ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Austria's Annual Greenhouse Gas Inventory 1990—2013

Draft Submission under Regulation (EU) No 525/2013

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REPORT
REP-0541
Vienna 2015

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Title photograph

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

Reporting entity	Contracting entity
Überwachungsstelle Emissionsbilanzen *(Inspection Body for Emission Inventories)* at the Umweltbundesamt GmbH Spittelauer Lände 5, 1090 Vienna/Austria	**BMLFUW** (*Federal Ministry of Agriculture, Forestry, Environment and Water Management*) Stubenring 1, 1012 Vienna/Austria
Date 29.06.2015	Responsible for the content of this report
Total Number of Pages 60 (including Annex)	Dr. Klaus Radunsky (Head of the inspection body)

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

Imprint

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

Printing by: Umweltbundesamt GmbH

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

978-3-99004-352-3

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VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten der Treibhausgas(THG)-Emissionen Österreichs. Diese Daten betreffen die Emissionen des Jahres 2013 sowie die aktualisierte Zeitreihe der Jahre 1990 bis 2012. Damit liefert der Bericht Daten für das erste Jahr der zweiten Kyoto-Verpflichtungsperiode sowie für das erste Jahr der Zielperiode 2013–2020 unter der „Effort Sharing-Entscheidung" (2009/406/EG).

Der Bericht folgt in Format und Inhalt den Anforderungen des THG-Überwachungssystems (Monitoring Mechanism), in Umsetzung von Artikel 7 der Verordnung Nr. 525/2013/EG[1]. Dieses System umfasst die jährliche Übermittlung von aktualisierten THG-Emissionsdaten sowie zusätzlicher Informationen (z. B. SEF, Indikatoren) und einem dazugehörigen Kurzbericht („Short-NIR") mit 15. Jänner an die Europäische Kommission (EK). **Im Berichtsjahr 2015 verzögerte sich die Berichterstattung aufgrund von Problemen mit der Berichtssoftware**.

Eine detaillierte Darstellung der Daten im Common Reporting Format (CRF) wird der Europäischen Kommission in digitaler Form übermittelt. Auch die Berichtstabellen gemäß Durchführungsverordnung (EU) Nr. 749/2014 der Kommission über die Struktur, das Format, die Verfahren der Vorlage und die Überprüfung der von den Mitgliedstaaten gemäß der Verordnung (EU) Nr. 525/2013 gemeldeten Informationen sind nicht Bestandteil des vorliegenden Berichts, sondern werden der Europäischen Kommission separat übermittelt (EIONET/CDR).

Rechtlicher Hintergrund

Als Vertragsstaat der Klimarahmenkonvention (*Rahmenübereinkommen der Vereinten Nationen über Klimaänderungen* (UN Framework Convention on Climate Change – UNFCCC, BGBl. Nr. 414/1994[2]) ist Österreich verpflichtet, jährlich seine Emissionen und Senken bezüglich der direkten Treibhausgase CO_2, CH_4, N_2O, HFC, PFC, SF_6 und (heuer erstmals) NF_3, sowie der indirekten Treibhausgase NO_x, NMVOC, CO und SO_2 zu erheben und zu berichten. Die dafür anzuwendende Methodik ist in einem umfassenden Regelwerk entsprechend den Beschlüssen der Vertragsstaatenkonferenz der UNFCCC festgelegt.

Auch die Europäische Union (EU) ist Vertragsstaat der Klimarahmenkonvention. Die EU Inventur wird aus der Summe der Mitgliedsstaaten-Inventuren errechnet. Deshalb hat die EU mit dem o. g. THG-Überwachungssystem die Anforderungen, die an die EU gestellt werden an die Mitgliedsstaaten weitergege-

[1] Verordnung (EU) Nr. 525/2013 des Europäischen Parlaments und des Rates vom 21. Mai 2013 über ein System für die Überwachung von Treibhausgasemissionen sowie für die Berichterstattung über diese Emissionen und über andere klimaschutzrelevante Informationen auf Ebene der Mitgliedstaaten und der Union und zur Aufhebung der Entscheidung Nr. 280/2004/EG. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0013:0040:DE:PDF

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

ben und diese dazu verpflichtet, Daten und Informationen, die für die Erstellung der EU Inventur benötigt werden, rechtzeitig zur Verfügung zu stellen. Mit dem vorliegenden Bericht kommt Österreich dieser Berichtspflicht nach.

Die Erhebung der Daten berücksichtigt außerdem die Ergebnisse der jährlichen Überprüfung durch die UNFCCC im Rahmen der so genannten UNFCCC-Tiefenprüfung. Von 8. bis 13. September 2014 fand die letzte Tiefenprüfung der Österreichischen Treibhausgas-Inventur durch internationale FachexpertInnen statt. Die Ergebnisse dieser Prüfung wurden im Frühjahr 2015 auf der Website der UNFCCC veröffentlicht[3].

Tabelle A: Jährlicher Prozess zur Erstellung und Überarbeitung der THG Inventur.[4]

15. Jänner *(Jahr n)*	Übermittlung der THG Inventur an EK (CRF für die Jahre 1990 bis zum Jahr n-2)
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten durch die EK
15. März *(Jahr n)*	Übermittlung des (endgültigen) nationalen Inventurberichtes (NIR)
15. März bis 8. April *(Jahr n)*	Überprüfung der Daten (CRF) und des nationalen Inventurberichtes (NIR) durch die EK
15. April *(Jahr n)*	Übermittlung der THG Inventur (CRF und NIR) an die UNFCCC
Juni *(Jahr n)* bis März *(Jahr n+1)*	Überprüfung der Daten durch die UNFCCC: ● Stufe 1: Initial Check ● Stufe 2: Synthesis and Assessment ● Stufe 3: Individual Review
bis 15. Januar *(Jahr n + 1)*	Berücksichtigung der Verbesserungsvorschläge der EK und der UNFCCC bei der Erstellung und Überarbeitung der THG Inventur

Zur Erfüllung der Anforderungen, die sich aus der Klimarahmenkonvention und vor allem aus dem Inkrafttreten des Kyoto-Protokolls[5] am 16. Februar 2005 ergeben haben, wurde entsprechend Artikel 5.1 des Kyoto-Protokolls ein Nationales System eingerichtet. Ziel ist es, die Qualität der Inventur sicherzustellen und kontinuierlich zu verbessern. Dazu wurde ein Gesamtkonzept für das Nationale Inventur System Austria (NISA) entwickelt, das auf der *Österreichischen Luftschadstoff-Inventur* (OLI) als zentralem Kern aufbaut. Ein umfassendes Inventurverbesserungsprogramm und ein Qualitätsmanagementsystem entsprechend ISO/IEC 17020 sind ein wesentlicher Teil des NISA[6].

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998[7] erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z.15 unter anderem die Aufgabe übertragen, fachliche Grundlagen zur Erfüllung des Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen zu erstellen. In § 6 (2) Z.20 werden die Entwicklung und Führung von Inventuren und Bilanzen zur Dokumentation des Zustan-

[3] http://unfccc.int/resource/docs/2015/arr/aut.pdf

[4] Im Berichtsjahr 2015 verzögerte sich die Berichterstattung aufgrund von Problemen mit der Berichtssoftware („CRF-Reporter“).

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

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

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

des und der Entwicklung der Umwelt sowie der Umweltbelastungen und ihrer Ursachen ausdrücklich als besondere Aufgaben des Umweltbundesamtes genannt. Dieser Aufgabe wird mit der Erstellung sowie der jährlichen Aktualisierung der *Österreichischen Luftschadstoff-Inventur* (OLI) gemäß den in den relevanten internationalen Übereinkommen vereinbarten Richtlinien vom Umweltbundesamt nachgekommen. Die OLI deckt sowohl Treibhausgasemissionen, als auch Emissionen sonstiger Luftschadstoffe ab und ist damit u. a. die Datenbasis für die Erstellung des vorliegenden Berichts. Um eine vergleichbare Zeitreihe zur Verfügung zu haben wird die OLI erforderlichenfalls auch für zurückliegende Jahre aktualisiert. Die in diesem Bericht dargestellten Emissionsdaten ersetzen somit die publizierten Daten vorhergehender Berichte.

Inventur	**Datenstand**	**Berichtsformat**
OLI 2014	29. Juni 2015	Common Reporting Format (CRF)

Tabelle B: Datengrundlage des vorliegenden Berichts.

ZUSAMMENFASSUNG

Die hier dargestellte Entwicklung der Treibhausgase in Österreich folgt in der Einteilung den Sektoren des Klimaschutzgesetzes.

Treibhausgas-Inventur 2013

Im Jahr 2013 wurden in Österreich 79,6 Mio. Tonnen Treibhausgase (THG) emittiert. Gegenüber 2012 bedeutet das eine Abnahme um 0,2 % bzw. 0,2 Mio. Tonnen CO_2-Äquivalent. Für den Bereich, der nicht im Emissionshandel geregelt ist, liegt das Ziel für das Jahr 2013 bei 52,6 Mio. Tonnen THG. Die tatsächlichen Emissionen dieser Quellen lagen bei 49,7 Mio. Tonnen CO_2-Äquivalent und damit um rund 2,9 Mio. Tonnen unter diesem Ziel.

Energie und Industrie

Der Sektor Energie und Industrie ist im Jahr 2013 mit ca. 36,3 Mio. Tonnen CO_2-Äquivalent der größte Emittent an Treibhausgasen in Österreich. Gegenüber dem Jahr 2012 sind die Emissionen dieser Sektoren um 2,0 % (0,7 Mio. Tonnen) gesunken. 2013 liegen die Emissionen damit geringfügig unter dem Niveau von 1990 (− 0,2 Mio. Tonnen).

Der Rückgang der THG-Emissionen gegenüber 2012 ist auf geringere Emissionen aus Kraft- und Fernwärmewerken (− 1,0 Mio. Tonnen bzw. – 12 %), speziell bei Kohle- und Gaskraftwerken zurückzuführen. Die Elektrizitätserzeugung aus thermischen Kraftwerken ging um 21 % zurück, jene aus Wasserkraft um 5 %. Der – etwa gleichbleibende – Bedarf an Elektrizität wurde durch vermehrte Importe abgedeckt.

Die Emissionen der produzierenden Industrie sind gegenüber dem Vorjahr um ein Prozent (0,2 Mio. Tonnen) gestiegen, v. a. aufgrund der Eisen- und Stahlindustrie. Gegenüber 1990 haben die THG-Emissionen der produzierenden Industrie um 3,7 Mio. Tonnen zugenommen,

Bereich Emissionshandel

Die Emissionshandelsbetriebe verursachten im Jahr 2013 Treibhausgase im Ausmaß von 29,9 Mio. Tonnen CO_2-Äquivalent (Energie: 9,0 Mio. Tonnen, Industrie: 20,9 Mio. Tonnen). Die Energiebetriebe im Emissionshandel zeigen 2012−2013 einen deutlichen Emissionsrückgang (− 0,9 Mio. Tonnen).

Seit 2013 umfasst der Bereich Emissionshandel neben Industriebetrieben auch weitere Quellen wie Erdgasspeicher, Pipelines oder auch die Ammoniakproduktion.

Verkehr

Der Sektor Verkehr weist im Jahr 2013 THG-Emissionen im Ausmaß von ca. 22,3 Mio. Tonnen CO_2-Äquivalent auf. Im Vergleich zu 2012 sind die Emissionen aus diesem Sektor um 1,0 Mio. Tonnen (+ 4,7 %) gestiegen.

Grund für diesen Anstieg ist der stark gestiegene fossile Kraftstoffabsatz (+ 4,4 %) bei gleichzeitig sinkenden beigemengten Biokraftstoffen. 2013 betrug der Anteil an Biokraftstoffen 6,2 %, im Jahr 2012 noch 6,8 %. Seit 1990 verzeichnet der Sektor Verkehr eine Emissionszunahme von 63 %.

Gebäude

Auf den Sektor Gebäude entfallen im Jahr 2013 ca. 8,3 Mio. Tonnen an THG-Emissionen. Das entspricht einem Rückgang um 3,8 % (− 0,3 Mio. Tonnen) gegenüber dem Jahr 2012. Im Vergleich wurden 2013 mehr Heizgradtage verzeichnet. Hauptgrund für den Emissionsrückgang ist der reduzierte Einsatz der fossilen Energieträger Heizöl und Erdgas. Seit 1990 haben die Emissionen in diesem Sektor um 36,5 % (− 4,8 Mio. Tonnen) abgenommen.

Landwirtschaft

Im Vergleich zu 2012 blieben die Treibhausgas-Emissionen im Sektor Landwirtschaft mit rd. 7,7 Mio. Tonnen CO_2-Äquivalent in etwa konstant (− 0,3 %). Die THG-Emissionen dieses Sektors sind seit 1990 um 17,1 % (− 1,6 Mio. Tonnen) zurückgegangen.

Abfallwirtschaft

Im Jahr 2013 wurden vom Sektor Abfallwirtschaft 3,0 Mio. Tonnen CO_2-Äquivalent emittiert. Dies entspricht einem Rückgang um 3,7 % (− 0,1 Mio. Tonnen) gegenüber dem Vorjahr und um 31,3 % (− 1,4 Mio. Tonnen) gegenüber 1990.

Fluorierte Gase

Im Jahr 2013 wurden in Österreich F-Gase im Ausmaß von 2,0 Mio. Tonnen CO_2-Äquivalent emittiert. Damit sind sie auf annähernd konstantem Niveau mit 2012 (+ 0,5 %). Seit 1990 nahmen die F-Gas-Emissionen Österreichs um insgesamt 23 % zu (+ 0,4 Mio. Tonnen CO_2-Äquivalent).

Im Juni 2014 trat die EU VO Nr. 517/2014 in Kraft, die vorsieht, bis 2030 die Herstellung und den Import von F-Gasen mit einem hohen Treibhausgaspotenzial deutlich zu reduzieren.

Daten: Internationale Vorgaben und Sektoreinteilung

Für die THG-Inventur 2013 wurden neue internationale Vorgaben angewendet, u. a. eine Neubewertung der Treibhausgaspotenziale einzelner Treibhausgase. Die Sektoreinteilung folgt der des Klimaschutzgesetzes. Die Emissionen der Sektoren können daher von bisher publizierten Daten abweichen.

1 INTRODUCTION

This report covers the Austrian greenhouse gas (GHG) inventory data for the years 1990 to 2013. It presents GHG data for the first year under the second commitment period under the Kyoto-Protocol and the first year of the Effort-sharing decision target period 2013-2020.

