bedingt durch den zunehmenden Kraftstoffexport – zu einem verstärkten Anstieg der NO_x-Emissionen, vor allem im Schwerverkehr. Im Jahr 2005 wurde ein Höchstwert erreicht; seither nimmt der Kraftstoffexport kontinuierlich ab.

Tabelle 5: Emissionen bedingt durch Kraftstoffexport (Quelle: Umweltbundesamt).

	Emissionen [Kilotonnen]				
	SO_2	**NO_x**	**NMVOC**	**NH_3**	**$PM_{2,5}$**
1990	0,69	13,98	2,68	0,02	0,53
1995	0,83	14,43	-0,63	-0,05	0,64
2000	0,49	29,78	-0,63	-0,21	0,81
2005	0,05	55,11	4,65	0,57	1,93
2010	0,03	32,39	1,81	0,39	1,11
2011	0,03	25,35	1,35	0,31	0,86
2012	0,03	24,41	1,16	0,28	0,81
2013	0,04	27,83	1,06	0,24	0,86
2014	0,03	23,80	0,86	0,21	0,72
2015	0,03	22,65	0,85	0,23	0,71
2016	0,03	19,18	0,77	0,22	0,66
2017	0,03	16,98	0,69	0,22	0,62
2018	0,03	14,38	0,60	0,21	0,56
2019	0,03	11,87	0,48	0,18	0,51
2020	0,03	8,42	0,36	0,14	0,41
2021	0,03	6,72	0,31	0,13	0,36
2022	0,02	3,71	0,19	0,08	0,22
2023	0,01	4,03	0,27	0,11	0,20

Die Emissionen abzüglich dieser oben angeführten Mengen aus dem Kraftstoffexport (vgl. Annex 2: Austria's Emissions based on fuel used (without ‚fuel exports')) wurden bis zum Inventurjahr 2019 für den Vergleich mit den verbindlichen Höchstmengen gemäß NEC-Richtlinie[3] herangezogen.

Zur Überprüfung der NEC-Emissionsreduktionsverpflichtungen für die Jahre ab 2020 werden die Emissionsmengen auf Basis der verkauften Treibstoffe (vgl. Annex 1: Austria's Emissions Based on fuel sold (with ‚fuel exports')) verwendet.

Dies ist in den Leitlinien für die Inventurberichterstattung[4] begründet. Dort ist vorgesehen, dass die Beurteilung der Zielerreichung grundsätzlich anhand der auf Basis der verkauften Treibstoffmenge berechneten Inventurdaten erfolgt.

Jene Staaten, deren Verpflichtungen auf Basis der verbrauchten Treibstoffe festgelegt wurden, können allerdings auch die auf Basis der verbrauchten Treibstoffmengen berechneten Inventurdaten als Grundlage für die Beurteilung der Zielerreichung wählen. Die Festlegung der ab 2010 geltenden Emissionshöchstmengen erfolgte in den späten 1990er-Jahren; damals war die Problematik des Kraftstoffexports im Fahrzeugtank noch nicht einmal erkannt worden. Die Festlegung

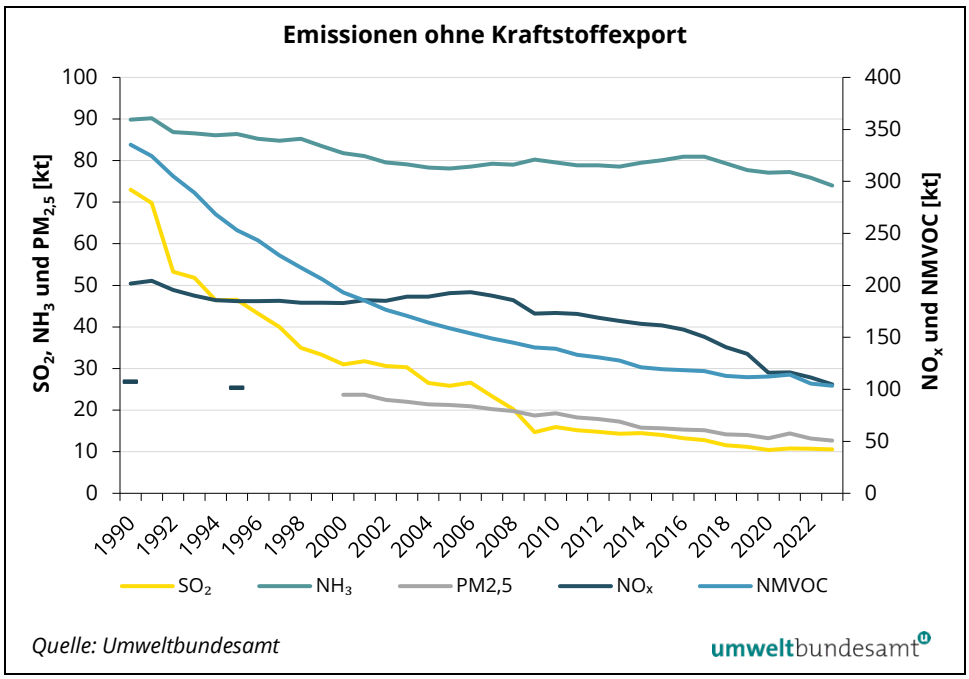
[3] Richtlinie 2001/81/EG über nationale Emissionshöchstmengen für bestimmte Luftschadstoffe

[4] 2023 Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution. Diese Leitlinien sind auch unter der NEC-Richtlinie anzuwenden.

der Emissionsreduktionsverpflichtungen für 2020 und 2030 basiert jedoch schon auf Modellrechnungen im Auftrag der Europäischen Kommission, bei denen der Kraftstoffexport in die österreichischen Daten eingerechnet wurde.

Die folgende Abbildung zeigt die österreichischen Emissionen der Schadstoffe SO_2, NO_X, NH_3, NMVOC und $PM_{2,5}$ abzüglich der Emissionen aus dem Kraftstoffexport. Sie werden auf Basis des verbrauchten Kraftstoffs ("fuel used") ermittelt. Die Emissionswerte in tabellarischer Form sind im Anhang 2 angeführt.

Abbildung 2: SO_2, NO_x, NMVOC, NH_3 und $PM_{2,5}$-Emissionen ohne Kraftstoffexport.



Quelle: Umweltbundesamt

umweltbundesamt

3 INTRODUCTION

This report provides a summary of Austria's annual Sulfur Dioxide (SO_2), Nitrogen Oxides (NO_x), Ammonia (NH_3), Non-Methane Volatile Organic Compounds (NMVOC) and Particulate Matter ($PM_{2.5}$) emissions for the years between 1990 and 2023.

The annexes at the end of the report include trend tables for the main NFR sectors and the years 1990 – 2023 (SO_2, NO_X, NH_3, NMVOC and $PM_{2.5}$):

- Annex 1: national emission data based on the fuel sold
- Annex 2: national emission data based on the fuel used

The complete tables in the NFR format have been uploaded to the Central Data Repository (CDR)[5] of EIONET[6] as digital files (Excel).

[5] http://cdr.eionet.europa.eu/at/eu/nec

[6] European Environment Information and Observation Network (EIONET)

4 EMISSION TRENDS

The following table shows the current results of the Austrian Air Emission Inventory (OLI) for the emissions of SO_2, NO_X, NH_3, NMVOC und $PM_{2.5}$ for the years 1990 to 2023.

Table 1: Emissions in Austria, 1990–2023 (Source: Umweltbundesamt).

	Emissions in Austria [kilotonnes]				
	SO_2	**NO_x**	**NMVOC**	**NH_3**	**$PM_{2.5}$**
1990	73.70	215.86	337.97	89.83	27.36
1995	47.30	199.19	252.47	86.32	26.00
2000	31.52	212.62	192.50	81.55	24.47
2005	25.89	247.73	163.49	78.68	23.13
2010	15.98	205.82	140.97	79.91	20.32
2011	15.16	197.83	134.55	79.18	19.13
2012	14.78	193.25	131.83	79.17	18.64
2013	14.35	193.69	128.73	78.82	18.13
2014	14.51	186.67	122.11	79.67	16.53
2015	14.05	184.03	120.25	80.34	16.35
2016	13.25	176.54	119.20	81.16	15.99
2017	12.79	167.32	118.15	81.17	15.79
2018	11.58	155.10	113.60	79.57	14.73
2019	11.17	145.85	112.17	77.91	14.52
2020	10.44	124.42	112.76	77.27	13.64
2021	10.84	123.12	114.58	77.37	14.73
2022	10.74	114.99	105.69	75.91	13.40
2023	10.58	108.76	103.71	74.11	12.87

Emissions of all the above pollutants have decreased since 1990. Compared to 2022, the inventory results show reduced emissions for all pollutants in 2023 as well.

4.1 Description of trends since 1990

4.1.1 SO_2 emissions

In 2023, SO_2 emissions amounted to 10.6 kt. Since 1990 (73.7 kt), emissions have decreased by 86 % and since 2005 by 59 %. This decline is mainly due to the substitution of coal and heating oil with low-sulphur fuels, such as natural gas, the reduction of the sulphur content in mineral oil products and fuels (as

prescribed by the Austrian Fuel Ordinance), as well as the installation of desulphurisation units in industry and energy plants (according to the Clean Air Act for boilers).

In 2023, the largest contributor to the national total SO_2 emissions was industry (sum of fuel combustion (*1.A.2*) and process emissions (*2*)) with 79 %, whereby the iron and steel industry (*1.A.2.a*) was mainly responsible (contribution of 48 % to national emissions). The energy industries sector (*1.A.1*) contributed 8.1 %; the other sectors (*1.A.4*, predominantly households) 10 %. In 1990 the sector *1.A.4* had still been a main emission source of SO_2, responsible for 44 % of national total emissions. Because of the switch of coal and heating oil to low-sulphur fuels or other energy carriers, the largest emission reductions have been achieved in this sector.

From 2022 to 2023, SO_2 emissions decreased by 0.2 kt (-1.5 %). This reduction was largely influenced by the decrease in emissions from oil refining (*1.A.1.b*) due to improvements in the 'SNO_x' plant (a combined flue gas desulphurisation and flue gas denitrification system). The reduced use of biomass in the wood processing industries within the sector Other Stationary Combustion in Manufacturing Industries and Construction (*1.A.2.g.viii*) led to a further decrease in emissions. In the case of households (*1.A.4.b.1*), the reduction in the use of coal and biomass resulted in decreasing emissions in 2023 compared to the previous year as well. The reduction of biomass is largely driven by milder weather conditions. The decrease in heating oil and gas (and to a lesser extent also coal) is due to price changes on the energy market, but is also the result of the increasing switch to climate-friendly heating systems.

This decline was partly offset by higher process emissions from integrated steel plants (*1.A.2.a*).

