ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Austria's Annual Greenhouse Gas Inventory 1990—2015

Submission under Regulation (EU) No 525/2013

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REPORT
REP-0598
Vienna 2017

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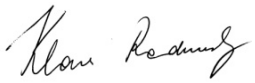
The authors of this report want to express their thanks to all experts at the *Umweltbundesamt* as well as experts from other institutions involved in the preparation of the Austrian Greenhouse Gas Inventory for their contribution to the continuous improvement of the inventory.

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 12.01.2017	Responsible for the content of this report  Dr. Klaus Radunsky (Head of the inspection body)
Total Number of Pages 62 (including Annex)	

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.

ISBN 978-3-99004-411-7

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VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten der Emissionen von Treibhausgasen (THG) Österreichs. Diese Daten betreffen die Emissionen des Jahres 2015 sowie die aktualisierte Zeitreihe der Jahre 1990 bis 2014. Damit liefert der Bericht Daten für die ersten drei Jahre der zweiten Kyoto-Verpflichtungsperiode sowie für die ersten drei Jahre 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).

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 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 weitergegeben

[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

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 internationale FachexpertInnen im Rahmen der so genannten UNFCCC-Reviews. Eine solche Tiefenprüfung fand zuletzt von 26.09.–01.10.2016 statt, und konnte erfolgreich abgeschlossen werden. Ergebnisse dieser Prüfung, inkl. Empfehlungen zur Verbesserung, werden im Frühjahr 2017 auf der Website der UNFCCC veröffentlicht.

Darüber hinaus fand vom 30.05.–03.06.2016 der "comprehensive ESD-Review" unter der Leitung der Europäischen Umweltagentur statt, bei der für Österreich drei Empfehlungen, jedoch keine technischen Korrekturen ausgesprochen wurden. Mit der diesjährigen Inventur wurde eine Empfehlung dieses ESD-Review umgesetzt und für die Kategorie Abfalldeponierung ein sogenannter "revised estimate" erstellt, welcher in geringfügig geringeren Emissionen resultierte.

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

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) an die EK
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten (CRF) und des nationalen Inventurberichtes (NIR) durch die EEA im Rahmen der ‚initial QA/QC checks'
15. April *(Jahr n)*	Übermittlung der THG Inventur (CRF und NIR) an die UNFCCC
15. April bis 30. Juni	Überprüfung der THG-Inventur (CRF und NIR) durch die EEA im Rahmen des Reviews unter der Effort-Sharing-Decision (‚ESD-Review')
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[3] 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[4].

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

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

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998[5] erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z.15 unter anderem die Aufgabe übertragen, fachliche Grundlagen zur Erfüllung des Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen zu erstellen. In § 6 (2) Z.20 werden die Entwicklung und Führung von Inventuren und Bilanzen zur Dokumentation des Zustandes und der Entwicklung der Umwelt sowie der Umweltbelastungen und ihrer Ursachen ausdrücklich als besondere Aufgaben des Umweltbundesamtes genannt. Dieser Aufgabe wird mit der Erstellung sowie der jährlichen Aktualisierung der *Österreichischen Luftschadstoff-Inventur* (OLI) gemäß den in den relevanten internationalen Übereinkommen vereinbarten Richtlinien vom Umweltbundesamt nachgekommen. Die OLI deckt sowohl Treibhausgasemissionen, als auch Emissionen sonstiger Luftschadstoffe ab und ist damit u. a. die Datenbasis für die Erstellung des vorliegenden Berichts. Um eine vergleichbare Zeitreihe zur Verfügung zu haben wird die OLI erforderlichenfalls auch für zurückliegende Jahre aktualisiert. Die in diesem Bericht dargestellten Emissionsdaten ersetzen somit die publizierten Daten vorhergehender Berichte.

Inventur	Datenstand	Berichtsformat
OLI 2016	12. Jänner 2017	Common Reporting Format (CRF)

Tabelle B: Datengrundlage des vorliegenden Berichts.