The greenhouse gas inventory is submitted to the European Commission by the Austrian Federal Government in fulfilment of Austria's obligations under Article 7 of Regulation (EU) No 525/2013[8] ("*Monitoring Mechanism Regulation*"; MMR) repealing Decision No 280/2004/EC[9] ("*Monitoring Mechanism Decision*"; MMD) concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol. The purpose of this decision is to monitor all anthropogenic greenhouse gas emissions not controlled by the Montreal Protocol[10] and to evaluate the progress towards meeting the greenhouse gas reduction commitments under the UNFCCC and the Kyoto Protocol.

According to the above mentioned regulation and the reporting requirements, which are the same as under the United Nations Framework Convention on Climate Change (UNFCCC), Member States are obliged to determine their anthropogenic emissions by sources and removals by sinks applying with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*[11], and submit information in accordance with the *Reporting Guidelines (Decision 24/CP.19)*[12] established by the Conference of the Parties to the UNFCCC and under the Kyoto Protocol.

The national greenhouse gas inventory has to be submitted to the European Commission (EC) every year no later than 15 January. Furthermore, Member States have to submit by 15 January elements of their National Inventory Reports (NIR) relevant for the preparation of the Union greenhouse gas inventory report (Article 7 (1) p of 525/2013/EC). A complete and up-to-date national inventory report is expected to be submitted by 15 March each year**. In 2015 the submission took place only after this date due to the delayed availability of a fully functioning UNFCCC reporting software.**

The elements of the so-called "Short-NIR" are based on Article 7 paragraph 1 of the MMR and Articles 3-16 of the *Commission Implementing Regulation (EU) No 749/2014* on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council (MMR IR). The overview table of reporting requirements according to the Commission Implementing Regulation (EU) No 749/2014 ('MMR-IR_Annex1_overview_AT') as well as the completed MMR IR reporting templates are no part of this report but submitted separately by upload at EIONET/CDR.

[8] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0013:0040:EN:PDF

[9] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:049:0001:0001:EN:PDF

[10] http://ozone.unep.org/new_site/en/Treaties/treaty_text.php?treatyID=2

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

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

The complete tables of the Common Reporting Format (CRF), including in particular Sectoral Reports, Sectoral Background Tables and the Reference Approach for CO_2 are submitted separately in digital form only[13].

Table 1: Status of the present report.

Reporting Obligation	Format	Inventory	Version
Mechanism for monitoring Community greenhouse gas emissions	Common Reporting Format (CRF)	OLI 2014	June 29th 2015

Geographical coverage is complete. There is no part of the Austrian territory that has not been covered by the inventory. Emissions from most sources specified in the CRF have been estimated. For information on sources not estimated ("NE") and emissions included with sources other than those stipulated in the CRF ("IE") please refer to Table 9 Completeness of the CRF.

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

2 EMISSION TRENDS

In 2013 Austria's total greenhouse gas (GHG) emissions (without LULUCF) amounted to 79.6 Mt CO_2 equivalents (CO_2e). Compared to the base year 1990 GHG emissions increased by 1.2%, compared to 2012 GHG emissions have slightly decreased (–0.2%).

GHG emissions according to Article 2(1) of Decision No. 406/2009/EC amounted to 49.7 Mt CO_2 equivalents in 2013 (see 'MMR_IR_AnnexX_ESD_AT'), which is 0.4% or 0.19 Mt more than in 2012. In the first year of the Effort-Sharing Decision Target period (2013-2020) emissions are thus below the annual emission allocation (AEA) of 2013[14] of 52.6 Mt CO_2 equivalents.

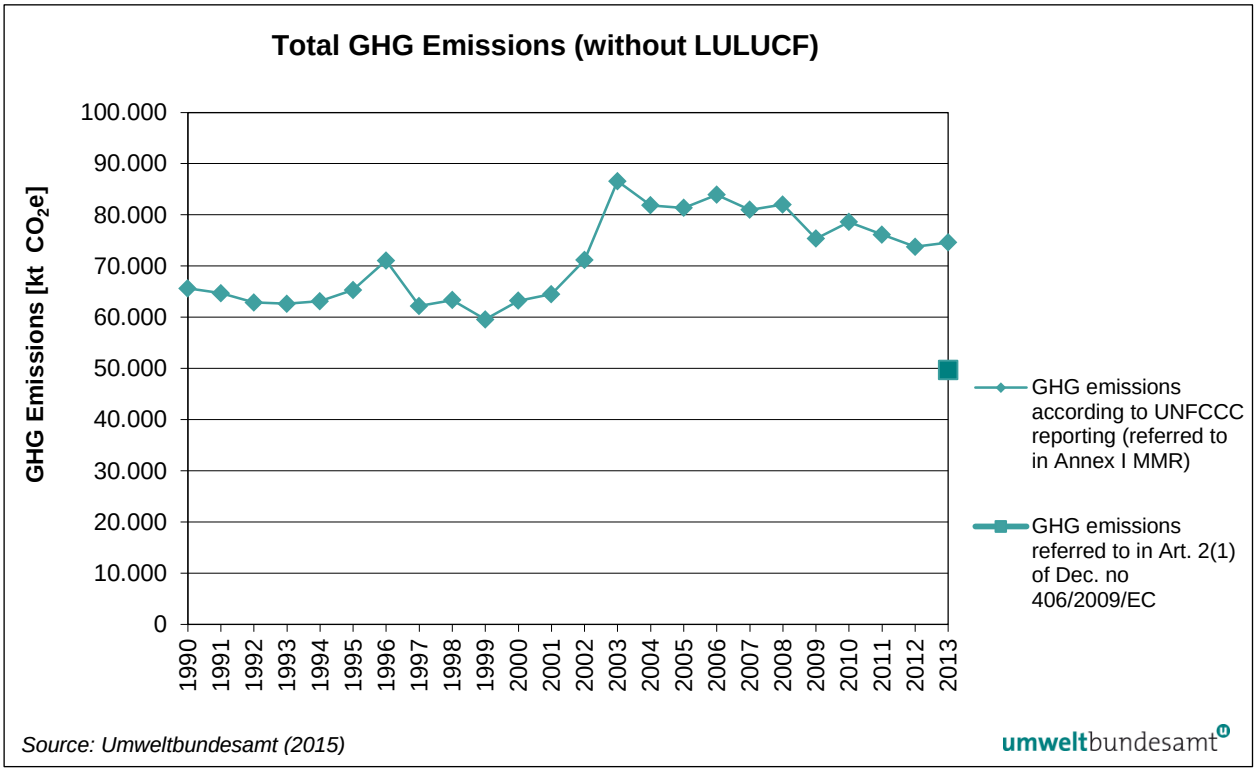

Figure 1: Trend in total GHG emissions 1990–2013 without LULUCF.

The main reason for the emissions still above the level of 1990, is the still high use of fossil fuels (CO_2), although since 2005 a decreasing trend can be observed.

[14] Initial AEAs: Annex II of Commission Decision (No 2013/162/EU) of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0162&from=EN) adjusted by Commission Implementing Decision (No 2013/634/EU) of 31 October 2013 on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0634&from=EN).

Trend 2012–2013

Decreasing emissions in the sectors *Energy* and *Waste* were responsible for the small overall emission reduction 2012−2013. GHG emissions from *Energy (1)* decreased by 0.7%, mainly due to the lower electricity production by thermal power plants, especially coal and gas fired plants, as well as the lower use of natural gas and heating oil. The increased electricity imports and the emission reduction in the paper industry also contribute to the reduction 2012−2013. Subcategory *road transport (1.A.3.b)* however showed increasing GHG emissions (+4.8%) compared to 2012, due to the increasing road performance (kilometres driven) in passenger and freight transport as well as an increased share of fuel export.

Sector *Waste (5)* continues with the emission trend of recent decades and shows a further decline by −5.6% as a result of reduced landfilling of waste and carbon content in deposited waste.

Emissions from *Agriculture (3)* remained quite constant (−0.3%). Emissions from *Industrial Processes and Other Product Use (2)* increased by 1.9% from 2012 to 2013, mainly due to increased production volumes in the iron and steel industry.

Table 2: Summary of Austria's anthropogenic greenhouse gas emissions by sector

GHG source and sink categories	1. Energy	2. IPPU	3. Agriculture	4. LULUCF	5. Waste	6. Other
	CO_2 equivalents (kt)					
1990	52 906	13 593	7 959	-13 042	4 226	0
1995	54 439	13 566	7 815	-14 119	3 636	0
2000	55 304	14 606	7 292	-16 888	2 922	0
2001	59 542	14 501	7 231	-19 610	2 833	0
2002	60 777	15 172	7 119	-14 760	2 854	0
2003	66 696	15 314	6 980	-5 331	2 909	0
2004	66 970	14 844	6 943	-9 674	2 766	0
2005	67 374	15 611	6 878	-11 142	2 632	0
2006	64 029	16 301	6 855	-5 806	2 528	0
2007	60 720	16 931	6 889	-5 942	2 394	0
2008	60 235	17 265	6 980	-4 747	2 276	0
2009	57 082	13 834	7 002	-4 688	2 115	0
2010	60 072	15 870	6 852	-6 167	1 993	0
2011	57 742	16 066	6 889	-6 439	1 884	0
2012	55 471	15 710	6 826	-6 016	1 785	0
2013	55 095	16 013	6 807	-4 978	1 684	0

The most important GHG in Austria is carbon dioxide (CO_2) with a share of 85.1% in 2013. The CO_2 emissions primarily result from combustion activities. Methane (CH_4), which mainly arises from stock farming and waste disposal, contributes 8.2% to national total GHG emissions, and nitrous oxide (N_2O) with agricultural soils as the main source contributes another 4.1% in 2013. The remaining 2.6% are emissions of fluorinated compounds, which are mostly emitted from the use of these gases as substitutes for ozone depleting substances (ODS) in refrigeration equipment.

Greenhouse gas emissions	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
	CO_2 equivalents (kt)						
1990	62 217	10 614	4 197	2	1 183	471	0
1995	64 147	9 471	4 290	358	83	1 100	6
2000	66 229	8 296	4 213	714	87	575	11
2001	70 266	8 136	4 086	863	116	629	11
2002	72 122	8 019	4 085	969	102	613	11
2003	78 037	8 007	4 085	1 072	126	549	22
2004	78 418	7 792	3 487	1 158	158	484	27
2005	79 596	7 574	3 500	1 146	158	494	28
2006	76 968	7 438	3 495	1 152	172	453	33
2007	74 271	7 306	3 504	1 196	230	367	59
2008	74 040	7 162	3 671	1 249	208	373	53
2009	67 850	7 047	3 447	1 307	36	342	5
2010	72 691	6 947	3 251	1 482	78	336	4
2011	70 582	6 745	3 315	1 556	74	307	4
2012	67 843	6 634	3 289	1 655	51	312	9
2013	67 768	6 530	3 264	1 674	49	304	10

Table 3: Austria's anthropogenic greenhouse gas emissions by gas

Total emissions without emissions from sector LULUCF

The dominant sector regarding GHG emissions in Austria is *Energy*, causing 69.2% of total national GHG emissions in 2013 (67.2% in 1990), followed by the sectors *Industrial Processes and Other Product Use* (20.1% in 2013) and *Agriculture* (8.6% in 2013).

GHG	1990	2013	Trend 1990–2013	1990	2013
	Emissions [kt CO_2e]			Share [%]	
Total	78 683	79 599	**+1.2%**	**100.0%**	**100.0%**
Energy	52 906	55 095	4.1%	67.2%	69.2%
IPPU	13 593	16 013	17.8%	17.3%	20.1%
Agriculture	7 959	6 807	−14.5%	10.1%	8.6%
LULUCF	−13 042	−4 978	−61.8%	−	−
Waste	4 226	1 684	−60.1%	5.4%	2.1%

Table 4: Austria's greenhouse gas emissions by sector (without 4. LULUCF) in the base year (1990) and in 2013 as well as their share and trend.

Total emissions without emissions from sector LULUCF

In 2013 emissions from *Industrial Processes and Other Product Use* were 17.8% higher than in 1990. Emissions from sector *Energy* increased by 4.1% over this period. The other sectors show decreasing GHG emissions. The most significant decrease occurred in sector *Waste*.

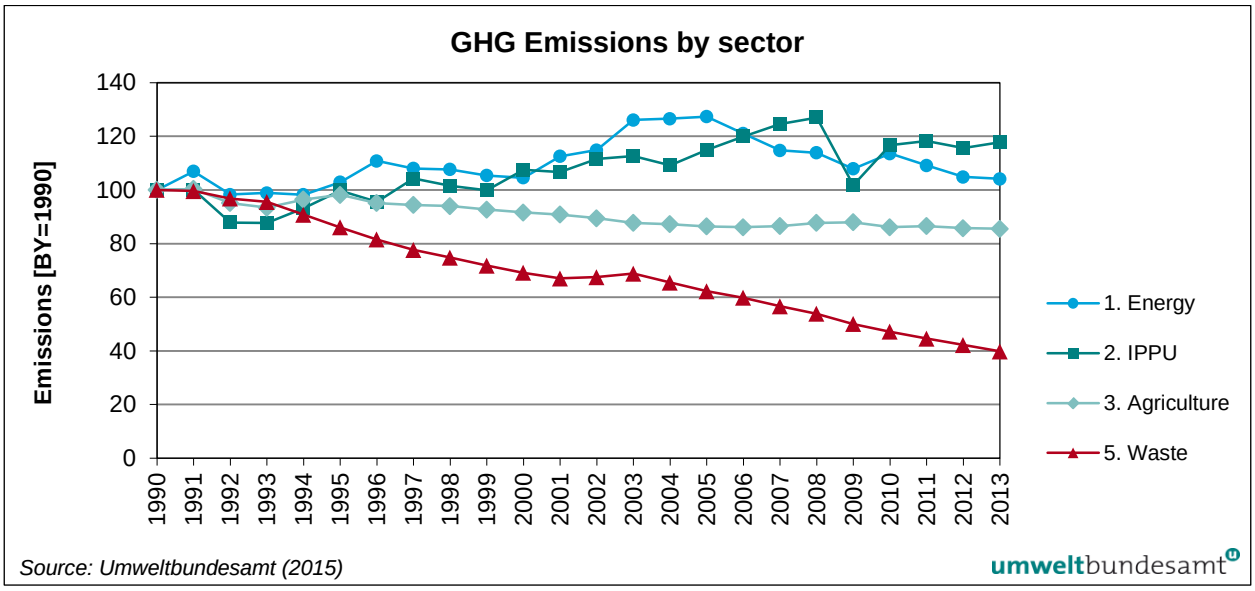

Figure 2: Trend in emissions 1990–2013 by sector (without LULUCF) in index form (1990 = 100).