4.1.2 NO_X emissions

In 1990, NO_X emissions amounted to 215.9 kt, and in 2023 to 108.8 kt, constituting a decrease of 50 % over the period. Given that emissions increased between 1990 and 2005 (2005: 247.7 kt), the emission reduction between 2005 and 2023 is in fact even higher (56 %).

The reduction in NO_x emissions from 2005 onwards was mainly due to reductions in sector *1.A.3.b* (road transport), largely influenced by technological improvements for heavy duty vehicles and to a lesser extent also for passenger cars. Reductions have also been achieved due to a general decrease in fuel oil and coal consumption in all sectors, the switch of households and service providers to modern low-emission heating systems as well as district heating, and the installation of abatement technologies in energy and manufacturing industries. The COVID pandemic caused a significant fall in emissions between 2019 and 2020.

The main share of Austria's national NO_x emissions is emitted by fuel combustion activities. With 43 %, road transportation accounted for the biggest share of

Austria's total emissions in the year 2023. In 2005, NO_x emissions from road traffic peaked and have since then decreased continuously. 2023 emissions have decreased by 70 % compared to 2005 levels. In particular, emissions from heavy duty vehicles (trucks and busses) have fallen due to improvements in exhaust after-treatment technology.

In 2023 national NO_x emissions were 6.2 kt or 5.4 % lower than in 2022. Road transportation (*1.A.3.b*) decreased by 2.9 kt. The main reason for this is the decline in activity of heavy commercial vehicles in inland (-1.2 kt) and in fuel exports (-1.1 kt) combined with improved specific NO_x emissions per vehicle kilometer (based on the fleet average).

NO_x emissions from the combustion of non-metallic minerals (*1.A.2.f*), particularly from cement and brick manufacturing industries, also fell between 2022 and 2023 due to lower production volumes. In Other sectors (*1.A.4*, predominantly households) the NO_x-emissions from fuel combustion fell by 7.1 % due to the lower use of oil and gas as a result of the increasing switch to climate-friendly heating systems, milder weather and price changes on the energy market.

4.1.3 NMVOC emissions

Non-methane volatile organic compounds emissions amounted to 338.0 kt in 1990 and to 103.7 kt in 2023. This corresponds to a reduction of 69 %. From 2022 to 2023, NMVOC emissions decreased by 2.0 kt (-1.9 %).

The largest reductions since 1990 have been achieved in the road transport sector due to an increased use of catalytic converters and diesel cars. Currently the road transport sector (*1.A.3.b*) accounts only for a small share (3.5 %) of Austria's total NMVOC emissions.

Reductions in the solvent sector (*2.D.3*) have been achieved due to the EU Solvents Directive and the national VOC Installation Act. In 2023, the solvent sector accounted for around 33 % of Austria's total NMVOC emissions. Compared to the previous year, emissions decreased slightly by 0.7 %, which was mainly due to the decrease in domestic disinfectant use that was at a very high level during the pandemic.

With a share of 32 %, the agriculture sector (*3*) contributed significantly to total NMVOC emissions in 2023. However, emission calculations for this sector are considerably uncertain. NMVOC emissions from agriculture originate mainly from manure management (*3.B*) and to a lesser extent from agricultural soils (*3.D*). Compared to the previous year, emissions from agriculture decreased in 2023 (-2.7 %), largely due to falling livestock numbers, in particular cattle.

Residential stationary heating (*1.A.4.b.1*) accounted for 20 % of the total 2023 NMVOC emissions. The decline in the use of biomass due to milder weather led to a decrease in emissions of 3.4 % in 2023 compared to the previous year.

4.1.4 NH_3 emissions

Ammonia emissions amounted to 74.1 kt in 2023. Since 1990, NH_3 emissions have decreased by 18 %; since 2005, they have decreased by 5.8 %.

The main source of NH_3 emissions is the agriculture sector with a share of 94 % in 2023. Within the agriculture sector, about 48 % of NH_3 emissions result from Manure Management (*3.B*) and 52 % from Agricultural Soils (*3.D*). There was a decrease of 20 % in NH_3 emissions from the agriculture sector between 1990 and 2023. This reduction can mainly be explained by decreasing livestock numbers, more efficient feeding, an increased application of low emission spreading techniques (e.g. band spreading, trailing shoe, rapid incorporation of manure) and reduced amounts of mineral fertilizer application.

Compared to the previous year 2022, total emissions decreased by 1.8 kt (-2.4 %). The main reasons for this reduction were falling ammonia emissions from the application of manure on agricultural soils as a result of lower animal numbers and the increased use of low-nitrogen application techniques in Austria. The decreasing livestock numbers (cattle -1.4 %, swine -5.0 %, sheep -2.2 %, goats 2.1 %) resulted in lower ammonia emissions from the manure management category as well. Emissions from mineral fertilizer application fell slightly by -1.6 %, although sales volumes decreased significantly between 2022 and 2023 (-7.4 %). The reason is a strong increase in urea fertilizer amounts (+39 %), which almost offset the overall reduction in mineral fertilizer sales numbers.

4.1.5 $PM_{2.5}$ emissions

Since 1990, $PM_{2.5}$ emissions have decreased by 53 % to 12.9 kt in 2023. The decrease since 2005 is 44 %. The largest reductions were achieved through reduced coal consumption for the provision of space heating and hot water in households (*1.A.4.b.1*) and improved vehicle exhaust after-treatment technologies in road transport (*1.A.3.b*).

From 2022 to 2023, $PM_{2.5}$ emissions decreased by 0.5 kt (3.9 %), due to the lower biomass consumption from residential heating (*1.A.4.b.1*).

With a share of about 42 %, sector *1.A.4.b.1* Residential: Stationary was the main source of total $PM_{2.5}$ emissions in 2023. The 3.2 % decrease in emissions between 2022 and 2023 was a consequence of mild weather as well as changes in energy prices and the associated reduced use of biomass. To some extent, the overall decreasing trend in $PM_{2.5}$ emissions of *1.A.4.b.1* stationary residential heating since 2005 can also be explained by efficiency improvements through thermal renovation and a switch to modern biomass appliances (improvements in fuel combustion technologies). Obsolete log firing systems ("all-purpose burners") continue to be the main source of the relatively high emissions in this sector.

4.2 Emission reduction obligations as of 2020

The EU Directive on the Reduction of National Emissions of Certain Atmospheric Pollutants (NEC Directive for short)[7] and the national Air Emissions Act 2018[8], respectively, set out separate targets for anthropogenic emissions of NO_x, SO_2, NMVOC, NH_3 and particulate matter ($PM_{2.5}$) for the years 2020 to 2029. The Member States are obliged to comply with these emission reduction commitments annually and to limit the emissions of these five pollutants accordingly.

The NEC targets for the years from 2020 onwards are set as relative values compared to base year values. The base year for the calculations of the emission reduction commitments is 2005.

The following table shows Austria's emission reduction commitments that apply for the years from 2020 and 2030.

Table 2: National Emission reduction commitments under the NEC Directive for Austria (Source: EG - L 2018, https://www.ris.bka.gv.at/eli/bgbl/I/2018/75).

	National Emission reduction commitments under the NEC Directive	
Atmospheric pollutant	**Reduction compared with 2005 for any year from 2020 to 2029**	**Reduction compared with 2005 for any year from 2030**
NO_x	-37 %	-69 %
SO_2	-26 %	-41 %
NMVOC	-21 %	-36 %
NH_3	-1 %	-12 %
$PM_{2.5}$	-20 %	-46 %

The emissions of NO_x and NMVOC from activities falling under categories 3.B (manure management) and 3.D (agricultural soils) are not to be taken into account in the context of the reduction obligations and should therefore be deducted from the respective total emissions.

In accordance with Article 5 of the NEC Directive, Member States will be given some flexibility and adaptation possibilities. These are not applied by Austria in the present report.

Based on 2025 NEC emissions reporting, the compliance with the 2023 targets is as follows:

- Austria fulfills the respective national emission reduction commitments in 2023 for all air pollutants covered by the NEC Directive (NO_x, SO_2, NMVOC, NH_3 and $PM_{2.5}$).

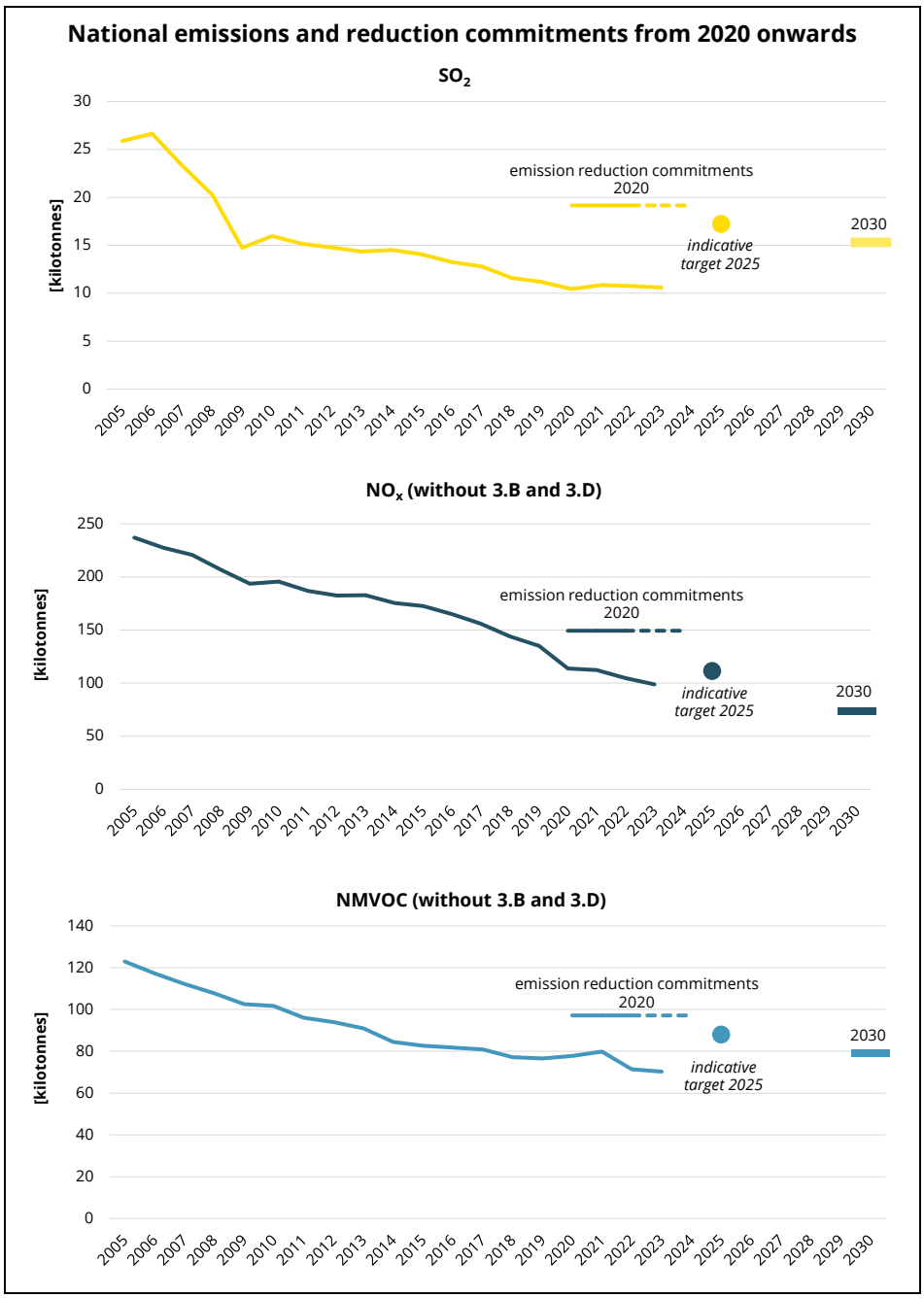
[7] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC

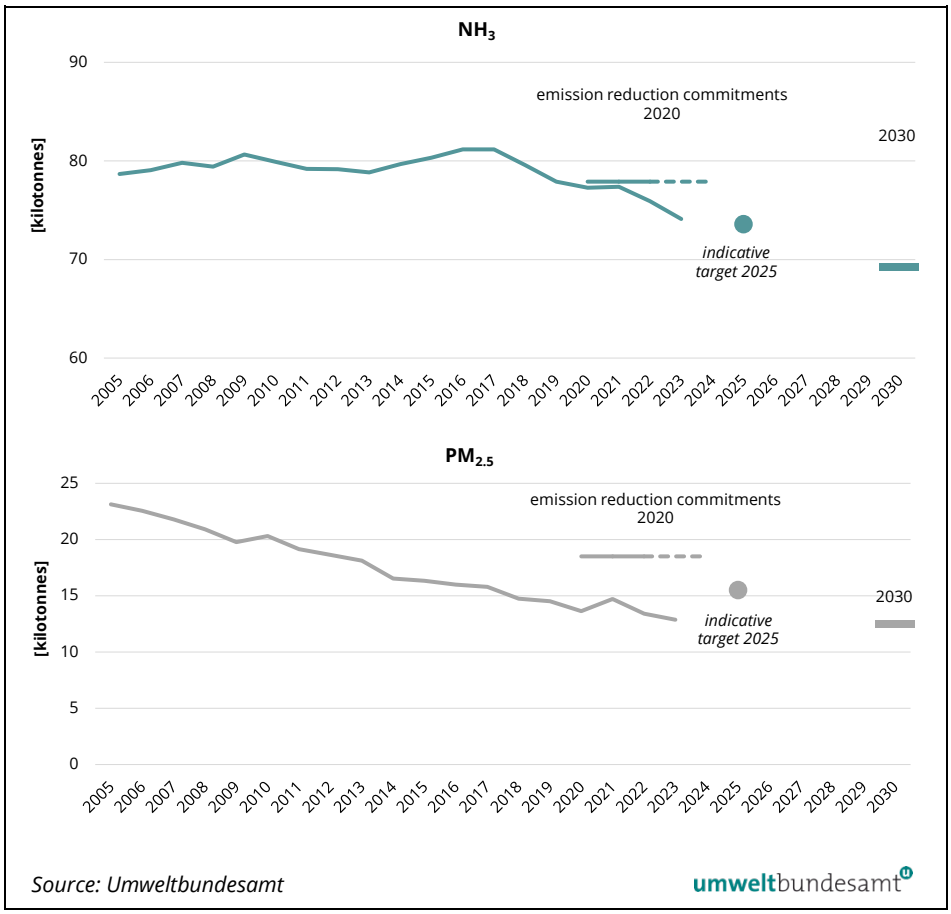
[8] Air Emissions Act (Emissionsgesetz-Luft) 2018 (EG-L 2018; BGBl. I Nr. 75/2018): Bundesgesetz über nationale Emissionsreduktionsverpflichtungen für bestimmte Luftschadstoffe (Emissionsgesetz-Luft 2018 – EG-L 2018)

Table 3: Emissions and the percentage change from 2005 to 2023 (Source: Umweltbundesamt).

	2005	2023	2005-2023
NOx (without 3.B and 3.D)	237.02	98.80	-58.3 %
NMVOC (without 3.B and 3.D)	122.96	70.28	-42.8 %
SO2	25.89	10.58	-59.2 %
NH3	78.68	74.11	-5.8 %
PM2,5	23.13	12.87	-44.4 %

Figure 1: Comparison of emissions with emission reduction commitments from 2020 onwards.





4.3 Fuel export

Emission calculations for the sector road transport are based on the quantity of fuel sold in Austria. However, it is important to note that the fuel quantity, which is sold in Austria, is higher compared to the quantity of fuel that is used and consumed in Austria. This is referred to as "fuel export". In Austria there is a net export of fuels in vehicle tanks that cross national borders, with subsequent combustion and emissions taking place outside the national territory.

The dynamic is explained in part by structural conditions (Austria is a landlocked country with a high share of exports in the economy) and by differences in fuel price levels between Austria and its neighboring countries.

The net quantities of fuel exported (and used) abroad can be determined from the difference between fuel sales in Austria and the calculated domestic consumption. Emissions from "fuel exports in motor vehicles" are derived from the associated mileage (vehicle-km) of cars and heavy-duty vehicles outside the national territory.

The table below shows the emissions from fuel exports. In 2023, NO_x emissions were estimated at 4.0 kt, which is around 3.7 % of Austria's national total NO_x emissions or 8.5 % of NO_x emissions from *1.A.3.b.* Road Transport.

From the end of the 1990s, there was an increase of these exported NO_x emissions, mainly from heavy-duty vehicles. A peak was reached in 2005; since then, fuel exports have declined continually.

Table 4: Emissions from fuel exports (Source: Umweltbundesamt).

	Emissions [kilotonnes]				
	SO_2	**NO_x**	**NMVOC**	**NH_3**	**$PM_{2.5}$**
1990	0.69	13.98	2.68	0.02	0.53
1995	0.83	14.43	-0.63	-0.05	0.64
2000	0.49	29.78	-0.63	-0.21	0.81
2005	0.05	55.11	4.65	0.57	1.93
2010	0.03	32.39	1.81	0.39	1.11
2011	0.03	25.35	1.35	0.31	0.86
2012	0.03	24.41	1.16	0.28	0.81
2013	0.04	27.83	1.06	0.24	0.86
2014	0.03	23.80	0.86	0.21	0.72
2015	0.03	22.65	0.85	0.23	0.71
2016	0.03	19.18	0.77	0.22	0.66
2017	0.03	16.98	0.69	0.22	0.62
2018	0.03	14.38	0.60	0.21	0.56
2019	0.03	11.87	0.48	0.18	0.51
2020	0.03	8.42	0.36	0.14	0.41
2021	0.03	6.72	0.31	0.13	0.36
2022	0.02	3.71	0.19	0.08	0.22
2023	0.01	4.03	0.27	0.11	0.20

The national emissions without fuel exports (see Annex 2: Austria's Emissions based on fuel used (without ‚fuel exports')) were used to assess compliance with the emission ceilings under the NEC Directive[9] for the years 2010 to 2019. However, from 2020 onwards the emissions based on fuels sold (see Annex 1: Austria's Emissions Based on fuel sold (with ‚fuel exports')) are used for assessing the compliance with the current national emission reduction commitments. This is justified in the inventory reporting guidelines[10]. It provides that the assessment of the achievement of the target is, in principle, based on the inventory data calculated on the basis of the quantity of fuel sold. However, those

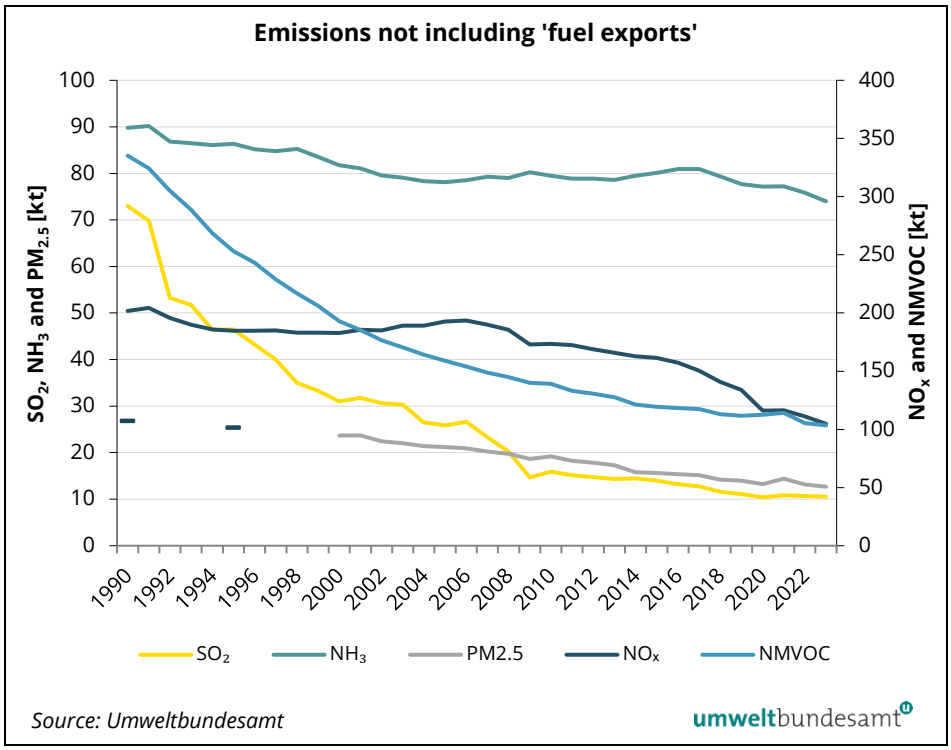
[9] Directive 2001/81/EG on national emission ceilings for certain atmospheric pollutants

[10] 2023 Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution. These guidelines are also applicable under the NEC Directive.

Member States whose obligations have been determined on the basis of the fuel consumed may also choose the inventory data calculated on the basis of the quantities of fuel used as the basis for assessing the achievement of the target. The emission ceilings applicable from 2010 onwards were established in the late 1990s; at that time, the problem of fuel export in the vehicle tank had not been adequately considered. However, the setting of emission reduction commitments for the years post-2020 and post-2030 is based on model calculations made on behalf of the European Commission, where fuel exports have been considered in the respective Member State targets.

The following figure shows the Austrian emissions of the pollutants SO_2, NO_x, NH_3, NMVOC and $PM_{2.5}$ without emissions from fuel exports (calculated on the basis of fuel used). The emission values in tabular form are listed in Annex 2.

Figure 2: SO_2, NO_x, NMVOC, NH_3 and $PM_{2.5}$-emissions without fuel exports.