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

2.1 Energy

In 2013, greenhouse gas emissions from sector *Energy* amounted to 55 095 kt CO_2 equivalents which correspond to 69.2% of the total national emissions. 99.0% of the emissions from this sector originate from fossil fuel combustion (1.A), fugitive emissions from fuels (1.B) are of minor importance.

The most important **sub-category** is *transport* with a share of 41.4% in 2013, followed by *energy industries* (20.5%), *manufacturing industries and construction* (20.2%) and the sub-category *other sectors* (16.8%). The most important **greenhouse gas** is CO_2, contributing 97.9% to the total sectoral GHG emissions, followed by N_2O (1.1%) and CH_4 (1.0%).

From 2012 to 2013, emissions from this sector decreased by 0.7%. Main drivers are the lower electricity production by thermal power plants, especially coal and gas fired plants, as well as the lower use of natural gas and heating oil. The nearly constant demand for electricity was covered by increased electricity imports. In addition, the paper industry shows production and emissions reductions between 2012 and 2013.

The **overall trend** in GHG emissions from the sector *Energy* shows increasing emissions with a plus of 4.1% from 1990 to 2013. The **main driver** for this trend is road transport with a strong increase of emissions (+63.0%) from 1990 to 2013. The dips and jumps from year to year are mainly due to:

- the weather circumstances in the corresponding years (in particular cold or mild winters, and/or dry or wet summers) which affect the heating demand, and the availability of climate change-friendly electricity from hydro power plants
- the economic situation as reflected in the gross domestic product (GDP)

Trend 1990–2013 by sub-category

In 2013 emissions from sub-category ***energy industries*** were 18.2% below the level in 1990. Emissions from power plants are quite continuously decreasing since 2005, mainly because of the growing contribution of renewable energy sources, the substitution of solid and liquid fuels by natural gas and biomass as well as improvements in efficiency. The share of biomass used as a fuel in this sector increased from 0.9% (1990) to 25% (2013), the contribution of hydro and wind power plants to total public electricity production increased from 69% (1990) to 80% (2013). Electricity consumption increased by 47% since 1990. Since 2002 the increase is mainly covered by imports from abroad. The increase in GHG emissions in other energy supply is due to enhanced refinery activity and rising demand for natural gas supply.

Energy related GHG emissions from ***manufacturing industries and construction*** increased by 12.8% from 1990 to 2013, mainly in the chemical and other industries. Fuel consumption increased by 45.1% in that period, mainly due to increased use of natural gas and biomass. As natural gas has a lower carbon content, and CO_2 emissions from biomass combustion are not accounted for under the UNFCCC reporting framework, the increase in GHG emissions is significantly smaller compared to the increase in fuel combustion.

Transport showed a strong increase in GHG emissions since 1990 (+63.2%) mainly due to an increase of road performance (kilometres driven) in passenger and freight transport. In addition to the increase of road performance within Austria, the amount of fuel sold in Austria but used elsewhere – an effect mainly caused by higher fuel prices in neighbouring countries compared to Austria – has increased considerably since 1990. However, from 2005 onwards GHG are decreasing due to the decreasing trend of total fuel sold together with the increased use of biofuels and the gradual replacement of vehicles by newer, less consuming cars (with less specific fuel consumption). In 2013 however, fuel sales have reached again the level of 2006.

The variation in demand for heating and hot water generation due to climatic circumstances and the shift in the fuel mix are the most important drivers for emissions from sub-category ***other sectors***. Emissions in 2013 were 36.2% lower than in 1990. This reduction is mainly attributable to the declining consumption of heating oil and solid fuels and the increase in the consumption of biomass and natural gas as well as the growing importance of district heating. Total fuel consumption of this sub-category decreased by 12.1% since 1990.

Fugitive emissions decreased by 24.2% since 1990 due to the closure of coal mines until 2006.

2.2 Industrial Processes and Other Product Use

In 2013, greenhouse gas emissions from *Industrial Processes and Other Product Use* amounted to 16 013 kt CO_2 equivalents, which correspond to 20.1% of total national emissions.

The most important **sub-categories** of this sector are the *metal industry* and the *mineral industry*, generating 63.9% and 17.0% of total sectoral emissions (2013). The most important **greenhouse gas** of this sector is CO_2 with a contri-

bution of 85.8% to total sectoral emissions (2013), followed by HFCs with 10.5%, SF_6 with 1.9%, N_2O with 1.2%, PFCs and CH_4 with 0.3% each. NF_3 – reported for the first time in this year's submission – contributes 0.1% to total emissions from this sector.

From 2012 to 2013, overall emissions from this sector increased by 1.9%, mainly due to increased production volumes in the iron and steel industry. The chemical industry shows the largest decrease in emissions between 2012 and 2013 (–8.3 %), primarily in ammonia production.

The **overall trend** in GHG emissions from *Industrial Processes and Other Product Use* shows increasing emissions of 17.8% from 1990 to 2013. Within this period, emissions fluctuated, showing a minimum in 1993. **Main drivers** for the trend in emissions from this sector were (i) the termination of primary aluminium production in 1993, (ii) the introduction of N_2O abatement technologies in the chemical industry in 2004 and in 2009 (which became fully operational in 2010), (iii) increasing metal production resulting in 25.1% higher GHG emissions in 2013 compared to 1990 and (iv) a strong increase of HFC emissions in the period 1992 to 2013 from 2.4 to 1 674 kt CO_2 equivalents.

Trend 1990–2013 by sub-category

The largest increase in GHG emissions between 1990 and 2013 can be observed in the *metal industry* due to increased emissions from iron and steel production (+54.2%). The sub-categories *mineral industry* and the *chemical industry* however show declining emissions by 12% and 55% in that period. Emissions of *fluorinated gases* increased by 23.0% since 1990 due to the use of HFCs as cooling agents that replaced Ozone Depleting Substances. Emissions from *solvents* decreased by 3% due to decreased use of solvents and solvent containing products (legal measures), as well as nitrous oxide.

2.3 Agriculture

In 2013, greenhouse gas emissions from *Agriculture* amounted to 6 807 kt CO_2 equivalent, which corresponds to 8.6% of total national emissions.

The **most important sub-categories** of this sector are *enteric fermentation* (60%) and *agricultural soils* (26%). In the Austrian **greenhouse gas** inventory the sector agriculture is the largest source for both N_2O and CH_4 emissions: In 2013 67% (7.4 kt) of total N_2O emissions and 69% (180.0 kt) of total CH_4 emissions in Austria originated from this sector. 66% of GHG emissions from the sector are CH_4, 32% are N_2O.

From 2012 to 2013 emissions remained quite constant (–0.3%).

The **overall trend** in GHG emissions from *Agriculture* is decreasing, with a decrease of 14.5% from 1990 to 2013. The **main drivers** for this trend are decreasing livestock numbers and lower amounts of N-fertilizers applied on agricultural soils. Fluctuations, which can be seen in particular in the first half of the 1990s, result from the variation of the sales of mineral fertilizer due to volatility in prices.

2.4 LULUCF

In 2013, net removals from the category LULUCF amounted to −4 978 kt CO_2 equivalents, which corresponds to 6.3% of the national total GHG emissions (without LULUCF) in 2013 compared to 17% in the base year.

The **overall trend** in net removals from LULUCF is minus 62% over the observed period. The **main driver** for this trend is the biomass carbon stock change in forest land. Fluctuations are due to weather conditions which affect the growth rates on the one hand (e.g. very low increment in 2003) and wind throws on the other, as well as timber demand and prices (e.g. very high harvest rates in 2007 and 2008).

The **most important sub-category is** *forest land (4.A)* with net removals of −4 386 kt CO_2 equivalents in 2013. *Harvested Wood Products (4.G)* contributed −1 266 kt CO_2. CH_4 and N_2O emissions amounted to 20 kt CO_2 equivalents. Total net emissions arising from the other sub-sectors amounted to 654 kt CO_2 in 2013.

Regarding **LULUCF activities pursuant to Decision No 529/2013/EU**, Austria decided to account of greenhouse gas emissions and removals from af-/reforestation, deforestation and forest management activities only. Due to the difficulties with the CRF Reporter, no greenhouse gas emissions by source and removals of CO_2 by sinks resulting from LULUCF activities in accordance with Decision No 529/2013/EU and with Article 3(3) and (4) of the Kyoto Protocol could be reported with this submission (KP LULUCF are thus excluded from the CRF).

2.5 Waste

In 2013, greenhouse gas emissions from *Waste* amounted to 1 684 kt CO_2 equivalent, which corresponds to 2.1% of total national emissions.

The **most important sub-category** of the waste sector is *solid waste disposal*, which caused 79% of the emissions from this sector in 2013, followed by *waste water treatment and discharge* (11%) and *biological treatment of solid waste* (10%). The most important **greenhouse gas** is CH_4 with a share of 84% in emissions from *waste* (2013), followed by N_2O with 16%.

From 2012 to 2013 GHG emissions continued to decrease (−5.6%) as a result of reduced waste volumes as well as decreased carbon content in deposited waste.

The **overall trend** in GHG emissions from *waste* is decreasing, with a decrease of 60.1% from 1990 to 2013. The **main driver** for this trend is the implementation of waste management policies: Waste separation, reuse and recycling activities have increased since 1990 and the amount of disposed waste has decreased correspondingly especially since 2004 when pre-treatment of waste became obligatory (although some exceptions were granted to some Austrian provinces). Furthermore, methane recovery has improved. The legal basis for the reduced disposal of waste as well as the landfill gas recovery is the Landfill Ordinance. Since 2009 all waste with high organic content has to be pretreated before deposition (without exceptions).

3 RECALCULATIONS

This chapter describes the changes made since the last submission to the UNFCCC in April 2014. The tabular format as set out in Annex III to the Commission Implementing Regulation (EU) No 749/2014 ('MMR-IRArticle8_Recalculations_AT') has not been completed for this years' submission due to non-comparability of emission values: Last years' submissions was calculated and reported according to the IPCC 1996 Guidelines whereas this submission is based on the IPCC 2006 Guidelines.

3.1 Background

The Austrian greenhouse gas inventory is subject to continuous improvement. An inventory improvement programme was established as part of the QMS, to grant transparency and monitoring of findings by the EC and UNFCCC[15] review experts (or other sources) on quality of activity data, emission factors, methods and other relevant technical elements of inventories. Any findings and discrepancies are documented; responsibilities, resources and a time schedule for implementation of measures and improvements (incl. recalculations) are attributed to each of these in the improvement plan.

In 2014 Austria's inventory was adapted to the IPCC 2006 GL, resulting in a multitude of methodological and structural changes. In addition, the GWPs according to the 4th Assessment Report (IPCC 2007) were applied for the first time. The recalculations of sectoral emissions are more extensive and complex than in previous years and result from:

- inclusion of new gases (e.g. NF_3)
- inclusion of new sources (e.g. cold start emissions, CO_2 from urea-based catalytic converters, fugitive emissions from oil pipelines)
- modified formulas, EF, parameters, etc.
- revised allocations
- other methodological improvements

3.2 Implications (level, trend)

As can be seen in Figure 3, Austria's GHG emission reported this year (OLI 2014) in sum differs only slightly to the data submitted last year (OLI 2013[16]), given the multitude of changes. The national total (excl. LULUCF) for the base year

[15] The last UNFCCC Review was in September 2014, the last in-depth review (In-Country-Review) took place from 30th September to 5th October 2013. The Review-Reports are published on the UNFCCC Website: http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8452.php

[16] Status Data: 10.3.2014 (CRF v1.4)

is 0.76% higher, the national total (excl. LULUCF) for 2012 is 0.33% lower compared to the values submitted last year. The trend reported in this submission is thus flatter (+1.4%) than in the previous submission (+2.5%).

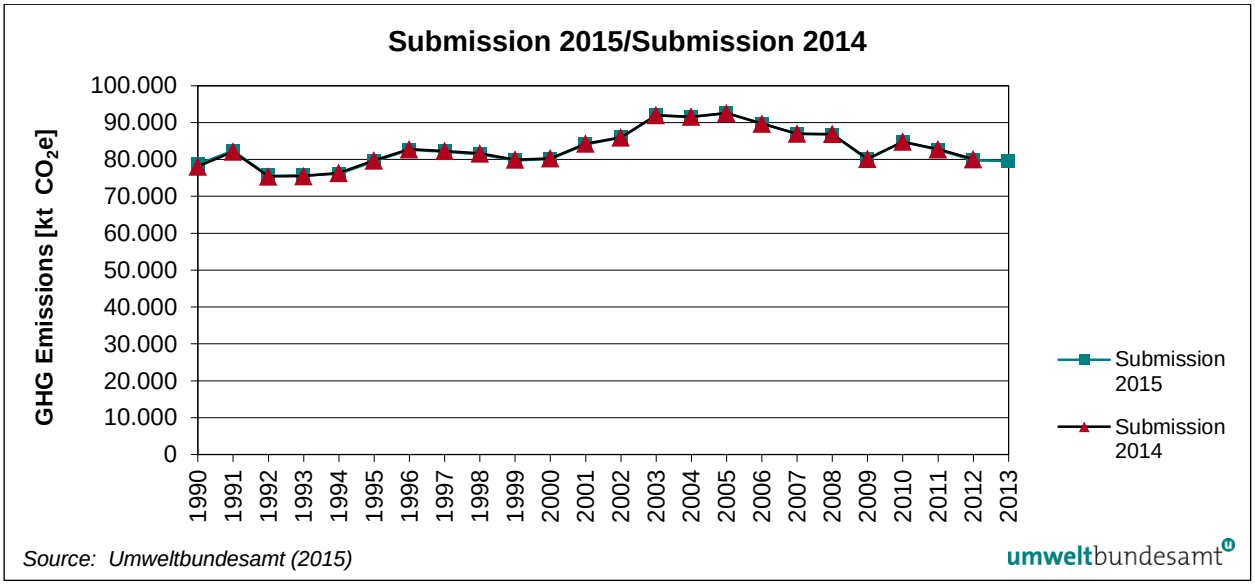

Figure 3: Comparison Submission 2015/Submission 2014 (Recalculations).

National total emissions (excluding LULUCF) for the base year **1990** have been slightly revised upwards since last years' submission (+597 kt CO_2e), mainly due to the higher GWP of CH_4. In 1990 the share of CH_4 in total GHG emissions was 13.5% compared to 8.2% in 2013.

Revised total emissions for **2012** are 266 kt CO_2 equivalents lower than the value submitted last year, mainly because of methodological revisions in the sector *Agriculture*.

Table 5: Recalculation difference of Austria's GHG emissions compared to the previous submission

	National Total GHG emissions without LULUCF			
	Submission 2015	**Submission 2014**	**Recalculation Difference**	
	[kt CO_2e]	**[kt CO_2e]**	**[kt CO_2e]**	**[%]**
1990*	78 683	78 086	597	0.76%
1991	82 395	82 135	260	0.32%
1992	75 622	75 411	211	0.28%
1993	75 704	75 484	220	0.29%
1994	76 131	76 345	-214	-0.28%
1995	79 456	79 744	-287	-0.36%
1996	82 647	82 755	-108	-0.13%
1997	82 124	82 278	-154	-0.19%
1998	81 416	81 653	-237	-0.29%
1999	79 746	79 966	-220	-0.27%
2000	80 124	80 277	-153	-0.19%
2001	84 107	84 275	-167	-0.20%

	National Total GHG emissions without LULUCF			
	Submission 2015	Submission 2014	Recalculation Difference	
	[kt CO_2e]	[kt CO_2e]	[kt CO_2e]	[%]
2002	85 921	85 976	-54	-0.06%
2003	91 899	91 985	-86	-0.09%
2004	91 523	91 569	-46	-0.05%
2005	92 496	92 581	-85	-0.09%
2006	89 713	89 711	2	0.00%
2007	86 933	86 967	-34	-0.04%
2008	86 757	86 882	-125	-0.14%
2009	80 032	80 148	-116	-0.14%
2010	84 788	84 808	-20	-0.02%
2011	82 583	82 761	-178	-0.22%
2012	79 793	80 059	-266	-0.33%

The largest revisions have occurred in the sectors *Industrial Processes and Other Product Use* and *Energy*, among others due to changed allocations: According to the 2006 IPCC GL, *CRF 1.A.2*.a *Iron and Steel* shall include only emissions from fuel not used as reducing agent in the blast furnace and sintering. The emissions associated with the use of limestone as reducing agent, as well as all emissions associated with the use of coke and coal in the blast furnace (previously reported under sector *Energy*) are now reported under *2.C.1 Iron and Steel Production*. This reallocation has resulted in lower emissions in subcategory 1.A.2.a.

A further reason for the higher emissions from *Industrial Processes and Other Product Use* is that now also emissions from solvent use are covered here, and that new fluorinated gases are considered (e.g. NF_3). Additionally also the new GWPs play an important role: Revised total emissions (in CO_2e) are higher for the year 2012 as the updated GWPs of many halocarbons are higher. Emissions in 1990 are higher as well because of the importance of PFC emissions in that year and the fact that updated GWPs of PFCs are also higher.

Recalculations in the sectors *Agriculture* and *Waste* are partly due to the new GWP, partly due to methodological changes.

Table 6: Recalculations per sector.

	Submission 2015		Submission 2014		Recalculation Difference	
THG	**1990**	**2012**	**1990**	**2012**	**1990**	**2012**
	[Mt CO_2e]		[Mt CO_2e]		[Mt CO_2e]	
Total	**78.68**	**79.79**	**78.09**	**80.06**	**0.60**	**-0.27**
Energy	52.91	55.47	55.43	59.69	-2.52	-4.22
IPPU	13.59	15.71	10.52	11.21	3.08	4.50
Agriculture	7.96	6.83	8.56	7.50	-0.60	-0.67
Waste	4.23	1.78	3.59	1.66	0.64	0.13

without emissions from LULUCF

The following table presents the recalculation difference with respect to last years' submission for each gas (positive values indicate that this years' estimate is higher). CO_2, CH_4 emissions and emissions of fluorinated compounds have been revised upwards, whereas N_2O emissions were revised downwards due to methodological changes. This is in part also due to the revised Global Warming Potentials (IPCC 2007).

Table 7: Recalculations per gas.

	1990 (Base year)	2012
	Recalculation Difference [%]	
Total	**0.76%**	**-0.33%**
CO_2	0.32%	0.16%
CH_4	27.39%	25.03%
N_2O	-32.29%	-37.01%
HFC, PFC, SF_6, (NF_3)	7.62%	12.70%

without emissions from LULUCF

3.3 Sectoral recalculations

The following section provides explanations for sectoral recalculations. The impact of the application of the new GWP is not explicitly presented in the descriptions. Further background information and a complete description of the recalculation for the period 1990-2012 will be given in Austria's National Inventory Report 2015.

3.3.1 Energy

3.3.1.1 Stationary sources

Updates of activity data and of NCVs follow the updates of the IEA-compliant energy balance compiled by the federal statistics authority Statistik Austria.

Revision of the Energy Balance

Main revisions affect the years 2009 to 2012 which results between +6.1 and −3.7 PJ of total gross inland consumption. Minor revisions affect the year 2005 (−0.5 PJ of total gross inland coal consumption).

Natural gas

2009: +3.4 PJ gross inland consumption (revision of imports).

2009–2011: Shift of natural gas from Total Other sectors to chemicals industry (between 1.4 and 1.9 PJ).

2010 and 2012: Shift from Transformation Sector (Industrial auto producers) to final energy consumption of Manufacturing Industries which is 3 PJ in 2012. This shift does not affect total consumption of Manuf. Industries.

Liquid fuels

Petrol coke 2011: +1.5 PJ of Manufacturing Industries final consumption.

Solid fuels

Coke oven coke 2005: Revision of final energy consumption of non metallic mineral industries by –0.5 PJ.

Other fuels

Industrial waste: Revision of final energy consumption of manufacturing industries by +2.5 PJ in 2009 and by +1.0 PJ in 2012. Revision of industrial autoproducers 2009–2012 with a maximum of +0.8 PJ in 2010 and +0.2 PJ in 2012.

Biomass

Fuel wood 2011–2012: Revision of final energy consumption of other sectors (+0.8 PJ in 2011 and +0.2 PJ in 2012).

Other solid biomass 2005: Revision of transformation input into public power plants by –3.2 PJ. This revision is due to the change from national energy balance data to IEA data use.

3.3.1.2 Mobile sources

Update/Improvement of activity data

For road transport the transition from the previously used emission calculation model GLOBEMI to the new model NEMO has resulted in revised emission data for the whole time series.

1.A.3.b Road Transport

Energy use and emissions for domestic traffic are calculated more accurately by the new model NEMO than before.[17] The methodological changes concerning domestic transport lead to an altered distribution of energy consumption between domestic and fuel export. The annually sold quantities of fuel in Austria however were not changed compared to the previous inventory (i.e. no impact on total emission data for this sub-category).

In the national energy balance the levels for liquid gas (LPG) were changed retrospectively for the years 2009-2012. Levels for natural gas (CNG) were only changed for the year 2012. In total, activity data for LPG and CNG show a slightly increased fuel use compared to last year's inventory.

1.A.3.c Rail Transport

Revisions of energy consumption data (diesel and coal) for the years 2009-2012 in the national energy balance resulted in minor adjustments. Overall revisions of the sector rail transport show a slight decrease of GHG emissions (−3.1 kt CO_2e in 2012).

1.A.3.d Domestic Navigation

Revisions of energy consumption data due to an updated fleet consumption model for Danube navigation resulted in minor adjustments. Overall revisions of the sector domestic navigation show an increase of GHG emissions (+0.8 kt CO_2e in 2012).

[17] Hausberger, S. et al. (2014): Road transport emissions and emissions from other mobile sources in Austria 1990–2013 (OLI2014), compiled on behalf of the Umweltbundesamt GmbH, Graz, 2014.

1.A.2.f, 1.A.4.a,b,c Mobile Sources (Off-Road)

The mobile sources of off-road transport have still been calculated with the model GEORG[18] as in the years before.

Revisions of the national energy balance resulted in minor adjustments of sectorial diesel consumption data applied in the national off-road model.

Update of methodology and emission factors

1.A.3.b Road Transport

The transition to the new emissions calculation model NEMO for road transport has not changed the method itself, but is characterised by some essential improvements, which are integrated over individual partial modules in NEMO as follows:

1) Updated fleet model

Change in the assumptions for age- and size-dependent vehicle failure probabilities used for the extrapolation of the vehicle fleet depending on the year of first registration, engine type and other distinguishing characteristics (engine capacity or gross vehicle weight) of the fleet stock structure has led to a change in age distribution. Furthermore, through the possibility of the implementation of electric vehicles as a single-car model category and through a methodical shift in the new registration of gasoline and diesel car units in the fleet stock changes for each drive and emission category arise. However, the total fleet stock for each vehicle category agrees except for rounding differences with the previous inventory.

2) Updated consumption and emission factors

The application of the new emission factors from the manual "Emission Factors Road Transport (HBEFA)" Version V3.2 leads to changes in specific fuel consumption and emissions per vehicle kilometer for all vehicle categories.

3) Updated HDV (heavy duty vehicles) size classes

Weight size classes of the vehicle category HDV were adjusted to the HBEFA logic and the associated emission factors.

This restructuring affects HDV > 3.5 t maximum gross weight and all HDV <> 18 t maximum gross weight instead of the current structure in GLOBEMI <> 14 t maximum gross weight. In addition, the HDV class "buses" has been divided exactly into two vehicle categories “coaches” and “service buses” with associated specific emission factors from HBEFA V3.2.

4) Updated vehicle driving distance distribution according to road categories

Changed fleet shares mentioned under 1) result in a different driving distance distribution between vehicle and road categories.

[18] Hausberger, S. et al. (2014): Road transport emissions and emissions from other mobile sources in Austria 1990-2013 (OLI2014), compiled on behalf of the Umweltbundesamt GmbH, Graz, 2014, p.29.

In the present inventory emission factors of the manual "Emission Factors Road Transport (HBEFA)", Version V3.2 has been used. This version was finally released by INFRAS (Bern) in July 2014 and shows changes to those emission factors that were used in the previous year in the inventory model GLOBEMI. Mistakenly, the description of the previous year's inventory was pointing out that HBEFA Version 3.2 had been integrated, but in fact this was an update of Version 3.1.

The use of updated EFs in road transport changed the emissions for the whole time series. For passenger cars the update resulted in significantly higher CO_2 emissions per vehicle kilometer from 2001 onwards. For light duty vehicles the update led to decreased CO_2 emissions per vehicle kilometer, whereas CO_2 emissions per vehicle kilometer from heavy duty vehicles increased.

Overall revisions of the sector road transport show a slight decrease of GHG emissions (-0.3% for 2012).

3.3.1.3 Fugitive Emissions

1.B.1. Coal Mining

Historical emissions from mining activities (1.B.1.a) were revised due to a refined methodology, calculating surface and underground mining separately (2006: +0.001 kt CH_4). Solid fuel transformation is now included in 1.A, leading to lower emissions under 1.B.1.b (−0.04 kt CH_4).

1.B.2 Oil and natural gas

Reporting of oil and natural gas production is now under 1.B.2.b.2 (previously reported under 1.B.2.a.2) due to the fact, that gas emissions hold >80% of total emissions. Under 1.B.2.a.3 emissions from crude oil transport are reported for the first time, increasing emissions 2012 by 1.25 kt CO_2e.

3.3.2 Industrial Processes and Other Product Use

Due to the reallocation of categories, emissions changed in various categories. In the following, those categories are presented where changes of emissions resulted from new activity data, methodologies or emission factors.

Update of activity data

2.A.4.b Soda ash use

The amount of total soda ash used in 2012 was revised, resulting in lower CO_2 emissions (−1.7 kt).

2.F.1 Refrigeration and air conditioning equipment

Updated activity data for Transport refrigeration for the past years led to a new trend for activity data.

2.F.3. Fire Protection

Due to a remark during the last ESD review, previously reported use of R227ea in the years 1991 and 1996 was moved to 1998. The use of this agent earlier than 1998 seemed unlikely (even though reported by the company), so data was moved in line with the German market.

2.F.4.b *Aerosols*

Same as for 2.F.3: first use of 134a for aerosols was changed to 1995, in line with the German market.

2.F.5 Solvents

Same as for 2.F.3: first use of HFC-43-10-mee was changed to 2000.

2.G.1 Electrical Equipment

Changes in the timeline are due to a recalculation of stock data of the association of energy suppliers and industrial facilities (where all data is gathered).

2.D.4 Solvents-other: Use of N_2O for anesthesia – N_2O emissions

Updated information for the usage of N_2O for medical purpose leads to a reduction of N_2O emissions, as quantities for export were also included (−0.02 kt N_2O in 2012).

Improvements of methodologies and emission factors

2.B.1 Ammonia production

In line with the 2006 IPCC Guidelines, CO_2 emissions from urea use are subtracted from ammonia production. Only those emissions are subtracted which are reported elsewhere in the inventory, i.e. urea use in the transport sector (2.G.4) and urea application in agriculture (3.H).
As CH_4 emissions reported under fertilizer production originate from one single carbon input to the integrated ammonia/fertilizer plant, these emissions are subtracted from the emissions reported under ammonia production, in order to avoid double counting (−40 kt in 2012).

2.B.8.b Petrochemical and Carbon Black production – Ethylene

In line with the 2006 IPCC Guidelines, CH_4 emissions from ethylene production were estimated using the default emission factor. This resulted in higher CH_4 emissions for the whole time series (+1.5 kt in 2012)

2.B.10 Other

New source categories were introduced (production of formaldehyde, maleic anhydride and phthalic anhydride), which resulted in higher CO_2 emissions (+142 kt in 2012).

2.C.1 Iron and Steel Production

In line with the 2006 IPCC guidelines, CO_2 emissions were estimated based on a carbon balance. All emissions except those related to the coke oven and on-site power plants were taken into account. Consequently, parts of the emissions that had previously been reported under sector 1 are now included in sector 2. This resulted in revised emissions for the whole time series. The increase in 2012 was 4 404 kt CO_2.

According to the 2006 IPCC Guidelines, VOC emissions in electric steel production consist of NMVOC only. Likewise, in rolling mills, emissions are restricted to NMVOC (i.e. no methane emissions). Hence, CH_4 emissions of electric steel production and rolling mills were revised to "NA" for the whole time series and higher NMVOC emissions were reported instead.