5 METHOD OF REPORTING

5.1 Methodology

The Austrian Air Emission Inventory for the period 1990 to 2023 has been compiled according to the 2023 Guidelines for Reporting Emissions and Projections Data as adopted by the Executive Body for the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP Convention) at its 42nd session.

In Austria, emissions of air pollutants as well as emissions of greenhouse gases are all gathered in a database based on the CORINAIR (CORe INventory AIR)/ SNAP (Selected Nomenclature for sources of Air Pollution) nomenclature. This nomenclature was designed by the EEA to function as common framework for describing and labelling the various anthropogenic sources of air pollutant (and GHG) emissions. To comply with the reporting obligations under the UNECE/LRTAP Convention, the CORINAIR/SNAP category emissions are translated and assigned to the respective categories of the NFR (Nomenclature for Reporting) format.

The complete set of tables in the NFR format, including – in particular – sectoral emissions and activity data, is submitted separately in digital form only (Excel files). In this report, the NFR summary tables are presented in annexes 1 and 2.

The following table summarises the status of this report:

Table 5: Status of report.

Format	Inventory	Version
NFR Format (UNECE)	OLI 2024	February 13th 2025

Data presented in this report are based on the 2024 Austrian Air Emission Inventory cycle (Österreichische Luftschadstoff-Inventur, OLI 2024) prepared by the Umweltbundesamt in the year 2024 with annual emissions estimates for the years between 1990 and 2023. The Austrian Air Emission Inventory is subject to continuous improvement, resulting in recalculations as outlined in Chapter 6.

5.2 Sources of Data

Table 6 presents the main data sources used for activity data as well as information on the institutions that carried out respective calculations.

Table 6: Main data sources for activity data and emission values.

Sector	Data Sources for Activity Data
Energy	• Energy Balance from Statistik Austria • EU-ETS • Steam boiler database (Large combustion plants) • Small scale combustion market data • Direct information from industry or associations of industry • IMEO Reports (OGMP 2.0)
Transport	• Energy Balance from Statistik Austria • Yearly new vehicle registrations from Statistik Austria • Yearly growth rates of transport performance on Austrian roads from Federal Ministry of Climate Action, Environment, Energy, Mobility, In-novation and Technology (BMK) • ZBD: Zentrale Begutachtungsdatenbank (periodically updated specific mileage, "sticker check" according to §57a KFG) • Yearly flight movements from AustroControl • Yearly FC of airport ground activities at Vienna International Airport
IPPU	• Reports submitted under the Industrial Emissions Directive • Market data for consumer products (EUROMONITOR) • Direct information from industry or associations of industry • National statistics (production and foreign trade) • Surveys at companies and associations
Agriculture	• National studies • National agricultural statistics obtained from Statistik Austria • INVEKOS Data from the Integrated Administration and Control System (IACS) • 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)
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

Emission calculations and related inventory work (reporting, QA/QC, documentation and archiving, etc.) are carried out by sector experts of the Inspection Body for Emission Inventories (IBE).

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 (Agriculture)
- 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)

A detailed description of the activity data, emission factors, and the methodologies applied will be provided in Austria's Informative Inventory Report (IIR) 2025[11], which is to be submitted under the UNECE Convention on Long-range Transboundary Air Pollution and the NEC-Directive (EU 2016/2284) on 15 March 2025. Furthermore, relevant service contracts, as described in brief above, will be referenced in the sector-specific chapters of this document.

[11] https://www.umweltbundesamt.at/emiberichte

6 RECALCULATIONS

Following the continuous improvements made to Austria's annual Air Emission Inventory, some sources have been recalculated on the basis of updated activity data or revised methodologies. Thus, the emission data for the period from 1990 to 2022 submitted this year may differ from the data previously reported.

The figures presented in this report replace former data reported by the Umweltbundesamt under the reporting framework of the UNECE/LRTAP Convention and the NEC Directive of the European Union.

Table 7: Recalculation difference with respect to the previous submission (Source: Umweltbundesamt).

	Recalculation Difference [%]		
	1990	**2005**	**2022**
SO2	0.00 %	-0.01 %	-0.39 %
NOx	-0.16 %	-0.04 %	0.48 %
NMVOC	2.80 %	6.12 %	5.65 %
NH3	21.25 %	19.19 %	11.65 %
PM2.5	0.11 %	-1.21 %	-0.35 %

Recalculations were carried out in all sectors for all pollutants. However, the most significant revisions were done for ammonia due to several improvements in the agriculture sector (activity data as well as methodological revisions). For NMVOC there have been remarkable changes as well, largely due to the reassessment of the methodology for estimating emissions from Solvent Use but also due to the revisions carried out in sector Agriculture.

The following section describes the methodological changes made to each sector of the inventory since the previous submission.

6.1 ENERGY (1)

6.1.1 Stationary combustion (*1.A.1.a-c, 1.A.2.a-g, 1.A.3.e.i and 1.A.4.a-1.A.4.c*)

6.1.1.1 Update of activity data

Revision of the energy balance

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

- Natural gas 2022: Gross inland consumption was not revised. The transformation input was revised downwards by 3.7 PJ and shifted to final energy

consumption. The final energy consumption of *1.A.4.a* and *1.A.4.b* was revised downwards by 0.2 PJ and final energy consumption of manufacturing industries was revised upwards by +4.0 PJ.

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

6.1.1.2 Methodological Changes

Energy Industries (*1.A.1*) and Manufacturing Industries (*1.A.2*)

- Natural gas consumption of gas supply companies (reported as transformation input for district heating and already included in public district heating plants *1.A.1.a*) was moved from sector *1.A.1.c* to sector *1.A.2.g* since the year 2011, as the offset quantity had previously been deducted from this sector. This improved consistency with the energy balance at the sector level.
- Revision of NH_3 emission factor for municipal solid waste (NFR *1.A.1.a*) to implement the EMEP 2023 Guidebook Tier 1 factor.

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

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

Other Sectors (*1.A.4*)

For 1990 to 2022, minor changes in air pollutant emissions of categories Commercial/Institutional *(1.A.4.a)* and Residential *(1.A.4.b)* occur because of updated heating stock data and newly allocated shares of combustion technologies per energy carrier (updated energy demand model for space heating).

NH_3 emission factors for all heating types using biomass were revised following EMEP 2023 Guidebook Tier 2.

$PM_{2.5}$ emission factors for heating type *#15 Natural-draft wood boilers* were revised following EMEP 2023 Guidebook Tier 2 to include condensable fraction (assuming the condensable fraction only contains particles <2.5 µm and does not contain any BC).

6.1.2 Fugitive emissions (*1.B*)

Storage of solid fuels (*1.B.1.a*)

PM emissions for 2022 were recalculated by +2.8% (+0.001 kt $PM_{2.5}$) due to revised coal consumption activity data.

Natural gas (*1.B.2.b*)

Emissions of NMVOC were revised over the whole time series due to the consideration of the results of a new study on fugitive emissions from gas transmission, storage and distribution in Austria, conducted by Forschung Burgenland based on a survey among Austrian gas companies (WARTHA 2024[12]). Moreover, verified methane emissions data on gas transmission became available from the IMEO reporting[13] within the scope of OGMP 2.0 from 2022 onwards, that were used for NMVOC reporting from high pressure gas pipelines as well. NMVOC emissions from natural-gas appliances and natural-gas-powered vehicles ('gas post meter') are reported for the first time, resulting in additional NMVOC emissions in this years' submission over the whole time series (e.g. +0.2 kt in 2022).

Overall NMVOC emissions from this category for 2022 were 0.4 kt (115 %) higher than reported in the previous submission.

6.1.3 Transport (*1.A.3*)

6.1.3.1 Road Transport (*1.A.3.b*)

Update/improvement of activity data

- **Revision of the energy balance**

  Update of natural gas and liquefied petroleum gas consumption for the years 2021 and 2022 due to revisions in the current national energy balance by the federal statistics office 'Statistik Austria'.
- **Update of the correction factor (CF) for real-world fuel consumption PC (passenger cars)**

The real-world consumption correction factors - when switching from NEDC (New European Driving Cycle) to WLTP (Worldwide harmonized Light vehicles Test Procedure) standard values - have been updated in the NEMO emissions calculation model for PC. The revision with minor adjustments from 2019 onwards and a substantial update from 2021 onwards is based on the national CO_2 monitoring data and data from the new version 5.1 of the Handbook of emission factors (not published yet).

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

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

- CO2-CF for gasoline PC from 2021 onwards = 20%
- CO2-CF for diesel PC from 2021 onwards = 18%

Methodological changes

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

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

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

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

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

All these changes resulted in recalculations in *1.A.3.b. Road Transport* for 2022 of +0.7 kt NO_x, +0.0001 kt SO_2, +0.02 kt NH_3, +0.12 kt NMVOC and –0.3 kt $PM_{2.5}$.

6.1.3.2 Military (*1.A.5*)

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

These changes resulted in recalculations in *1.A.5. Other* for 2022 of + 0.001 kt NO_x, + 0.03 kt SO_2, + 0.000002 kt NH_3, + 0.0002 kt NMVOC and + 0.0003 kt $PM_{2.5}$.

6.2 INDUSTRIAL PROCESSES (*2*)

6.2.1 Update of data

6.2.1.1 Lime Production (*2.A.2*)

As no activity data for 2021 and 2022 were available, it was modelled from reported CO_2 emissions. A change in UNFCCC reporting of these emissions (separate reporting of emissions and recovery, instead of reporting of net-emissions) resulted in a minor change in modelled activity data, which resulted in slight recalculations for PM (-0.0001 kt $PM_{2.5}$ in 2022).

6.2.1.2 Copper production (*2.C.7.a*)

Activity data for 2022 was updated (e.g. -0.00005 kt $PM_{2.5}$ and – 0.03 kt SO_2 in 2022).

6.2.1.3 Domestic solvent use (*2.D.3.a*)

Market data on solvent containing products for the years 2010-2023 was incorporated (+ 1.93 kt NMVOC in 2022). For the years prior to 2010, the change in methodology for *2.D.3* affected also *2.D.3.a* emissions (skipping the upscaling to top down data).

6.2.1.4 Road Paving (*2.D.3.b*)

Activity data for 2022 was updated (-0.01 kt NMVOC and - 0,002 kt $PM_{2.5}$ in 2022).

6.2.1.5 Asphalt Roofing (*2.D.3.c*)

Activity data for the years from 2017 onwards were updated, resulting in - 0.002 kt NMVOC, - 0.1 kt CO and -0.00001 kt $PM_{2.5}$ in 2022.

6.2.2 Methodological changes

6.2.2.1 Fertilizer production (*2.B.10.a*)/ Storage, handling and transport of chemical products (*2.B.10.b*)

NMVOC emissions from ammonia production were previously reported together with emissions from another production site under *2.B.10.a other*. They are now allocated according to the EMEP/EEA GB 2023 category split (no effect on overall emissions level).