2.C.3 Aluminium Production

The default CO_2 emission factor for primary aluminium production was updated in line with the 2006 IPCC Guidelines and secondary aluminium production was introduced as a new category, resulting in revised emissions for the whole time series (lower emissions 1990-1992, higher emissions 1992-2012, +4.11 kt in 2012).

2.F.1 Refrigeration and air conditioning equipment

A transcription error in the calculation of R134a stock in mobile air conditioning for passenger cars was corrected. This resulted in lower stocks and lower emissions in the years 2006-2012 (−12.2 t of R134a emitted in 2012).

3.3.3 Agriculture

Based on a new study (AMON & HÖRTENHUBER 2014[19]) the Austrian inventory model for sector agriculture was revised according to the 2006 IPCC GL and the EMEP/EEA GB 2013.

Due to the applied model of the nitrogen balance along the reactions throughout the N-flow the recalculations resulted in higher emissions of NH_3 and lower ones of N_2O.

Update of activity data

3.A Enteric Fermentation

Annual livestock data

The two previous categories "chicken" and "other poultry" were divided into "layers" and "broilers" and "turkeys" and "other poultry" (i.e. the rest including ducks, geese, etc.).

[19] Amon & Hörtenhuber: Implementierung der 2006 IPCC Guidelines und Aktualisierung von Daten zur landwirtschaftlichen Praxis in der Österreichischen Luftschadstoffinventur (OLI), Sektor Landwirtschaft, Wien 2014

3.B Manure Management

Annual livestock data

See *3.A Enteric Fermentation*

3.D Agricultural Soils

Other organic fertilizers applied to soils (CRF 3.D.a.2.c)

In addition to N from digested manure, which has been already accounted for in previous submissions, this revision implements additional N inputs from energy crops that are digested in biogas plants, and applied to soils as fertilizer after the digestion process (biogas slurry). This update resulted in additional N_2O emissions of 107 tonnes in 2013.

Crop Residues (CRF 3.D.a.4)

Direct N_2O emissions from plant residues left on the fields and mineralized (after incorporation). In contrast to the 1996 IPCC Guidelines, the new 2006 IPCC Guidelines account for the nitrogen of both, above and below ground biomass.

The estimation of N from crop residues is now covering the following sources:

(a) residues from harvest crops which have already been considered in the previous National Inventory, and additionally

(b) N from legume crops in rotations on arable land

(c) N from meadows ploughed every few years

(d) N from crop residues of cover crops

The source category ‘N-fixing crops‘ has been removed as a direct source of N_2O. Anyhow, the N in crop residues of N-fixing crops has to be accounted for under ‘crop residues’.

Improvements of methodologies and emission factors

3.A Enteric Fermentation

In Austria no country specific methane conversion rate is available. The 2006 IPCC default value has been used, which was 6.0% according to the 1996 IPCC GL and is 6.5% according to the 2006 IPCC GL. Therefore CH_4 emissions increased by about 8% within this source category.

3.B CH_4 emissions from Manure Management

As used in previous submissions, the country specific MCFs for liquid systems of cattle and swine have been applied. For the other systems the 2006 IPCC default values have been used. The default MCF for cattle/swine – solid storage UNTREATED increased from 0.01 to 0.02. Furthermore there were several changes of the IPCC default Tier 1 methane EF, which are applied in the Austrian inventory. These changes, especially the higher MCF for solid storage, lead to an increase of CH_4 emissions within this source category (+0.5 kt in 2012).

3.B Direct N_2O emissions from manure management

The IPCC default values have been used for the Austrian inventory. Almost all of the updated EFs in the 2006 IPCC GL were revised downwards. N_2O emissions of this source category decreased significantly compared to previous inventories (-1.8 kt in 2012), mainly due to lower N_2O EF for solid systems (decreased from 0.02 to 0.005 kg N_2O-N /kg N_{ex}) compared to the 1996 IPCC GL.

3.B.5 Indirect N_2O emissions from manure management

The 2006 IPCC Guidelines introduce the estimation of indirect N_2O emissions from the N volatilization from manure management systems. According to the 1996 IPCC Guidelines all indirect N_2O emissions caused by atmospheric deposition of nitrogen and nitrogen leaching from soils were reported under CRF category *4.D.3 Indirect soil emissions*.

The 2006 IPCC Guidelines require a split of indirect N_2O emissions into:

- Sector Manure Management including nitrogen losses through both, deposition (i.e. gaseous NH_3-N and NO_X-N losses) and leached NO_3-N.
- Sector Agricultural Soils including deposition and leaching/run-off. The following N inputs are considered: application of organic and mineral fertilizers, N in crop residues (above- and below-ground), urine and dung N deposited on pasture, range and paddock by grazing animals.

3.D.a Agricultural Soils (direct soil emissions – N_2O)

According to the 1996 IPCC Guidelines all N_2O emissions were calculated from N applied to soils after subtraction of volatile losses through NH_3-N and NO_x-N during and after application. Following IPCC 2006, N_2O is calculated from overall N additions to soils without subtraction of the amounts that volatilize as NH_3-N and NO_x-N during and after application. As a consequence, the emission factor was reduced to 0.01 kg N_2O-N per kg N applied to soils. The new methodology leads to a decrease in N_2O emissions (−1.2 kt in 2012).

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

According to the IPCC definition, indirect N_2O emissions are caused by atmospheric deposition of nitrogen and by nitrogen leaching and run-off from soils. In the new 2006 IPCC Guidelines the overall value for the emission factor for leached N has been changed from 0.025 to 0.0075 kg N_2O–N/kg N leached. Furthermore, Austria introduced a national value for $Frac_{Leach}$ (0.15) based on a national study (Eder, A.; et al 2014)[20], substituting the previously used default factor of 0.30.

Due to the already explained revisions and the reallocation of nitrogen volatilized at housings, which is accounted under sector manure management according to the 2006 IPCC GL, indirect N_2O emissions from agricultural soils decreased (−2.7 kt in 2012).

[20] Eder, A.; Blöschl, G.; Feichtinger, F.; Herndl, M.; Klammler, G.; Hösch, J.; Erhart, E. & Strauss, P (2014). Indirect nitrogen losses of managed soils contributing to greenhouse emissions of agricultural areas in Austria: results from lysimeter studies. Article in Nutr Cycl Agroecosyst. DOI 10.1007/s10705-015-9682-9. 2015

New emission sources

3.G Liming

Up to now, Liming was reported under CRF category 5.B.1 *Cropland remaining Cropland* in sector LULUCF and is now reported under subcategory 3.G *Liming*. Liming is a source of CO_2 emissions.

3.H Urea Application

Emissions from urea application are reported in accordance with the 2006 IPCC GL for the first time in sector Agriculture. Emissions from urea use are reallocated according to the sectors where the urea is used. Adding urea to soils during fertilisation leads to a loss of CO_2 that was fixed in the industrial production process. In the previous inventory CO_2 emissions were reported in the Industrial Processes and Product Use Sector (IPPU Sector).

3.3.4 LULUCF

Revisions of the data series for LULUCF are due to the following changes:

5.A Forest land

no revisions of the time series

5.B Cropland

The whole time series of cropland areas and consequently the time series of LUC areas to cropland were updated on basis of the most up-to-date figures from the statistics and assessment system.

Liming is no more reported under Cropland but in the Agriculture sector.

So, the emission estimates for this subcategory and for the whole time series changed on basis of these modifications.

5.C Grassland

The whole time series of grassland areas and consequently the time series of LUC areas to grassland were updated on basis of the most up-to-date figures from the statistics and assessment system. Major changes (reductions) occurred in the grassland areas in Alpine ranges. In the last years a process was started in the grassland assessment system to correct for wrongly assessed grassland areas which in fact represent other land uses (forests, other land). This correction process was finalised in the year 2014 and as a consequence the whole time series of grassland areas was corrected. So, the emission estimates for this subcategory and for the whole time series changed on basis of these corrected activity data.

5.D Wetlands

No revisions of the time series

5.E Settlements

The areas of the LUC subcategories CL to SL and GL to SL were changed on basis of the area improvements in the CL and GL subcategories and the related consequences on areas from these land-uses changing to SL. The annual areas of the LUC subcategories CL to SL and GL to SL were also cor-

rected to better meet the annual increase in total SL area. So, the emission estimates for this subcategory and for the whole time series changed on basis of these adjusted activity data.

5.F Other lands

Due to the significant correction of the time series of grassland areas in Alpine ranges the total Other Land areas also changed and there was no more LUC from GL to OL due to area consistency reasons. This had consequences on the emissions and removals on this subcategory.

HWPs

Emissions and removals from HWPs were estimated for the first time.

LULUCF KP estimates

The Af-/reforestation and deforestation time series were not revised.

Emissions/removals from Forest Management including HWPs were estimated for the first time, because Austria did not elect Forest Management for the first commitment period. The methods follow the approaches as for Forest Land remaining Forest Land, but with slightly different activity data and consequently emissions/removals due to the rules for accounting under ARD.

3.3.5 Waste

Update of activity data

5.B Biological Treatment of Solid Waste

Activity data for composted waste had to be slightly revised downwards for 2011 and 2012 as in previous submissions also anaerobically treated (digested) biogenic waste was considered under composting (which is actually an aerobic process).

5.D Wastewater Treatment and Discharge

CH_4 emissions 2011 and 2012 were revised due to the availability of updated connection rates of the Austrian population.

Improvements of methodologies and emission factors

5.D Wastewater Treatment and Discharge

Until submission 2014 the calculation was largely based on the protein intake of the population as described in the 1996 IPCC Guidelines, resulting in a steady growth of N_2O emissions in line with the rising population connected. For submission 2015 some adaptations to better comply with the IPCC 2006 GL were necessary: Indirect emissions from the effluent from wastewater treatment plants are considered for the first time. Furthermore, the current inventory is based on measured nitrogen flows and a country specific EF for advanced wastewater treatment plants is applied. This methodological change has led to a revision of N_2O emissions downwards for the entire time-series (−0.32 kt N_2O in 2012).

4 NATIONAL INVENTORY SYSTEM

The regulations under the UNFCCC and the Kyoto Protocol define the standard for national emission inventories related to transparency, consistency, comparability, completeness and accuracy (TACCC) of inventories. Above this, each Party shall have in place a national system[21] including all institutional, legal and procedural arrangements made within a Party for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

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

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

This section provides a short description of the most important aspects of NISA; a detailed description including all required information as set down in Decision 15/CMP.1, part II ("Reporting of supplementary information under Article 7, paragraph 2", D. National systems in accordance with Article 5, paragraph 1) can be found in the Austrian Initial Report[22], in Austria's NIR 2015[23] and in the NISA Implementation Report[24].

Austria has a centralized inventory system, with all the work related to inventory preparation being carried out at a single national entity. The most important legal arrangement is the Austrian Environmental Control Act (Umweltkontrollgesetz, UKG[25]), which defines the main responsibility for inventory preparation and identifies the Umweltbundesamt as the single national entity with the overall responsibility for inventory preparation. To comply with the stringent requirements the Umweltbundesamt established the 'Inspection Body for Emission Inventories' which is entrusted with the preparation of emission inventories as assigned to the Umweltbundesamt under the UKG.

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[21] 19/CMP.1 Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol; FCCC/KP/CMP/2005/8/Add.3

http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf

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

[23] Umweltbundesamt (2015): Austria's National Inventory Report 2015, Submission under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol. Umweltbundesamt, Vienna. Not published yet.

[24] Umweltbundesamt (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna. http://www.umweltbundesamt.at/umweltkontrolle/

[25] „Umweltkontrollgesetz" – Bundesgesetz über die Umweltkontrolle und die Einrichtung einer Umweltbundesamt Gesellschaft mit beschränkter Haftung; Federal Law Gazette 152/1998.

Inspection Body for Emission Inventories
PSID 241

Umweltbundesamt GmbH, Environment Agency Austria
Dr. Klaus Radunsky (Head of Inspection Body), DI Michael Anderl (Deputy)
Spittelauer Lände 5
1090 Wien, Austria

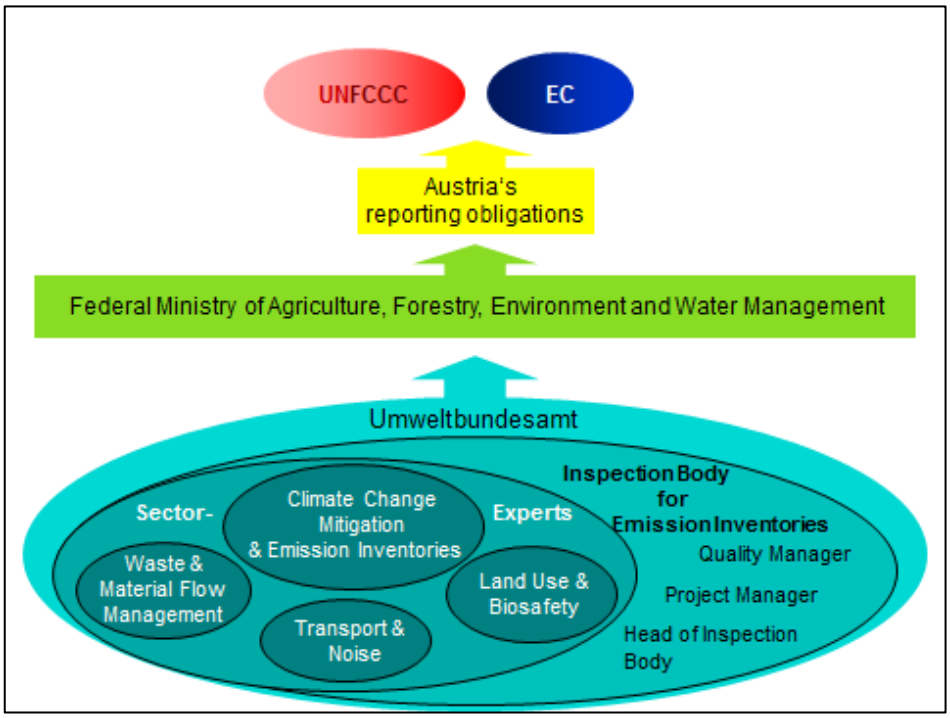

Figure 4: Responsibilities within the Austrian National Inventory System Austria.

The personnel of the IBE is made up of staff from various organisational units of the Environment Agency Austria, who in the course of their inspection activity for the IBE are assigned to the IBE and therefore responsible to the head of the inspection body. The head of the inspection body (HI) supervises the project manager (PM), who is responsible for coordinating the IBE staff (SM) when carrying out their inspections.

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

4.1.1 Legal and institutional arrangements

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

LEGAL ARRANGEMENT: ENVIRONMENTAL CONTROL ACT (FEDERAL LAW GAZETTE 152/1998)

- § 5 (regulates responsibilities of the Umweltbundesamt)

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

  (2)15 …the *Umweltbundesamt* is obliged to prepare "technical expertise for *compliance* with UNECE/LRTAP convention […] and with the UNFCCC and the Kyoto Protocol, including the preparation of emission inventories, evaluation of the impact of measures, and assistance in preparation of reports regarding climate".
- § 11 (regulates financing of the Umweltbundesamt)

  …ensures financial resources for preparation of tasks as referred to in para 6.
- § 7 (regulates issues related to data security)

  … in processing the legally assigned tasks the Umweltbundesamt is seen as a public authority and can therefore process (confidential) personal data and can exchange these data with other public authorities.

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

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

1. Statistic Austria

- Statistical yearbook (public)
- National Energy balance (comprehensive/detailed Energy balance and IEA/Eurostat questionnaire)
  - **Long-term Contract** with the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and Federal Ministry of Economy, Family and Youth (BMWFJ)
- Production/Import/Export statistics for solvents, F-gases
  - **Contract on annual basis** with the with the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
- Agricultural statistics (public)
- Transport Statistics (public)
- Flight movements per aircraft type and airports (non-standard analysis by Statistic Austria and AustroControl for free)

  Procedural arrangement:
  - close cooperation Umweltbundesamt – Statistic Austria on definition of data format and specification

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

2. Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)

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

- data on emissions and activity data from installations under the EU ETS (Federal law gazette 118/2011 establishing a scheme for greenhouse gas emission allowance trading)
- activity data of certain F-gases (Austrian Fluorinated Compounds Ordinance 139/2007 regarding prohibitions and restrictions of HFCs, PFCs, SF6)
- activity data from landfill sites (Austrian Landfill Ordinance No. 39/2008) – EDM (Electronic Data Management)
- activity data regarding waste incineration (Austrian Waste Incineration Ordinance No. 35/2013)
- emissions data collected in the framework of E-PRTR (Austrian Ordinance No. 380/2007 concerning the establishment of the European Pollutant Release and Transfer Register)
- emissions data (SO_2, NO_x, dust) and activity data from steam boiler installations (Federal law gazette 127/2013 establishing integrated pollution prevention and control)

  Procedural arrangement: The access to the data is organised for free via the EDM – Electronic Data Management – **http://edm.gv.at**, which is an information network which allows enterprises and authorities to handle registration and notification obligations in the waste and environment sectors online.

  - EDM aimed at sustainably reducing the administrative burden of enterprises and authorities to efficient, electronic recording and notification systems and to ensure a high level of environmental protection in Austria.
  - EDM is set up by Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, BMLFUW and operated by Umweltbundesamt

3. Austrian Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW)

- National Forest inventory
  - **Contract on a regular interval** with the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
- Forest soil condition survey (of all federal provinces)

  Procedural arrangement: close cooperation Umweltbundesamt – BFW on definition of data format and specification;

4. Research institutions:

a. Technical University of Graz (Karl-Franzens-Universität Graz)

- GLOBEMI – Emission model road (IPCC sector 1.A.3.b): calculation of road emissions
- NEMO – Emission model of off-road machinery: calculation of road emissions
  - Contract on annual basis with Umweltbundesamt

    Procedural arrangement: close cooperation Umweltbundesamt – TU Graz

b. University of Natural Resources and Life Sciences Vienna (BOKU) / Leibniz Institute for Agricultural Engineering Potsdam-Bornim (ATB)

- Agricultural model: calculation of emissions
  - Contract on a regular interval with Umweltbundesamt

    Procedural arrangement: close cooperation Umweltbundesamt – BOKU

5. Austrian Economic Chambers and Associations of the Austrian Industries as well as Individual plant operators/companies

- Activity data, emission data and relevant parameters; information on the process and abatement technology
  - no formal agreements were made but it is in Austria good practice to have a good cooperation and exchange of knowledge regarding the requirements of GHG and Air pollutants Inventory on a continuing basis

    Procedural arrangement: close cooperation

4.1.2 Data Sources

The following table presents the main data sources used for activity data as well as information on who did the actual calculations (for unpublished studies a detailed description of the methodologies is given in the NIR):

Table 8: Main data sources for activity data and emission values.

Sector	Data Sources for Activity Data	Emission Calculation
Energy	Energy Balance from Statistik Austria; EU-ETS; Steam boiler database; direct information from industry or associations of industry	Umweltbundesamt, plant operators
Transport	Energy Balance from Statistik Austria	Umweltbundesamt (Aviation), Technical University Graz (Road and Off-road transport)
IPPU	National production statistics, import/export statistics; EU-ETS; direct information from industry or associations of industry Short term statistics for trade and services Austrian foreign trade statistics Structural business statistics Surveys at companies and associations	Umweltbundesamt, plant operators F Gases: Umweltbundesamt, based on ÖkoRecherche Solvents: Umweltbundesamt, based on studies by Institut für industrielle Ökologie and Forschungsinstitut für Energie und Umweltplanung, Wirtschaft und Marktanalysen GmbH[26]

[26] Research Institute for Energy and Environmental Planning, Economy and Market Analysis Ltd./Institute for Industrial Ecology

Sector	Data Sources for Activity Data	Emission Calculation
Agriculture	National Studies, national agricultural statistics obtained from Statistik Austria	Umweltbundesamt, based on studies by: University of Natural Resources and Applied Life Sciences, Research Center Seibersdorf
LULUCF	National forest inventory obtained from the Austrian Federal Office and Research Centre for Forests National agricultural statistics and land use statistics obtained from Statistik Austria	Umweltbundesamt
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)	Umweltbundesamt

The main sources for emission factors are:

- national studies for country specific emission factors
- plant-specific data reported by plant operators
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[27]
- EMEP/EEA air pollutant emission inventory guidebook – 2009. Technical report No. 6/2009.[28] (previously known as EMEP/CORINAIR Emission Inventory Guidebook)
- EMEP/EEA air pollutant emission inventory guidebook – 2013. Technical report No. 12/2013.[29]
- Handbook emission factors for road transport (HBEFA), Version 3.2 (planned to be published by INFRAS, Bern/Switzerland, by beginning of 2014)

4.1.3 QA/QC Plan (QMS of IBE)

A Quality Management System (QMS) has been designed and implemented to fulfil all requirements of *good practice, i.e.* to improve transparency, consistency, comparability, completeness and accuracy as well as confidence in the national inventory. Since December 2005 the inventory team at the Umweltbundesamt has been accredited as inspection body (Id.No.241) in accordance with the Austrian Accreditation Law (AkkG)[30] by decree of the Minister of Economics and Labour[31]. This standard takes into account standards regarding a QMS as set out in the EN/ISO 9000 series and goes beyond: it also provides a clear statement of requirements regarding competence and independence; impartiality and integrity.

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

[28] Prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections (TFEIP) and published by the European Environment Agency (EEA). Copenhagen 2009. http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009

[29] http://www.eea.europa.eu/publications/emep-eea-guidebook-2013

[30] *„Akkreditierungsgesetz"*; Federal Law Gazette No. 28/2012

[31] No. BMWA-92.715/0036-I/12/2005, issued on 19 January 2006, valid from 23 December 2005

The implementation of QA/QC procedures as required by the IPCC supports the development of national greenhouse gas inventories that can be readily assessed in terms of quality and completeness. The QMS as implemented in the Austrian inventory includes all elements of the QA/QC system outlined in IPCC 2006 GL Volume 1 'QA/QC and Verification', and goes beyond. It comprises supporting and management processes in addition to the QA/QC procedures in inventory compilation and thus ensures agreed standards not only within (i) the inventory compilation process and (ii) supporting processes (e.g. archiving), but also for (iii) management processes (e.g. annual management reviews, internal audits, regular training of personnel, error prevention).

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

The Austrian Quality Management System is described in detail in Austria's NIR 2014, some aspects and improvements compared to the previous submission (QMS activities and improvements 2014) are described below.

The Quality Manual can be downloaded at:
http://www.umweltbundesamt.at/umweltsituation/luft/emissionsinventur/emi_ueberwachung/

Sector Experts

Within the inventory system specific responsibilities for the different emission source/sink categories ('Sector Experts') are defined. There are 8 sectors defined (Energy, Transport, Fugitive Emissions, IP, Product Use, Agriculture, LULUCF and Waste). Two experts form a sector team, whereas one team member is nominated as team leader ('Sector Lead'). Sector experts collect activity data, emission factors and all relevant information needed for finally estimating emissions. The sector experts are also responsible for the choice of methods, data processing and archiving and for contracting studies (if needed), and perform Quality Assurance and Quality Control (QA/QC) activities. The main data sources used, as well as information on who did the actual calculations, are presented in Table 8.

Data Management

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

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

QMS activities and improvements 2014

In 2014 an external audit led by a representative appointed by the accreditation body has taken place to assess the QM system with regard to compliance with the underlying standard EN ISO/IEC 17020, to check its implementation in practice and to assure that measures and recommendations as set out in previous audits have been implemented accordingly. Such an audit is obligatory every 15 months. The final judgement of the auditor confirmed the compliance and practicability of the QM system and stressed the high competence of the personnel.

In addition, the following QA/QC measures were implemented in 2014:

- QMS: Improvements in the QA/QC Manual were made related to the implementation of internal audits, the procedure regarding monitoring of personnel, and the records of inventory preparation (documentation of expert judgements, communication with data suppliers and internal communication).
- Test Emission Time Series: As a follow up to the risk analysis 2013, an internal test ("dummy") submission was carried out by the deputy of the data manager. Aim was to test and improve the technical competence of the deputy and to enhance the resilience of the inventory system.
- Mutual Review New Zealand – Austria: From 6 to 8 October 2014, two inventory experts from New Zealand visited the IBE to discuss national system and QA/QC issues as well as other issues on implementation of the IPCC 2006 GL in the sectors Energy and IPPU. Recommendations, especially on transparency, are planned to be addressed in the NIR. The organization of the IBE, in particular the sector expertise, double and permanent occupation of responsibilities, regular participation in international reviews and the distribution of 'general' roles (Data Manager, Quality Manager, 'KCA/UA Officer', HI, Inventory Support) were judged particularly positive.
- Input Data Audit Waste: 2014 an audit of the procedure of collection, processing and evaluation of landfilled waste data was carried out to determine the QA/QC activities implemented and quality of activity data used for CRF 5.A SWDS (category-specific QC on AD). It was conducted at the Umweltbundesamt (unit waste and material flow management, responsible for data base query) as well as at the premises of BMLFUW, responsible for validation and analysis of the data query and data and official data supplier. In the course of the audit it became apparent that overall sufficient QA/QC measures are taken to achieve and maintain high quality data on landfilled waste amounts. In the documentation, however, some improvement needs were identified and finally recommended.
- "Stakeholder Exchange Agriculture": In September 2014, an event on the implementation of the IPCC 2006 GL in the sector Agriculture took place at the Umweltbundesamt, organised by the IBE, involving relevant national experts and stakeholders. The aim was to get feedback on the new agricultural model (peer review of method) and define further improvement (research) needs. Improvements have been included in the IBE internal sectoral improvement plan.

4.1.4 Changes in the national inventory system

The national inventory system is unchanged compared to the description given in chapter 4 and in the Austrian Initial Report under the Kyoto Protocol[32].

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

5 CHANGES IN THE NATIONAL REGISTRY

The following changes to the national registry of Austria have occurred in 2014:

Table 9: Changes to the national registry of Austria in 2014

Reporting Item	Description
15/CMP.1 annex II.E paragraph 32.(a) Change of name or contact	The name and contact of the registry administrator as an institution has not changed. A change of the name of the alternate registry administrator was notified to the Secretariat in 2014.
15/CMP.1 annex II.E paragraph 32.(b) Change regarding cooperation arrangement	No change of cooperation arrangement occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(c) Change to database structure or the capacity of national registry	An updated diagram of the database structure has been submitted by separate upload at EIONET/CDR ('CSEUR_DB_MODEL_20150113') Versions of the CSEUR released after 6.1.7.1 (the production version at the time of the NIR submission in 2014) introduced changes in the structure of the database. These changes were limited and only affected EU ETS functionality. No change was required to the database and application backup plan or to the disaster recovery plan. No change to the capacity of the national registry occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(d) Change regarding conformance to technical standards	Changes introduced since version 6.1.7.1 of the national registry were limited and only affected EU ETS functionality. However, each release of the registry is subject to both regression testing and tests related to new functionality. These tests also include thorough testing against the DES and were successfully carried out prior to the relevant major release of the version to Production (see separate file 'Annex B - Changes from V6 2 1 - 6 3 3 2_V2' uploaded at EIONET/CDR). Annex H testing was carried out in February 2015 and the test report is submitted by separate upload at EIONET/CDR ('Annex H Test Results – EU'). No other change in the registry's conformance to the technical standards occurred for the reported period.
15/CMP.1 annex II.E paragraph 32.(e) Change to discrepancies procedures	No change of discrepancies procedures occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(f) Change regarding security	No change of security measures occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(g) Change to list of publicly available information	No change to the list of publicly available information occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(h) Change of Internet address	No change of the registry internet address occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(i) Change regarding data integrity measures	No change of data integrity measures occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(j) Change regarding test results	Changes introduced since version 6.1.7.1 of the national registry were limited and only affected EU ETS functionality. Both regression testing and tests on the new functionality were successfully carried out prior to release of the version to Production. The site acceptance test was carried out by quality assurance consultants on behalf of and assisted by the European Commission; the report is submitted by separate upload at EIONET/CDR ('Annex B - Changes from V6 2 1 - 6 3 3 2_V2'). Annex H testing was carried out in February 2015 and the test report is submitted by separate upload at EIONET/CDR ('Annex H Test Results – EU').

6 REPORTING UNDER ARTICLE 7 MMR

Information on Article 7(1) a – d of the MMR is provided in the respective CRF Tables and MMR IR reporting template ('MMR_IR_AnnexX_ESD_AT). Information on the accounting of emissions and removals from LULUCF activities, in accordance with Decision No 529/2013/EU and Art. 3(3) and (4) of the Kyoto Protocol, is included in Chapter 2.4. Emission trends 1990–2013 (Article 7(1) e) are described in Chapters 2. Changes to the national system and the national registry are presented in Chapter 4.1.4 (Article 7(1) n) and 5 (Article 7(1) o). Article 7(1) p-information is given in Chapter 4.1.3 (QA/QC Plan) and the respective MMR IR reporting template ('MMR-IRArticle14_Uncertainty_AT').