6.2.2.2 Solvent use (*2.D.3* except *2.D.3.b* and *2.D.3.c*)

The methodology for estimating emissions from Solvent Use was reassessed:

Scaling of bottom up data with top down estimates was not performed anymore, as now bottom up data (a study for the year 2000 and data for 2015, 2019 and 2022 derived from solvent balances that were prepared following the EU regulation - Industrial Emissions Directive 2010/75/EU) is more reliable than the respective top down estimates (derived from import/export and production statistics for solvents and solvent containing products). This led to higher solvent use in 2000, as for that year data was downscaled before. Top down data is now only used for verification of solvent consumption as a mean value over the time series.

Additionally:

- In the course of in depth QA/QC checks it became apparent that two categories that were included in the study were not considered in the inventory:
  - "glues" was missing in 2000 (not relevant for recent years as plant was closed)
  - "other" includes industrial installations not otherwise covered, and special applications of e.g. methanol for bleaching.
- De-icing of planes was updated for recent years
- For paint used in construction and building now for 2000 an estimate that is consistent with the estimate 2010 and 2015 was made (data in between was interpolated), resulting in higher emissions. The decrease can be explained by the implementation of the Decopaint Directive 2004/42/CE.

Data on product use in the domestic sector became available for 2010 onwards. Incorporation of this data, together with additional research on additional categories resulted in higher emissions from domestic solvent use for recent years (+ 2.9 t NMVOC of *2.D.3* emissions) with a comparable trend for 2005-2022 (-41% in last year's submission vs. -40% for the same period in this year's submission).

6.3 AGRICULTURE (*3*)

6.3.1 Update of activity data

6.3.1.1 Manure Management (*3.B*), Agricultural Soils (*3.D*)

AWMS data – new survey 'TIHALO III'

The research project 'Animal husbandry and manure management systems in Austria' ('TIHALO I', AMON et al. 2007 and 'TIHALO II', PÖLLINGER et al. 2018) has

been followed-up by a new investigation ('TIHALO III', PÖLLINGER et al. 2025)[14]. In this project, as in its predecessors, a comprehensive survey of the agricultural practices in Austria has been carried out. The results of this study (data on livestock feeding, management systems and practices, application techniques for 2023) were used as the basis for the calculation of Austria's emission inventory in submission 2025 resulting in revisions in all animal related emission sources.

Background data for feeding and nutrition of cattle

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

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

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

Livestock data – horses and deer

For 2023 new livestock numbers for horses became available (BML 2024)[15]. The years 2018-2022 were determined by interpolation. For deer, the entire time series was revised: data from IACS (INVEKOS)[16] available from 2000 onwards was taken (BML 2024) instead of the numbers previously used based on the farm structure surveys 2010 and 2020. IACS provides annual and more complete data for deer compared to the farm structure surveys. Animal numbers for the years 1990-1999 were determined by trend extrapolation.

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

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

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

Livestock data – rabbits

Rabbits were included for the first time in the inventory as a new animal category. Rabbit livestock numbers based on IACS (INVEKOS) for the years from 2000 onwards were taken as activity data (BML 2024). Animal numbers for the years 1990-1999 were determined by trend extrapolation. NO_x, NMVOC, NH_3 and $PM_{2.5}$ emissions from rabbits are for the first time recorded in the source categories *Manure Management* (*3.B.4.h*) as well as NO_x, NMVOC and NH_3 from *Animal manure applied to soils (3.D.a.2.a)*.

Biogas plants

Updated figures for biogas plants for 2018-2022 (E-CONTROL 2024) resulted in slightly revised NO_x and NH_3 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 2018-2022.

6.3.2 Methodological changes

6.3.2.1 Manure Management (*3.B*) – NH_3, NO_x, and NMVOC

One reason for the revised estimates is the improved activity data (AWMS data, feeding and nutrition, livestock data, new emission source rabbits, biogas - see above). In particular, the system 'pit storage below animal confinements' is connected with higher ammonia emissions. Additionally, methodological improvements have been carried out for the ammonia calculations. The total ammoniacal nitrogen (TAN) values for liquid and solid manure of cattle and swine used in previous submissions taken from SCHECHTNER et al. (1991)[17] were amongst the lowest in European countries. Revised values were derived from measurement data from PÖTSCH (2019)[18] and adjusted with the N-losses provided in the German and Swiss inventories, currently reflecting the latest science. The update of the TAN values resulted in higher NH_3 emissions. These improvements had also an impact on NO_x and NMVOC.

Furthermore, there have been recalculations carried out for methane emissions in CRT sector *3.A Enteric fermentation* with an effect on NMVOC emissions. For the first time this category was calculated based on the Tier 2 methodology according to (IPCC 2019) for sheep, goats, horses, poultry, deer and rabbits resulting in new country-specific CH_4 EFs (equation 10.21, IPCC 2019).

Overall, NO_x, NMVOC and NH_3 emissions from manure management have increased for the entire time series (+2.2 kt NH_3, +0.1 kt NO_x and +0.4 kt NMVOC for 2022).

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

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

6.3.2.2 Agricultural Soils (*3.D*) – NH_3, NO_x, NMVOC and $PM_{2.5}$

Animal Manure Applied to Soils (*3.D.a.2.a*)

Updated activity and nutrition data, as described before, resulted in revised NH_3, NO_x and NMVOC emissions. In addition, the methodological changes as discussed in sector *3.B Manure Management* (chapter 6.3.2.1) had also an effect on this emissions source:

The revised TAN values of cattle and swine resulted in higher ammonia emissions from manure application, in particular for cattle. For NO_x, the lower amounts of N available for application due to the increased NH_3-N losses during the storage resulted in lower emissions from manure application.

In addition, the revised methodologies with updated feed intake estimates, new TAN and VS excretion values resulted in higher NMVOC emissions from manure application.

Overall, the entire time series was recalculated for NH_3, NO_x and NMVOC (+4.2 kt NH_3, -0.4 kt NO_x and +1.5 kt NMVOC for 2022).

Other organic fertilizers (*3.D.a.2.c*)

As a result of the updated figures for biogas plants, NH_3 and NO_x emissions have been slightly revised for the years 2018 and 2022 (+0.0002 kt NH_3 and +0.0001 kt NO_x).

Urine and dung deposited by Grazing Animals (*3.D.a.3*)

Livestock related updates (livestock numbers, $N_{excretion}$ values) as well as new data on the Austrian agricultural practices from the new TIHALO III-survey led to revisions of air pollutant emissions from grazing animals. Furthermore, the methodological revisions in sector 3.B Manure Management (chapter 6.3.2.1) had also an influence on this source category. Improvements resulted in revised NH_3, NO_x and NMVOC emissions over the entire time series (+0.1 kt NH_3, +0.1 kt NO_x and +0.02 kt NMVOC for 2022).

On-farm storage, handling and transport of agricultural products (*3.D.c*)

Marginal revisions of cropland areas led to slightly changed PM emissions for several years (+0.0001 kt $PM_{2.5}$ for 2022).

Cultivated crops (*3.D.e*)

Marginal revisions of cropland areas led to slightly changed NMVOC emissions for several years (+0.001 kt NMVOC for 2022).

6.3.3 New emission sources

Rabbits (*3.B.4.h* Manure Management, *3.D.a.2.a* Animal Manure Applied to Soils)

The inclusion of rabbits under sector 3.B.4.h Other animals (together with deer) into Austria´s inventory resulted in slightly higher NH_3, NO_x, NMVOC and $PM_{2.5}$ emissions for the entire time series.

Crop residues applied to soils (*3.D.a.4*)

Ammonia emissions from crop residues applied to soils are reported for the first time in the current submission. Emissions are calculated by using the methodology according to the EMEP/EEA GB 2023 and are fully consistent with the 2019 IPCC Refinements (IPCC 2019). The inclusion of this new emission source resulted in increased NH_3 emissions for the entire time series between 0.005 and 0.7 kt NH_3.

6.4 WASTE (*5*)

6.4.1 Update of activity data

6.4.1.1 Anaerobic digestion at biogas facilities (*5.B.2*)

Recalculations of NH_3 for the entire time series, reported for 5.*B.2 anaerobic digestion at biogas facilities* (+0.01 kt in 2022), are due to updates of activity and nutrition data. See also Chapter 6.3 on recalculations in the agriculture sector.

6.5 Other Sources (*6.A*)

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

TABELLENVERZEICHNIS FÜR KAPITEL 1 BIS 3

ABBILDUNGSVERZEICHNIS FÜR KAPITEL 1 BIS 3

LIST OF TABLES FOR CHAPTERS 4 TO 7

LIST OF FIGURES FOR CHAPTERS 4 TO 7

ANNEX 1: AUSTRIA'S EMISSIONS BASED ON FUEL SOLD (WITH ‚FUEL EXPORTS')

Notation keys:

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

IE (included elsewhere) ... for emissions by sources and removals by sinks of pollutants 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 pollutants 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 pollutant.

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.

The complete tables in the NFR format are submitted separately in digital form only (Excel files).

Table A.I-1: SO_2 emissions [kilotonnes] 1990–2023 based on fuel sold. (Source: Umweltbundesamt)

	NFR								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	71.69	69.69	2.00	1.93	0.00	0.07	NA	73.70	0.25
1991	69.05	67.75	1.30	1.61	0.00	0.06	NA	70.72	0.28
1992	52.79	50.79	2.00	1.36	0.00	0.04	NA	54.20	0.30
1993	51.66	49.56	2.10	1.11	0.00	0.04	NA	52.82	0.32
1994	46.16	44.88	1.28	1.12	0.00	0.05	NA	47.33	0.34
1995	46.18	44.65	1.53	1.07	0.00	0.05	NA	47.30	0.38
1996	42.89	41.69	1.20	0.99	0.00	0.05	NA	43.94	0.42
1997	39.36	39.29	0.07	0.96	0.00	0.06	NA	40.38	0.43
1998	34.65	34.61	0.04	0.87	0.00	0.06	NA	35.58	0.45
1999	32.82	32.78	0.04	0.81	0.00	0.06	NA	33.70	0.44
2000	30.68	30.63	0.04	0.78	0.00	0.06	NA	31.52	0.48
2001	31.61	31.56	0.05	0.71	0.00	0.06	NA	32.38	0.47
2002	30.51	30.47	0.04	0.71	0.00	0.06	NA	31.28	0.43
2003	30.28	30.23	0.05	0.71	0.00	0.06	NA	31.05	0.40
2004	25.78	25.73	0.04	0.72	0.01	0.06	NA	26.57	0.47
2005	25.10	25.06	0.04	0.72	0.00	0.06	NA	25.89	0.55
2006	25.87	25.82	0.05	0.73	0.00	0.05	NA	26.65	0.58
2007	22.54	22.49	0.05	0.75	0.00	0.04	NA	23.33	0.61
2008	19.45	19.41	0.04	0.78	0.00	0.03	NA	20.27	0.61
2009	14.01	13.96	0.06	0.70	0.00	0.02	NA	14.73	0.53
2010	15.26	15.21	0.05	0.70	0.00	0.01	NA	15.98	0.57
2011	14.47	14.42	0.05	0.68	0.00	0.01	NA	15.16	0.60
2012	14.12	14.07	0.05	0.65	0.00	0.01	NA	14.78	0.57
2013	13.75	13.71	0.04	0.58	0.00	0.01	NA	14.35	0.54
2014	13.94	13.91	0.04	0.56	0.00	0.01	NA	14.51	0.54
2015	13.48	13.44	0.04	0.55	0.00	0.01	NA	14.05	0.58
2016	12.68	12.66	0.02	0.56	0.00	0.01	NA	13.25	0.54
2017	12.21	12.17	0.04	0.57	0.00	0.01	NA	12.79	0.52
2018	11.00	10.98	0.02	0.56	0.00	0.01	NA	11.58	0.59
2019	10.56	10.54	0.02	0.59	0.00	0.01	NA	11.17	0.68
2020	9.84	9.81	0.02	0.59	0.00	0.01	NA	10.44	0.24
2021	10.23	10.20	0.03	0.59	NA	0.01	NA	10.84	0.27
2022	10.16	10.13	0.03	0.56	NA	0.02	NA	10.74	0.45
2023	10.00	9.97	0.03	0.56	NA	0.01	NA	10.58	0.61

Table A.I-2: NO_x emissions [kilotonnes] 1990–2023 based on fuel sold. (Source: Umweltbundesamt)

	NFR								
	1	**1 A**	**1 B**	**2**	**3**	**5**	**6**		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	200.53	200.53	IE	1.53	13.66	0.12	NA	215.86	2.48
1991	210.42	210.42	IE	1.51	13.57	0.11	NA	225.62	2.80
1992	199.34	199.34	IE	1.41	13.14	0.08	NA	213.98	3.06
1993	193.61	193.61	IE	1.51	12.88	0.07	NA	208.07	3.27
1994	185.77	185.77	IE	1.38	12.67	0.07	NA	199.89	3.43
1995	185.49	185.49	IE	0.90	12.73	0.07	NA	199.19	3.85
1996	203.56	203.56	IE	0.87	12.55	0.07	NA	217.04	4.24
1997	189.80	189.80	IE	0.86	12.53	0.07	NA	203.26	4.43
1998	201.66	201.66	IE	0.83	12.55	0.07	NA	215.12	4.59
1999	193.83	193.83	IE	0.82	12.13	0.07	NA	206.85	4.52
2000	199.84	199.84	IE	0.83	11.88	0.07	NA	212.62	6.44
2001	210.68	210.68	IE	0.78	11.78	0.07	NA	223.31	6.32
2002	218.61	218.61	IE	0.79	11.74	0.07	NA	231.20	5.67
2003	230.20	230.20	IE	0.81	11.25	0.07	NA	242.33	5.21
2004	230.87	230.87	IE	0.69	10.69	0.07	NA	242.31	6.09
2005	236.23	236.23	IE	0.70	10.73	0.06	NA	247.73	6.99
2006	226.94	226.94	IE	0.58	10.76	0.05	NA	238.34	7.54
2007	220.15	220.15	IE	0.48	10.92	0.05	NA	231.59	7.99
2008	206.18	206.18	IE	0.56	11.45	0.04	NA	218.23	7.90
2009	193.17	193.17	IE	0.41	11.22	0.03	NA	204.82	6.86
2010	194.92	194.92	IE	0.55	10.33	0.02	NA	205.82	7.60
2011	186.45	186.45	IE	0.52	10.84	0.02	NA	197.83	7.98
2012	181.75	181.75	IE	0.55	10.93	0.02	NA	193.25	7.68
2013	182.41	182.41	IE	0.45	10.80	0.02	NA	193.69	7.46
2014	175.09	175.09	IE	0.46	11.09	0.02	NA	186.67	7.49
2015	172.02	172.02	IE	0.52	11.46	0.02	NA	184.03	8.18
2016	164.30	164.30	IE	0.52	11.70	0.02	NA	176.54	10.28
2017	155.37	155.37	IE	0.47	11.45	0.02	NA	167.32	10.06
2018	143.50	143.50	IE	0.41	11.16	0.02	NA	155.10	11.54
2019	134.65	134.65	IE	0.50	10.67	0.02	NA	145.85	13.47
2020	113.23	113.23	IE	0.48	10.68	0.03	NA	124.42	4.54
2021	111.79	111.79	IE	0.46	10.84	0.03	NA	123.12	5.35
2022	104.17	104.17	IE	0.40	10.39	0.03	NA	114.99	8.91
2023	98.30	98.30	IE	0.47	9.97	0.03	NA	108.76	11.59

Table A.I-3: NMVOC emissions [kilotonnes] 1990–2023 based on fuel sold. (Source: Umweltbundesamt)

	NFR								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	165.76	149.84	15.92	118.97	53.08	0.17	NA	337.97	0.18
1991	169.46	153.91	15.56	112.45	52.06	0.17	NA	334.14	0.20
1992	154.22	138.56	15.66	105.71	49.56	0.16	NA	309.65	0.21
1993	141.77	126.64	15.13	99.03	50.09	0.16	NA	291.05	0.23
1994	125.98	114.39	11.59	92.42	49.51	0.15	NA	268.07	0.24
1995	117.53	107.55	9.98	85.75	49.04	0.15	NA	252.47	0.26
1996	110.34	101.39	8.95	83.26	47.78	0.14	NA	241.52	0.31
1997	98.18	89.73	8.45	80.97	46.89	0.14	NA	226.17	0.35
1998	91.84	84.91	6.93	78.73	46.63	0.14	NA	217.33	0.39
1999	83.87	77.72	6.15	75.04	45.75	0.13	NA	204.79	0.38
2000	77.31	71.13	6.18	70.93	44.13	0.13	NA	192.50	0.42
2001	74.14	69.81	4.33	68.70	43.32	0.12	NA	186.28	0.41
2002	70.86	66.33	4.53	66.66	42.37	0.12	NA	180.00	0.37
2003	68.73	64.25	4.48	64.65	41.76	0.12	NA	175.27	0.34
2004	64.97	60.87	4.10	62.47	41.35	0.12	NA	168.91	0.40
2005	62.30	58.41	3.90	60.50	40.57	0.12	NA	163.49	0.47
2006	58.63	54.71	3.93	58.53	40.04	0.11	NA	157.31	0.50
2007	55.73	52.15	3.57	56.40	39.81	0.11	NA	152.05	0.53
2008	53.39	50.02	3.37	54.24	39.41	0.10	NA	147.15	0.52
2009	50.50	47.28	3.22	51.92	39.66	0.10	NA	142.18	0.45
2010	51.79	48.72	3.07	49.77	39.32	0.09	NA	140.97	0.49
2011	47.58	44.52	3.06	48.41	38.47	0.09	NA	134.55	0.51
2012	47.13	44.07	3.07	46.74	37.87	0.08	NA	131.83	0.49
2013	46.35	43.34	3.01	44.52	37.78	0.08	NA	128.73	0.46
2014	41.39	38.28	3.11	42.91	37.73	0.07	NA	122.11	0.46
2015	41.53	38.51	3.02	41.13	37.52	0.07	NA	120.25	0.50
2016	40.85	37.88	2.97	40.90	37.39	0.07	NA	119.20	0.23
2017	40.24	37.24	3.00	40.57	37.28	0.07	NA	118.15	0.20
2018	37.10	34.22	2.88	40.01	36.42	0.06	NA	113.60	0.22
2019	36.91	33.99	2.92	39.58	35.62	0.06	NA	112.17	0.24
2020	34.91	32.37	2.54	42.76	35.03	0.06	NA	112.76	0.10
2021	38.99	36.47	2.52	40.86	34.68	0.06	NA	114.58	0.12
2022	33.07	30.76	2.31	38.23	34.35	0.06	NA	105.69	0.19
2023	32.25	29.74	2.50	37.97	33.43	0.06	NA	103.71	0.22

Table A.I-4: NH_3 emissions [kilotonnes] 1990–2023 based on fuel sold. (Source: Umweltbundesamt)

	NFR								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	2.11	2.11	IE	0.34	86.47	0.37	0.55	89.83	0.00
1991	2.59	2.59	IE	0.58	86.20	0.38	0.55	90.30	0.00
1992	2.76	2.76	IE	0.44	82.70	0.43	0.56	86.89	0.00
1993	3.04	3.04	IE	0.29	82.14	0.51	0.57	86.55	0.00
1994	3.17	3.17	IE	0.24	81.47	0.60	0.57	86.05	0.00
1995	3.36	3.36	IE	0.17	81.60	0.61	0.58	86.32	0.00
1996	3.55	3.55	IE	0.16	80.11	0.63	0.59	85.04	0.00
1997	3.60	3.60	IE	0.16	79.60	0.62	0.59	84.58	0.00
1998	3.89	3.89	IE	0.17	79.84	0.65	0.60	85.15	0.00
1999	3.91	3.91	IE	0.19	77.89	0.70	0.60	83.28	0.00
2000	3.85	3.85	IE	0.17	76.19	0.74	0.61	81.55	0.00
2001	4.02	4.02	IE	0.15	75.49	0.77	0.62	81.04	0.00
2002	4.14	4.14	IE	0.13	74.14	0.79	0.62	79.83	0.00
2003	4.24	4.24	IE	0.14	73.76	0.81	0.63	79.59	0.00
2004	4.12	4.12	IE	0.12	72.98	1.00	0.64	78.86	0.00
2005	4.10	4.09	0.00	0.13	72.71	1.09	0.65	78.68	0.00
2006	4.01	4.01	0.01	0.14	73.15	1.12	0.66	79.07	0.00
2007	3.91	3.90	0.01	0.14	73.96	1.16	0.66	79.82	0.00
2008	3.65	3.64	0.00	0.14	73.80	1.15	0.67	79.41	0.00
2009	3.44	3.44	0.00	0.15	75.26	1.14	0.67	80.67	0.00
2010	3.49	3.49	0.00	0.15	74.42	1.17	0.68	79.91	0.00
2011	3.18	3.17	0.00	0.16	73.99	1.17	0.68	79.18	0.00
2012	3.04	3.04	0.00	0.15	74.12	1.18	0.68	79.17	0.00
2013	2.87	2.86	0.00	0.16	74.00	1.11	0.69	78.82	0.00
2014	2.63	2.63	0.00	0.15	75.05	1.15	0.69	79.67	0.00
2015	2.67	2.67	0.00	0.14	75.67	1.17	0.70	80.34	0.00
2016	2.57	2.57	0.00	0.15	76.52	1.22	0.70	81.16	0.00
2017	2.61	2.61	0.00	0.17	76.48	1.20	0.71	81.17	0.00
2018	2.54	2.54	0.00	0.14	74.94	1.19	0.76	79.57	0.00
2019	2.55	2.55	0.00	0.16	73.16	1.21	0.82	77.91	0.01
2020	2.32	2.32	0.00	0.16	72.68	1.24	0.88	77.27	0.00
2021	2.49	2.49	0.00	0.14	72.59	1.27	0.88	77.37	0.00
2022	2.39	2.39	0.00	0.13	71.27	1.24	0.88	75.91	0.00
2023	2.34	2.34	0.00	0.14	69.51	1.24	0.88	74.11	0.00