Information on Article 7(1) f – m is given hereinafter:

6.1 Article 7 (1) f

Information on indicators, as set out in Annex III of the MMR, for the year 2013 is reported as a separate file (AT_Annex III_indicators_2015.xls) by EIONET/CDR upload. See also Annex II of this report.

6.2 Article 7 (1) g

Information from the national registry on acquisition, holding, transfer, cancellation, retirement and carry-over of AAUs, RMUs, ERUs, CERs, tCERs and lCERs for 2014 has been reported as a separate file ('SEF_AT_2014_20150109.xls (xml)') by EIONET/CDR upload.

6.3 Article 7 (1) h

Summary information on concluded transfers pursuant to Article 3(4) and (5) of Decision No 406/2009/EC for the year 2014 has been reported as separate file ('Concluded transfers 2014.xlm') by EIONET/CDR upload.

6.4 Article 7 (1) i

Information on the use of joint implementation, of the CDM and of international emissions trading, pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, or any other flexible mechanism provided for in other instruments adopted by the Conference of the Parties to the UNFCCC or the Conference of the Parties to the UNFCCC serving as the meeting of the Parties to the Kyoto Protocol, to meet their quantified emission limitation or reduction commitments pursuant to

Article 2 of Decision 2002/358/EC and the Kyoto Protocol or any future commitments under the UNFCCC or the Kyoto Protocol, for the year 2013 is reported as a separate file ('AT_Art-7-1-i_mechanisms_20150630.pdf') by EIONET/CDR upload.

6.5 Article 7 (1) j

The status of implementation of recommendations listed in the most recently published individual UNFCCC Review report is reported as a separate file ('MMR_IR Article9_recommendations_AT').

6.6 Article 7 (1) k

The allocation of the verified emissions reported by installations and operators under Directive 2003/87/EC to the source categories of the national greenhouse gas inventory and the ratio of those verified emissions to the total reported greenhouse gas emissions in those source categories for 2013 is reported as a separate file ('MMR_IRArticle10_ETS_AT').

6.7 Article 7 (1) l

ETS reports are fully considered in the Austrian greenhouse gas inventory; consistency of data is thus given and the Article not relevant for Austria.

For details, especially the methodology of consideration of ETS-data ('bottom up' data) see chapter 3.2.9.1 of the National Inventory Report 2014.

6.8 Article 7 (1)m (i)

The Austrian Air Emission Inventory (OLI) covers both, greenhouse gases and air pollutants reported under the NEC Directive 2001/81/EC and CLRTAP. Data basis (activity data and other relevant parameters) is thus consistent for NEC, CLRTAP and MMR reporting.

Results of the checks performed for each air pollutant on the consistency of the data, for the year 2013 show no differences of more than +/− 5% between the total emissions excluding LULUCF. Minor differences are solely due to different reporting requirements regarding air transport and international navigation.

For the comparison the following versions were taken (NEC: v1.0 submitted 10/02/2015, CLRTAP: v2.0 submitted 13/04/15).

6.9 Article 7 (1)m (ii)

There are no producers of F-gases in Austria, and imports and exports of F-Gases to and from Austria are all from inside the EU. Article 6(1) of this regulation is thus not relevant for Austria.

6.10 Article 7 (1)m (iii)

Checks performed on the consistency of the data used to estimate emissions in preparation of the greenhouse gas inventory for 2013 with the energy data reported pursuant to Article 4 of Regulation (EC) No 1099/2008 show no differences of more than +/− 2%.

7 ABBREVIATIONS

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

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

BMWA..... Bundesministerium für Wirtschaft und Arbeit
Federal Ministry for Economic Affairs and Labour (renamed as BMWFJ)

BMWFJ ..... Bundesministerium für Wirtschaft, Familie und Jugend
Federal Ministry of Economy, Family and Youth (formerly called BMWA)

CDR ..... Central Data Repository

COP ..... Conference of the Parties

CORINAIR..... Core Inventory Air

CRF..... Common Reporting Format

EC ..... European Community

EEA..... European Environment Agency

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

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

EN ..... European Norm

ETC..... European Topic Centre

EU ..... European Union

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

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

GHG..... Greenhouse Gas

GLOBEMI..... Globale Modellbildung für Emissions- und Verbrauchsszenarien im Verkehrssektor
(Global Modelling for Emission- and Fuel consumption Scenarios of the Transport Sector) see (HAUSBERGER 1998)

GWP ..... Global Warming Potential

IPCC ..... Intergovernmental Panel on Climate Change

IEA ..... International Energy Agency

ISO..... International Standards Organisation

LTO ..... Landing/Take-Off cycle

LULUCF ..... Land Use, Land-Use Change and Forestry – IPCC CRF Category 5

MMR ..... Monitoring Mechanism Regulation

MM IR ..... Monitoring Mechanism – Commission Implementing Regulation

NEMO ..... Network Emission Model

NFI ..... National Forest Inventory

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

NISA ..... National Inventory System Austria

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

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

QMS ..... Quality Management System

SNAP ..... Selected Nomenclature on Air Pollutants

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

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

ANNEX I: EMISSION TRENDS

This Annex presents emission trends for CO_2, CH_4, N_2O and FCs.

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

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

IE (included elsewhere)..... for emissions by sources and removals by sinks of greenhouse gases estimated but included elsewhere in the inventory instead of the expected source/sink category.

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

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

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

Table A.I-1: Emission Trends CO_2 (kt).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Emissions/Removals with LULUCF	**49 159.82**	**50 014.19**	**49 327.14**	**68 440.42**	**71 147.42**	**68 312.44**	**69 274.72**	**63 142.99**	**66 505.72**	**64 123.55**	**61 807.92**	**62 769.68**
Total Emissions without LULUCF	**62 216.94**	**64 147.44**	**66 229.10**	**79 596.32**	**76 968.46**	**74 270.64**	**74 039.95**	**67 849.61**	**72 690.78**	**70 581.60**	**67 843.27**	**67 767.98**
1. Energy	51 293.49	53 100.57	54 070.98	66 161.70	62 839.01	59 538.69	59 058.43	55 935.61	58 863.65	56 582.74	54 281.99	53 916.90
A. Fuel Combustion (Sectoral Approach)	51 191.40	52 973.42	53 906.33	65 956.54	62 606.85	59 301.53	58 846.27	55 670.45	58 626.48	56 349.56	54 044.81	53 665.72
1. Energy Industries	13 792.26	12 918.31	12 220.72	16 279.65	15 152.48	13 875.08	13 666.09	12 634.29	14 023.93	13 750.91	12 403.69	11 205.32
2. Manufacturing Industries and Construction	9 802.93	10 222.53	9 905.94	11 701.12	11 288.37	10 912.29	11 274.50	10 883.61	11 368.33	11 353.36	11 053.49	11 001.75
3. Transport	13 776.66	15 685.53	18 645.01	24 751.98	23 449.88	23 603.99	22 331.97	21 525.13	22 193.73	21 511.29	21 399.45	22 603.38
4. Other Sectors	13 784.54	14 114.51	13 093.85	13 180.22	12 672.05	10 865.54	11 528.52	10 581.69	10 994.21	9 687.16	9 140.78	8 807.30
5. Other	35.00	32.55	40.80	43.57	44.06	44.63	45.19	45.72	46.28	46.84	47.40	47.97
B. Fugitive Emissions from Fuels	102.09	127.15	164.65	205.16	232.16	237.16	212.16	265.17	237.17	233.18	237.18	251.18
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	102.09	127.15	164.65	205.16	232.16	237.16	212.16	265.17	237.17	233.18	237.18	251.18
C. CO_2 Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	10 802.13	10 936.09	12 047.14	13 319.40	14 015.04	14 616.86	14 870.84	11 800.28	13 717.90	13 891.62	13 451.23	13 741.18
A. Mineral Industry	3 092.34	2 657.26	2 733.10	2 888.71	3 053.22	3 265.57	3 275.96	2 714.80	2 660.56	2 779.23	2 703.42	2 719.55
B. Chemical Industry	643.49	669.46	674.08	643.58	666.25	601.64	651.77	587.95	676.85	692.78	662.06	599.18
C. Metal Industry	6 787.00	7 419.42	8 447.33	9 573.77	10 042.69	10 515.85	10 723.68	8 333.20	10 188.64	10 230.28	9 878.87	10 222.68
D. Non-Energy Products from Fuels and Solvent Use	279.30	189.95	192.62	212.99	250.73	228.07	210.69	153.46	176.89	173.21	189.00	176.44
E. Electronics Industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Product Uses as Substitutes for ODS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other Product Manufacture and Use	0.00	0.00	0.00	0.36	2.14	5.72	8.75	10.86	14.96	16.13	17.87	23.33
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	94.42	99.80	98.72	102.95	104.26	106.97	104.58	109.66	107.20	105.20	108.02	107.86
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Liming	89.97	91.85	90.35	91.19	89.34	89.05	88.03	87.69	87.63	86.84	86.33	86.36
H. Urea application	4.45	7.95	8.37	11.76	14.91	17.92	16.55	21.97	19.56	18.36	21.69	21.51
I. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land Use, Land-Use Change and Forestry	-13 057.11	-14 133.25	-16 901.96	-11 155.90	-5 821.03	-5 958.21	-4 765.22	-4 706.62	-6 185.06	-6 458.05	-6 035.35	-4 998.30
A. Forest Land	-10 930.15	-12 284.21	-16 028.16	-8 824.84	-3 010.15	-1 982.18	-1 087.76	-4 524.47	-4 490.03	-4 455.60	-4 421.17	-4 386.55
B. Cropland	-68.89	-18.24	64.09	89.92	96.62	108.29	141.73	127.31	113.39	111.08	118.41	129.88
C. Grassland	324.19	141.97	146.59	353.32	353.54	356.50	347.65	48.75	46.25	48.79	44.51	50.14
D. Wetlands	42.08	35.81	35.80	37.17	39.32	51.30	48.93	68.78	73.40	69.77	74.84	78.04
E. Settlements	384.64	337.23	319.34	398.31	375.87	409.79	442.77	281.85	261.05	269.34	135.32	215.15
F. Other Land	443.95	375.30	365.68	319.10	310.99	302.88	294.77	211.02	203.38	195.73	188.08	180.55
G. Harvested Wood Products	-3 252.93	-2 721.12	-1 805.30	-3 528.89	-3 987.22	-5 204.80	-4 953.32	-919.86	-2 392.49	-2 697.15	-2 175.35	-1 265.50
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	26.89	10.97	12.26	12.26	10.15	8.12	6.09	4.06	2.03	2.03	2.03	2.03
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Biological Treatment of Solid Waste	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Incineration and Open Burning of Waste	26.89	10.97	12.26	12.26	10.15	8.12	6.09	4.06	2.03	2.03	2.03	2.03
D. Waste Water Treatment and Discharge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
7. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo Items:												
International Bunkers	935.45	1 388.98	1 767.97	2 040.20	2 119.21	2 251.24	2 251.64	1 952.94	2 120.08	2 230.68	2 136.52	2 045.69
Aviation	885.97	1 327.42	1 695.58	1 959.83	2 048.88	2 175.79	2 181.97	1 893.40	2 049.55	2 168.44	2 072.66	1 975.44
Navigation	49.48	61.55	72.39	80.37	70.33	75.44	69.67	59.54	70.53	62.24	63.86	70.24
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 Emissions from Biomass	9 927.77	11 454.01	12 477.53	16 071.30	17 397.06	19 119.97	20 509.53	21 100.98	23 695.55	22 992.46	24 922.37	24 412.99
CO_2 captured	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Long-term storage of C in waste disposal sites	207.32	115.61	113.27	43.68	48.09	43.90	31.60	18.34	17.58	19.61	11.89	13.11

Table A.I-2: Emission Trends CH_4 (kt).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Emissions/Removals with LULUCF	424.58	378,.4	331.86	302.96	297.54	292.25	286.49	281.88	277.88	269.79	265.38	261.22
Total Emissions without LULUCF	424.56	378.84	331.85	302.96	297.53	292.25	286.48	281.88	277.87	269.79	265.37	261.21
1. Energy	45.58	32.67	27.69	23.96	23.22	22.74	22.28	21.88	23.22	21.91	22.88	22.40
A. Fuel Combustion (Sectoral Approach)	21.60	19.20	14.42	12.88	11.82	11.27	11.47	10.87	11.85	10.65	11.25	11.18
1. Energy Industries	0.24	0.23	0.23	0.33	0.38	0.39	0.41	0.44	0.48	0.50	0.53	0.50
2. Manufacturing Industries and Construction	0.33	0.39	0.44	0.51	0.53	0.54	0.58	0.60	0.59	0.61	0.59	0.56
3. Transport	2.59	1.77	1.15	0.93	0.83	0.75	0.66	0.60	0.54	0.51	0.47	0.46
4. Other Sectors	18.44	16.81	12.60	11.11	10.08	9.58	9.82	9.23	10.24	9.03	9.65	9.66
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	23.99	13.47	13.27	11.08	11.40	11.48	10.80	11.01	11.37	11.26	11.63	11.22
1. Solid Fuels	13.33	1.47	1.09	0.01	0.01	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	10.66	12.00	12.18	11.08	11.40	11.48	10.80	11.01	11.37	11.26	11.63	11.22
C. CO_2 Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	1.40	1.38	1.40	1.45	1.92	1.90	1.88	1.84	1.87	1.87	1.87	1.96
A. Mineral Industry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	1.40	1.38	1.40	1.45	1.92	1.90	1.88	1.84	1.87	1.87	1.87	1.96
C. Metal Industry	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. Non-Energy Products from Fuels and Solvent Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Electronics Industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Product Uses as Substitutes for ODS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other Product Manufacture and Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
3. Agriculture	214.38	205.92	193.80	182.57	181.84	182.53	181.87	184.18	183.63	181.19	179.86	180.02
A. Enteric Fermentation	192.82	185.53	175.47	165.74	165.19	165.81	165.50	167.61	167.14	165.01	163.88	164.13
B. Manure Management	21.50	20.33	18.28	16.79	16.61	16.68	16.33	16.53	16.45	16.15	15.96	15.87
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02
G. Liming	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H. Urea application	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
I. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land Use, Land-Use Change and Forestry	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01
A. Forest Land	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01
B. Cropland	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested Wood Products												
H. Other												
5. Waste	163.20	138.86	108.97	94.98	90.55	85.08	80.46	73.98	69.16	64.81	60.76	56.82
A. Solid Waste Disposal on Land	157.82	133.61	105.05	91.00	86.63	81.16	76.65	70.24	65.52	61.25	57.19	53.31
B. Biological Treatment of Solid Waste	0.52	1.04	1.24	2.33	2.44	2.52	2.51	2.53	2.53	2.52	2.56	2.50
C. Incineration and Open Burning of Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste Water Treatment and Discharge	4.85	4.21	2.68	1.64	1.48	1.39	1.29	1.20	1.10	1.05	1.00	1.01

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo Items:												
International Bunkers	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.05	0.05
Aviation	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04
Navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 Emissions from Biomass												

Table A.I-3: Emission Trends N_2O (kt).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Emissions/Removals with LULUCF	14.13	14.45	14.18	11.79	11.78	11.81	12.38	11.63	10.97	11.19	11.10	11.02
Total Emissions without LULUCF	14.08	14.40	14.14	11.74	11.73	11.76	12.32	11.57	10.91	11.12	11.04	10.95
1. Energy	1.59	1.75	1.82	2.06	2.05	2.06	2.08	2.01	2.11	2.05	2.07	2.07
A. Fuel Combustion (Sectoral Approach)	1.59	1.75	1.82	2.06	2.05	2.06	2.08	2.01	2.11	2.05	2.07	2.07
1. Energy Industries	0.15	0.15	0.16	0.25	0.28	0.30	0.33	0.32	0.38	0.38	0.36	0.34
2. Manufacturing Industries and Construction	0.24	0.28	0.38	0.45	0.45	0.46	0.47	0.45	0.45	0.45	0.46	0.44
3. Transport	0.44	0.53	0.49	0.55	0.55	0.56	0.55	0.55	0.58	0.58	0.60	0.65
4. Other Sectors	0.76	0.78	0.78	0.81	0.76	0.72	0.73	0.68	0.70	0.65	0.65	0.64
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
C. CO_2 Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	3.69	3.52	3.82	1.44	1.43	1.39	1.56	1.00	0.69	0.63	0.62	0.62
A. Mineral Industry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	2.94	2.77	3.07	0.88	0.90	0.87	1.05	0.53	0.20	0.15	0.17	0.16
C. Metal Industry	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. Non-Energy Products from Fuels and Solvent Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Electronics Industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Product Uses as Substitutes for ODS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other Product Manufacture and Use	0.75	0.75	0.75	0.56	0.53	0.52	0.51	0.47	0.48	0.47	0.45	0.46
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
3. Agriculture	8.41	8.62	7.88	7.42	7.40	7.45	7.81	7.68	7.23	7.57	7.46	7.38
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	1.52	1.58	1.52	1.50	1.50	1.52	1.52	1.54	1.53	1.51	1.50	1.49
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	6.88	7.04	6.36	5.92	5.89	5.92	6.30	6.14	5.70	6.05	5.96	5.88
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Liming	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H. Urea application	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
I. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land Use, Land-Use Change and Forestry	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07
A. Forest Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Cropland	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE
E. Settlements	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE
F. Other Land	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE
G. Harvested Wood Products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	0.40	0.52	0.62	0.82	0.85	0.87	0.87	0.88	0.88	0.88	0.89	0.88
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Biological Treatment of Solid Waste	0.08	0.14	0.17	0.32	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.34
C. Incineration and Open Burning of Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste Water Treatment and Discharge	0.32	0.37	0.45	0.50	0.51	0.52	0.52	0.53	0.53	0.53	0.53	0.54
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
7. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo Items:												
International Bunkers	0.05	0.07	0.08	0.09	0.09	0.10	0.10	0.08	0.09	0.09	0.09	0.09
Aviation	0.03	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07
Navigation	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table A.I-4: Emission Trends HFCs, PFCs and SF_6.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Emissions of HFCs – kt CO_2 equivalent	**2.44**	**357.93**	**713.63**	**1 145.76**	**1 152.47**	**1 195.89**	**1 248.53**	**1 306.85**	**1 481.67**	**1 556.11**	**1 655.28**	**1 674.27**
HFC-23 (kt)	0.00	0.00	0.00	0.43	0.33	0.41	0.86	0.86	0.86	0.86	0.86	0.86
HFC-32 (kt)	0.00	0.16	5.67	19.16	20.90	24.67	27.25	32.57	38.92	47.55	56.90	57.04
HFC-43-10mee / act (kt)	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-125 (kt)	0.00	2.22	26.03	68.71	75.54	80.15	88.20	98.44	116.73	127.45	142.45	143.02
HFC-134a (kt)	0.00	222.76	301.06	409.69	376.54	389.36	394.32	390.77	420.47	444.54	453.70	464.18
HFC-143a (kt)	0.00	2.37	23.81	58.24	64.24	65.20	71.70	77.52	91.75	94.24	100.88	101.31
HFC-152a (kt)	0.00	81.68	595.21	204.69	247.82	248.70	87.15	129.37	134.38	0.00	0.00	0.00
HFC-227ea (kt)	0.00	0.00	0.00	0.31	0.63	0.11	0.00	0.00	0.00	0.74	0.00	0.00
HFC-245fa (kt)	0.00	0.00	1.50	4.55	2.36	2.31	2.26	2.21	2.16	2.11	2.06	2.01
HFC-365mfc (kt)	0.00	0.00	1.50	4.57	2.38	2.33	2.28	2.22	2.17	2.12	2.08	2.03
Unspecified mix of listed HFCs (kt CO_2 equivalent)	2.44	10.79	4.78	5.03	6.36	8.94	9.35	2.16	2.05	2.06	2.09	2.12
Emissions of PFCs (kt CO_2 equivalent)	**1 182.79**	**83.35**	**87.32**	**157.79**	**172.39**	**230.33**	**208.19**	**36.02**	**78.05**	**73.51**	**50.72**	**49.23**
CF_4 (kt)	137.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_2F_6 (kt)	10.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_3F_8 (kt)	0.00	0.00	0.00	0.00	0.21	0.17	0.11	0.00	0.00	0.00	0.00	0.00
C_4F_{10} (kt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unspecified mix of listed PFCs (kt CO_2 equivalent)	34.03	83.35	87.32	157.79	170.57	228.85	207.25	36.02	78.05	73.51	50.72	49.23
Emissions of SF_6 (kt CO_2 equivalent)	**470.61**	**1 100.11**	**574.53**	**493.63**	**453.46**	**367.01**	**373.43**	**341.68**	**335.87**	**307.35**	**311.88**	**304.19**
SF_6 (t)	20.64	48.25	25.20	21.65	19.89	16.10	16.38	14.99	14.73	13.48	13.68	13.34
Emissions of NF_3 (kt CO_2 equivalent)	**0.00**	**6.44**	**10.51**	**28.16**	**32.73**	**59.39**	**53.47**	**4.54**	**4.12**	**4.10**	**8.56**	**9.75**
NF_3 (t)	0.00	0.37	0.61	1.64	1.90	3.45	3.11	0.26	0.24	0.24	0.50	0.57

ANNEX II: INDICATORS

This Annex presents the indicators pursuant to Article 7(1) f of Regulation (EU) No 525/2013 'Monitoring Mechanism Regulation'. Information on all priority indicators (including Additional Priority Indicators) is provided[33]; however, data for one supplementary indicator was not available (indicated by NA).

Table A.III: Indicators pursuant to Article 7 (1) f of the Regulation No. 525/2013/EC 'Monitoring Mechanism Regulation' (MMR) for the years 1990, 1995, 2000, 2005–2013.

No	Indicator	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Priority												
1	Total CO_2 intensity of GDP [t CO_2/Mio Euro]	322.7	293.7	261.3	288.4	269.8	251.2	246.6	235.0	247.1	232.8	221.8	221.0
2	Energy related CO_2 intensity of GDP [t CO_2/Mio Euro]	265.5	242.5	212.7	238.9	219.5	200.6	196.0	192.8	199.3	185.8	176.7	175.0
3	Specific CO_2 emissions of passenger cars [g CO_2/km]	202.9	197.2	192.7	186.5	181.0	178.8	174.4	170.5	169.5	167.9	166.1	165.1
4	Energy related CO_2 intensity of industry [t/Mio Euro]	296.7	267.7	230.1	245.0	224.1	205.3	208.0	231.3	235.4	221.6	217.9	215.7
5	Specific CO_2 emissions of households [t CO_2/dwelling]	3.40	3.17	2.76	2.52	2.30	2.02	2.05	1.96	2.15	1.94	1.88	1.88
6	CO_2 intensity of the commercial and institutional sector [t CO_2/Mio Euro]	23.06	25.77	20.59	21.27	21.96	16.23	18.57	15.47	13.48	9.58	7.79	5.54
7	Specific CO_2 emissions of public and autoproducer power plants [t CO_2/TJ]	166.8	151.0	128.5	122.4	121.1	117.1	106.4	98.0	101.6	104.7	100.6	105.2
	Additional Priority												
1	Freight transport on road [g CO_2/ton-km]	109.7	95.3	79.4	74.5	74.1	72.3	71.9	71.1	68.5	68.8	68.1	64.6
2	Total CO_2 intensity – iron and steel industry [t CO_2/Mio Euro]	1 878	1 820	1 449	1 955	2 037	1 940	1 899	3 550	3 436	3 437	2 975	3 145
3	Energy related CO_2 intensity – chemical industry [t CO_2/Mio Euro]	481.0	428.8	400.7	426.5	356.8	313.9	416.9	468.2	443.4	451.7	385.4	435.2
4	Energy related CO_2 intensity – glass, pottery and building materials industry [t CO_2/Mio Euro]	590.9	561.1	524.0	549.7	565.7	595.6	646.1	684.4	630.9	618.2	633.4	659.8

[33] The units of the transport indicators (No. 3 Priority Indicator, No. 1 Additional Priority Indicator, and No.1-3 Supplementary Indicator) were changed to the common unit g CO_2/km (the suggested unit was g CO_2/100 km). Furthermore, the names of the transport indicators No. 3 and 4 Supplementary Indicator have been adapted for consistency reason.

No	Indicator	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Priority												
5	Specific CO_2 emissions of iron and steel industry [t CO_2/t production]	2.22	1.97	1.87	1.82	1.81	1.74	1.78	1.89	1.77	1.75	1.71	1.67
6	Specific energy related CO_2 emissions of cement industry [t CO_2/t production]	0.225	0.226	0.214	0.194	0.207	0.213	0.205	0.200	0.193	0.181	0.184	0.182
	Supplementary												
1	Specific diesel related CO_2 **emissions** of passenger cars [g CO_2/ km]	186.4	184.3	182.3	178.8	171.3	170.4	169.0	165.0	165.5	163.9	162.9	161.8
2	Specific petrol related CO_2 emissions of passenger cars [g CO_2/ km]	206.4	202.2	200.7	197.0	195.4	191.9	182.9	178.9	175.3	173.9	171.0	170.2
3	Passenger transport on road [g CO_2/passenger-km]	148.8	152.4	157.3	156.8	152.7	151.4	148.1	145.3	144.9	144.0	142.9	142.4
4	Passenger transport by air [kg CO_2/passenger]	234.0	226.1	125.8	110.8	110.7	108.8	98.8	96.0	81.6	93.3	86.0	87.9
5	Energy related CO_2 intensity – food, drink and tobacco industry [t CO_2/Mio Euro]	215.2	164.7	155.6	161.6	152.0	123.8	138.0	154.9	154.3	143.7	142.7	132.4
6	Energy related CO_2 intensity – paper and printing industry [t CO_2/Mio Euro]	907.5	852.1	689.0	622.3	551.6	510.6	531.4	608.9	623.6	511.0	496.7	376.5
7	Specific CO_2 emissions of households for space heating [t CO_2/m²]	33.33	29.86	25.04	22.27	20.06	17.45	17.73	16.79	18.36	16.47	15.84	15.83
8	Specific CO_2 emissions of commercial and institutional sector for space heating [kg CO_2/m²]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Specific CO_2 emissions of public power plants [t CO_2/TJ]	166.4	143.5	133.2	111.8	109.8	102.7	93.5	84.6	84.7	87.7	83.6	82.2
10	Specific CO_2 emissions of autoproducer plants [t CO_2/TJ]	168.2	168.6	117.4	160.4	156.3	157.0	145.6	139.8	152.9	152.2	141.8	154.6
11	Carbon intensity of total power generation [t CO_2/TJ]	68.37	59.09	48.16	59.00	57.20	53.60	48.95	43.05	50.03	52.52	42.20	42.11
12	Carbon intensity of transport [t CO_2/TJ]	65.97	64.10	63.69	65.27	62.65	61.79	60.40	60.40	60.54	60.14	60.47	61.05
13	Specific energy related CO_2 emissions of paper industry [t CO_2/t production]	0.755	0.643	0.543	0.466	0.424	0.421	0.426	0.486	0.469	0.417	0.395	0.305
14	Carbon intensity in Industry [kt CO_2 /PJ]	45.27	46.81	39.06	38.62	36.77	35.00	35.36	35.18	34.51	33.76	33.10	32.77
15	Carbon intensity Households [kt CO_2 /PJ]	40.92	37.51	34.91	31.21	30.04	27.95	27.87	26.79	27.17	26.63	25.01	25.08

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In "Austria's Annual Greenhouse Gas Inventory 1990–2013" the Umweltbundesamt presents updated greenhouse gas (GHG) emissions in Austria. In 2013 GHG emissions amounted to 79.6 Mt of CO_2 equivalents. This corresponds to a 1.2% increase against 1990 and a –0.2% decrease compared to 2012. Key driver for the development 2012 to 2013 is the decreasing consumption of fossil fuels for electrical power generation. GHG emissions according to Article 2(1) of Decision No. 406/2009/EC amounted to 49.7 Mt CO_2 equivalents in 2013.

New international standards, including new global warming potentials, have been applied for the GHG Inventory 2013, sectoral emissions thus differ more widely than usual from last year's submission.

The report is written in accordance with the obligations under the GHG Monitoring Mechanism Regulation (EU) No. 525/2013. The submission took place in June 2015.

EMAS
Geprüftes Umweltmanagement
REG.NO. AT- 000484

ISBN 978-3-99004-352-3