Table A.I-5: $PM_{2.5}$ emissions [kilotonnes] 1990–2023 based on fuel sold. (Source: Umweltbundesamt)

	NFR								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	22.68	22.57	0.11	4.08	0.34	0.25	NA	27.36	0.27
1995	21.95	21.86	0.09	3.45	0.34	0.25	NA	26.00	0.41
2000	20.69	20.60	0.09	3.21	0.32	0.24	NA	24.47	0.52
2001	21.08	20.98	0.09	3.13	0.33	0.24	NA	24.78	0.51
2002	20.67	20.57	0.10	2.72	0.32	0.25	NA	23.96	0.46
2003	20.64	20.54	0.10	2.66	0.32	0.25	NA	23.86	0.43
2004	20.06	19.97	0.09	2.61	0.36	0.25	NA	23.29	0.51
2005	20.07	19.98	0.09	2.53	0.31	0.22	NA	23.13	0.59
2006	19.74	19.66	0.09	2.27	0.31	0.22	NA	22.54	0.63
2007	19.08	19.00	0.08	2.13	0.31	0.27	NA	21.80	0.66
2008	18.13	18.06	0.08	2.21	0.31	0.26	NA	20.91	0.66
2009	17.15	17.10	0.06	2.06	0.30	0.25	NA	19.77	0.57
2010	17.71	17.64	0.07	2.01	0.30	0.30	NA	20.32	0.62
2011	16.50	16.43	0.07	2.06	0.28	0.29	NA	19.13	0.65
2012	16.11	16.04	0.07	1.96	0.27	0.31	NA	18.64	0.62
2013	15.62	15.55	0.07	1.97	0.26	0.27	NA	18.13	0.59
2014	13.97	13.91	0.06	1.97	0.27	0.32	NA	16.53	0.59
2015	13.83	13.76	0.07	1.93	0.26	0.33	NA	16.35	0.63
2016	13.46	13.39	0.06	1.95	0.26	0.32	NA	15.99	0.70
2017	13.25	13.19	0.07	1.96	0.26	0.32	NA	15.79	0.67
2018	12.28	12.22	0.06	1.91	0.26	0.28	NA	14.73	0.76
2019	12.00	11.94	0.06	1.93	0.26	0.33	NA	14.52	0.88
2020	11.23	11.18	0.05	1.84	0.25	0.33	NA	13.64	0.31
2021	12.17	12.12	0.05	1.96	0.25	0.35	NA	14.73	0.37
2022	10.92	10.87	0.05	1.87	0.25	0.36	NA	13.40	0.59
2023	10.46	10.41	0.05	1.84	0.25	0.33	NA	12.87	0.79

ANNEX 2: AUSTRIA'S EMISSIONS BASED ON FUEL USED (WITHOUT ‚FUEL EXPORTS')

Notation keys:

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

IE (included elsewhere) ... for emissions by sources and removals by sinks of pollutants 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 pollutants 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 pollutant.

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.II-1: SO_2 emissions [kilotonnes] 1990–2023 based on fuel used. (Source: Umweltbundesamt)

	NFR Sectors								
	1	**1 A**	**1 B**	**2**	**3**	**5**	**6**		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	71.00	69.00	2.00	1.93	0.00	0.07	NA	73.01	0.25
1991	68.12	66.82	1.30	1.61	0.00	0.06	NA	69.79	0.28
1992	51.87	49.87	2.00	1.36	0.00	0.04	NA	53.28	0.30
1993	50.62	48.52	2.10	1.11	0.00	0.04	NA	51.78	0.32
1994	45.26	43.98	1.28	1.12	0.00	0.05	NA	46.43	0.34
1995	45.35	43.82	1.53	1.07	0.00	0.05	NA	46.48	0.38
1996	42.20	41.00	1.20	0.99	0.00	0.05	NA	43.24	0.42
1997	38.98	38.91	0.07	0.96	0.00	0.06	NA	40.00	0.43
1998	34.04	34.00	0.04	0.87	0.00	0.06	NA	34.97	0.45
1999	32.40	32.36	0.04	0.81	0.00	0.06	NA	33.27	0.44
2000	30.18	30.14	0.04	0.78	0.00	0.06	NA	31.02	0.48
2001	31.00	30.96	0.05	0.71	0.00	0.06	NA	31.78	0.47
2002	29.85	29.80	0.04	0.71	0.00	0.06	NA	30.62	0.43
2003	29.55	29.51	0.05	0.71	0.00	0.06	NA	30.32	0.40
2004	25.72	25.68	0.04	0.72	0.01	0.06	NA	26.51	0.47
2005	25.05	25.01	0.04	0.72	0.00	0.06	NA	25.84	0.55
2006	25.83	25.79	0.05	0.73	0.00	0.05	NA	26.61	0.58
2007	22.51	22.45	0.05	0.75	0.00	0.04	NA	23.30	0.61
2008	19.42	19.38	0.04	0.78	0.00	0.03	NA	20.24	0.61
2009	13.98	13.93	0.06	0.70	0.00	0.02	NA	14.70	0.53
2010	15.22	15.18	0.05	0.70	0.00	0.01	NA	15.94	0.57
2011	14.44	14.40	0.05	0.68	0.00	0.01	NA	15.13	0.60
2012	14.09	14.05	0.05	0.65	0.00	0.01	NA	14.76	0.57
2013	13.71	13.67	0.04	0.58	0.00	0.01	NA	14.31	0.54
2014	13.91	13.87	0.04	0.56	0.00	0.01	NA	14.48	0.54
2015	13.45	13.41	0.04	0.55	0.00	0.01	NA	14.02	0.58
2016	12.65	12.63	0.02	0.56	0.00	0.01	NA	13.22	0.54
2017	12.17	12.14	0.04	0.57	0.00	0.01	NA	12.76	0.52
2018	10.97	10.95	0.02	0.56	0.00	0.01	NA	11.55	0.59
2019	10.53	10.51	0.02	0.59	0.00	0.01	NA	11.14	0.68
2020	9.81	9.79	0.02	0.59	0.00	0.01	NA	10.41	0.24
2021	10.21	10.18	0.03	0.59	NA	0.01	NA	10.82	0.27
2022	10.15	10.12	0.03	0.56	NA	0.02	NA	10.72	0.45
2023	9.99	9.96	0.03	0.56	NA	0.01	NA	10.56	0.61

Table A.II-2: NO_x emissions [kilotonnes] 1990–2023 based on fuel used. (Source: Umweltbundesamt)

	NFR Sectors								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	186.55	186.55	IE	1.53	13.66	0.12	NA	201.87	2.48
1991	189.18	189.18	IE	1.51	13.57	0.11	NA	204.38	2.80
1992	181.07	181.07	IE	1.41	13.14	0.08	NA	195.71	3.06
1993	175.49	175.49	IE	1.51	12.88	0.07	NA	189.95	3.27
1994	171.78	171.78	IE	1.38	12.67	0.07	NA	185.90	3.43
1995	171.06	171.06	IE	0.90	12.73	0.07	NA	184.76	3.85
1996	171.26	171.26	IE	0.87	12.55	0.07	NA	184.73	4.24
1997	171.65	171.65	IE	0.86	12.53	0.07	NA	185.11	4.43
1998	169.75	169.75	IE	0.83	12.55	0.07	NA	183.20	4.59
1999	170.21	170.21	IE	0.82	12.13	0.07	NA	183.23	4.52
2000	170.06	170.06	IE	0.83	11.88	0.07	NA	182.85	6.44
2001	173.08	173.08	IE	0.78	11.78	0.07	NA	185.71	6.32
2002	172.39	172.39	IE	0.79	11.74	0.07	NA	184.98	5.67
2003	176.95	176.95	IE	0.81	11.25	0.07	NA	189.08	5.21
2004	177.71	177.71	IE	0.69	10.69	0.07	NA	189.15	6.09
2005	181.12	181.12	IE	0.70	10.73	0.06	NA	192.62	6.99
2006	182.17	182.17	IE	0.58	10.76	0.05	NA	193.57	7.54
2007	178.62	178.62	IE	0.48	10.92	0.05	NA	190.07	7.99
2008	173.56	173.56	IE	0.56	11.45	0.04	NA	185.61	7.90
2009	161.29	161.29	IE	0.41	11.22	0.03	NA	172.94	6.86
2010	162.53	162.53	IE	0.55	10.33	0.02	NA	173.43	7.60
2011	161.10	161.10	IE	0.52	10.84	0.02	NA	172.48	7.98
2012	157.34	157.34	IE	0.55	10.93	0.02	NA	168.84	7.68
2013	154.59	154.59	IE	0.45	10.80	0.02	NA	165.86	7.46
2014	151.29	151.29	IE	0.46	11.09	0.02	NA	162.86	7.49
2015	149.37	149.37	IE	0.52	11.46	0.02	NA	161.38	8.18
2016	145.12	145.12	IE	0.52	11.70	0.02	NA	157.36	10.28
2017	138.39	138.39	IE	0.47	11.45	0.02	NA	150.34	10.06
2018	129.12	129.12	IE	0.41	11.16	0.02	NA	140.72	11.54
2019	122.78	122.78	IE	0.50	10.67	0.02	NA	133.98	13.47
2020	104.81	104.81	IE	0.48	10.68	0.03	NA	116.00	4.54
2021	105.07	105.07	IE	0.46	10.84	0.03	NA	116.41	5.35
2022	100.46	100.46	IE	0.40	10.39	0.03	NA	111.28	8.91
2023	94.27	94.27	IE	0.47	9.97	0.03	NA	104.73	11.59

Table A.II-3: NMVOC emissions [kilotonnes] 1990–2023 based on fuel used. (Source: Umweltbundesamt)

	NFR Sectors								
	1	1 A	1 B	2	3	5	6		
	ENERGY	FUEL COMBUSTION ACTIVITIES*	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	163.07	147.16	15.92	118.97	53.08	0.17	NA	335.29	0.18
1991	159.72	144.17	15.56	112.45	52.06	0.17	NA	324.40	0.20
1992	149.54	133.88	15.66	105.71	49.56	0.16	NA	304.97	0.21
1993	139.66	124.53	15.13	99.03	50.09	0.16	NA	288.93	0.23
1994	126.41	114.82	11.59	92.42	49.51	0.15	NA	268.50	0.24
1995	118.16	108.18	9.98	85.75	49.04	0.15	NA	253.10	0.26
1996	112.11	103.16	8.95	83.26	47.78	0.14	NA	243.29	0.31
1997	100.92	92.48	8.45	80.97	46.89	0.14	NA	228.92	0.35
1998	91.51	84.59	6.93	78.73	46.63	0.14	NA	217.01	0.39
1999	85.14	78.99	6.15	75.04	45.75	0.13	NA	206.06	0.38
2000	77.94	71.76	6.18	70.93	44.13	0.13	NA	193.13	0.42
2001	73.20	68.87	4.33	68.70	43.32	0.12	NA	185.34	0.41
2002	67.43	62.90	4.53	66.66	42.37	0.12	NA	176.58	0.37
2003	64.02	59.54	4.48	64.65	41.76	0.12	NA	170.56	0.34
2004	60.23	56.13	4.10	62.47	41.35	0.12	NA	164.17	0.40
2005	57.66	53.76	3.90	60.50	40.57	0.12	NA	158.84	0.47
2006	55.19	51.26	3.93	58.53	40.04	0.11	NA	153.87	0.50
2007	52.58	49.00	3.57	56.40	39.81	0.11	NA	148.90	0.53
2008	51.20	47.83	3.37	54.24	39.41	0.10	NA	144.96	0.52
2009	48.45	45.23	3.22	51.92	39.66	0.10	NA	140.13	0.45
2010	49.98	46.92	3.07	49.77	39.32	0.09	NA	139.17	0.49
2011	46.23	43.17	3.06	48.41	38.47	0.09	NA	133.20	0.51
2012	45.97	42.90	3.07	46.74	37.87	0.08	NA	130.66	0.49
2013	45.29	42.28	3.01	44.52	37.78	0.08	NA	127.67	0.46
2014	40.53	37.42	3.11	42.91	37.73	0.07	NA	121.25	0.46
2015	40.68	37.66	3.02	41.13	37.52	0.07	NA	119.40	0.50
2016	40.07	37.10	2.97	40.90	37.39	0.07	NA	118.43	0.23
2017	39.56	36.55	3.00	40.57	37.28	0.07	NA	117.47	0.20
2018	36.49	33.61	2.88	40.01	36.42	0.06	NA	112.99	0.22
2019	36.43	33.51	2.92	39.58	35.62	0.06	NA	111.69	0.24
2020	34.55	32.01	2.54	42.76	35.03	0.06	NA	112.40	0.10
2021	38.68	36.16	2.52	40.86	34.68	0.06	NA	114.28	0.12
2022	32.87	30.57	2.31	38.23	34.35	0.06	NA	105.50	0.19
2023	31.98	29.47	2.50	37.97	33.43	0.06	NA	103.43	0.22

* *exhaust and non-exhaust emissions (gasoline evaporation) from 1.A.3.b Road Transport calculated on the basis of 'fuel used'*

Table A.II-4: NH_3 emissions [kilotonnes] 1990–2023 based on fuel used. (Source: Umweltbundesamt)

	NFR Sectors								
	1	**1 A**	**1 B**	**2**	**3**	**5**	**6**		
	ENERGY	FUEL COMBUSTION ACTIVITIES	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	2.09	2.09	IE	0.34	86.47	0.37	0.55	89.81	0.00
1991	2.47	2.47	IE	0.58	86.20	0.38	0.55	90.18	0.00
1992	2.69	2.69	IE	0.44	82.70	0.43	0.56	86.82	0.00
1993	3.01	3.01	IE	0.29	82.14	0.51	0.57	86.51	0.00
1994	3.20	3.20	IE	0.24	81.47	0.60	0.57	86.08	0.00
1995	3.42	3.42	IE	0.17	81.60	0.61	0.58	86.37	0.00
1996	3.72	3.72	IE	0.16	80.11	0.63	0.59	85.21	0.00
1997	3.83	3.83	IE	0.16	79.60	0.62	0.59	84.81	0.00
1998	3.97	3.97	IE	0.17	79.84	0.65	0.60	85.22	0.00
1999	4.14	4.14	IE	0.19	77.89	0.70	0.60	83.51	0.00
2000	4.06	4.06	IE	0.17	76.19	0.74	0.61	81.76	0.00
2001	4.08	4.08	IE	0.15	75.49	0.77	0.62	81.10	0.00
2002	3.85	3.85	IE	0.13	74.14	0.79	0.62	79.54	0.00
2003	3.74	3.74	IE	0.14	73.76	0.81	0.63	79.08	0.00
2004	3.56	3.56	IE	0.12	72.98	1.00	0.64	78.31	0.00
2005	3.53	3.52	0.00	0.13	72.71	1.09	0.65	78.11	0.00
2006	3.46	3.46	0.01	0.14	73.15	1.12	0.66	78.52	0.00
2007	3.35	3.35	0.01	0.14	73.96	1.16	0.66	79.26	0.00
2008	3.25	3.25	0.00	0.14	73.80	1.15	0.67	79.01	0.00
2009	3.04	3.03	0.00	0.15	75.26	1.14	0.67	80.26	0.00
2010	3.10	3.10	0.00	0.15	74.42	1.17	0.68	79.52	0.00
2011	2.86	2.86	0.00	0.16	73.99	1.17	0.68	78.87	0.00
2012	2.76	2.76	0.00	0.15	74.12	1.18	0.68	78.89	0.00
2013	2.62	2.62	0.00	0.16	74.00	1.11	0.69	78.58	0.00
2014	2.42	2.42	0.00	0.15	75.05	1.15	0.69	79.46	0.00
2015	2.44	2.44	0.00	0.14	75.67	1.17	0.70	80.11	0.00
2016	2.35	2.35	0.00	0.15	76.52	1.22	0.70	80.93	0.00
2017	2.39	2.39	0.00	0.17	76.48	1.20	0.71	80.95	0.00
2018	2.34	2.33	0.00	0.14	74.94	1.19	0.76	79.36	0.00
2019	2.37	2.36	0.00	0.16	73.16	1.21	0.82	77.73	0.01
2020	2.18	2.18	0.00	0.16	72.68	1.24	0.88	77.13	0.00
2021	2.36	2.36	0.00	0.14	72.59	1.27	0.88	77.25	0.00
2022	2.31	2.31	0.00	0.13	71.27	1.24	0.88	75.83	0.00
2023	2.23	2.23	0.00	0.14	69.51	1.24	0.88	74.00	0.00

Table A.II-5: $PM_{2.5}$ emissions [kilotonnes] 1990–2023 based on fuel used. (Source: Umweltbundesamt)

	NFR Sectors								
	1	**1 A**	**1 B**	**2**	**3**	**5**	**6**		
	ENERGY	FUEL COMBUSTION ACTIVITIES *	FUGITIVE EMISSIONS FROM FUELS	INDUSTRIAL PROCESSES	AGRICULTURE	WASTE	OTHER	NATIONAL TOTAL	International Bunkers
1990	22.15	22.04	0.11	4.08	0.34	0.25	NA	26.83	0.27
1995	21.32	21.23	0.09	3.45	0.34	0.25	NA	25.36	0.41
2000	19.89	19.80	0.09	3.21	0.32	0.24	NA	23.66	0.52
2001	20.00	19.91	0.09	3.13	0.33	0.24	NA	23.70	0.51
2002	19.16	19.06	0.10	2.72	0.32	0.25	NA	22.45	0.46
2003	18.80	18.70	0.10	2.66	0.32	0.25	NA	22.03	0.43
2004	18.19	18.10	0.09	2.61	0.36	0.25	NA	21.42	0.51
2005	18.14	18.05	0.09	2.53	0.31	0.22	NA	21.20	0.59
2006	18.11	18.03	0.09	2.27	0.31	0.22	NA	20.91	0.63
2007	17.54	17.46	0.08	2.13	0.31	0.27	NA	20.26	0.66
2008	16.99	16.91	0.08	2.21	0.31	0.26	NA	19.77	0.66
2009	16.05	15.99	0.06	2.06	0.30	0.25	NA	18.67	0.57
2010	16.60	16.53	0.07	2.01	0.30	0.30	NA	19.21	0.62
2011	15.64	15.57	0.07	2.06	0.28	0.29	NA	18.27	0.65
2012	15.30	15.23	0.07	1.96	0.27	0.31	NA	17.83	0.62
2013	14.75	14.69	0.07	1.97	0.26	0.27	NA	17.26	0.59
2014	13.25	13.19	0.06	1.97	0.27	0.32	NA	15.81	0.59
2015	13.12	13.05	0.07	1.93	0.26	0.33	NA	15.64	0.63
2016	12.80	12.74	0.06	1.95	0.26	0.32	NA	15.33	0.70
2017	12.63	12.57	0.07	1.96	0.26	0.32	NA	15.17	0.67
2018	11.72	11.66	0.06	1.91	0.26	0.28	NA	14.17	0.76
2019	11.49	11.43	0.06	1.93	0.26	0.33	NA	14.01	0.88
2020	10.82	10.77	0.05	1.84	0.25	0.33	NA	13.24	0.31
2021	11.81	11.76	0.05	1.96	0.25	0.35	NA	14.37	0.37
2022	10.70	10.65	0.05	1.87	0.25	0.36	NA	13.18	0.59
2023	10.26	10.21	0.05	1.84	0.25	0.33	NA	12.67	0.79

* *exhaust and non-exhaust emissions (tyre and break wear, road abrasion) from 1.A.3.b Road Transport calculated on the basis of 'fuel used'*

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Austria's Annual Air Emission Inventory 1990–2023 provides an overview of national emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x), ammonia (NH_3), non-methane volatile organic compounds (NMVOC) and particulate matter ($PM_{2.5}$) for the years 1990 to 2023. Emission trends and recalculations of these air pollutants, regulated in the European NEC Directive, are described.

The results show emission reductions for all pollutants between 2022 and 2023: SO_2 declined by 1.5 %, NO_x by 5.4 %, NMVOC by 1.9 %, NH_3 by 2.4 %, and $PM_{2.5}$ by 3.9 %. Lower SO_2 emissions resulted from reductions of petrol refining and lesser biomass consumption in the wood processing industries and households. The reduction of NO_x was largely due to the decreased mileage of heavy-duty vehicles. NMVOC emissions were driven by sectors solvents, agriculture and households. The main reasons for reduced NH_3 emissions were lower livestock numbers and the increased use of band spreading techniques. $PM_{2.5}$ emissions declined as a result of the lower biomass consumption from residential heating largely because of the milder weather conditions. The 2023 emissions comply with national emission reduction commitments for all pollutants.

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ISBN 978-3-99004-809-2