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

ZUSAMMENFASSUNG

Die in dieser Zusammenfassung dargestellte Entwicklung der Emissionen der Treibhausgase in Österreich folgt in der Einteilung den Sektoren des Klimaschutzgesetzes. Die Sektoreinteilung in den übrigen Teilen dieses Berichts entspricht hingegen dem international festgelegten Format für die Berichterstattung unter der Klimarahmenkonvention (UNFCCC), wodurch diese Zahlen geringfügig von jenen in der Zusammenfassung abweichen.

Treibhausgas-Bilanz 2015

Im Jahr 2015 wurden in Österreich rd. 78,9 Mio. Tonnen Treibhausgase (THG) emittiert. Gegenüber 2014 bedeutet das einen Anstieg um 3,2 % bzw. + 2,5 Mio. Tonnen CO_2-Äquivalent. Im Emissionshandelsbereich beträgt der Anstieg gegenüber dem Vorjahr 1,4 Mio. Tonnen, im Nicht-EH-Bereich 1,1 Mio. Tonnen.

Quantitative Ziele auf nationalstaatlicher Ebene sind im Klimaschutzgesetz nur für Emissionen festgelegt, die nicht dem Emissionshandel unterliegen. Die entsprechende Obergrenze für das Jahr 2015 beträgt 51,5 Mio. Tonnen CO_2-Äquivalent, die tatsächlichen Emissionen (Nicht-Emissionshandelsbereich) betrugen 49,3 Mio. Tonnen CO_2-Äquivalent und lagen damit ca. – 2,2 Mio. Tonnen unter dem Ziel.

Energie und Industrie: − 2,2 % seit 1990

Der Sektor Energie und Industrie ist im Jahr 2015 mit ca. 35,7 Mio. Tonnen CO_2-Äquivalent der größte Emittent an Treibhausgasen in Österreich. Gegenüber 2014 sind die Emissionen um + 5,6 % (ca. 1,9 Mio. Tonnen CO_2-Äquivalent) gestiegen.

Emissionshandelsbereich

Die Emissionshandelsbetriebe verursachten im Jahr 2015 Treibhausgase im Ausmaß von 29,5 Mio. Tonnen (Energie: 9,3 Mio. Tonnen CO_2-Äquivalent, Industrie: 20,2 Mio. Tonnen CO_2-Äquivalent). Das ist um 4,9 % (+ 1,4 Mio. Tonnen) mehr als 2014. Die Emissionen der Industriebetriebe stiegen um 1,2 % (+ 0,2 Mio. Tonnen), die Emissionen der Energiebetriebe um 14,1 % (+ 1,1 Mio. Tonnen CO_2-Äquivalent).

Wesentlich für den Anstiege bei den Energiebetrieben war eine erhöhte Stromproduktion aus Erdgas (+ 2,2 TWh), die zusammen mit den ausgebauten Kapazitäten von Windkraft und Photovoltaik (+ 1,1 TWh) einen Teil des Rückgangs aus der Wasserkraftproduktion (− 3,9 TWh) kompensierten.

Nicht-Emissionshandelsbereich

Die Emissionen des Nicht-EH Bereichs sind im Jahr 2015 gegenüber 2014 um insgesamt 0,5 Mio. Tonnen CO_2-Äquivalent angestiegen; die ist hauptsächlich auf den gestiegenen Erdgaseinsatz in der Energieindustrie und der produzierenden Industrie zurückzuführen.

Verkehr: + 60,0 % seit 1990

Der Sektor Verkehr weist im Jahr 2015 THG-Emissionen im Ausmaß von ca. 22,1 Mio. Tonnen CO_2-Äquivalent auf. Im Vergleich zu 2014 sind die Emissionen um 1,5 % (+ 0,3 Mio. Tonnen CO_2-Äquivalent) gestiegen.

Grund für diesen Anstieg sind der gestiegene fossile Kraftstoffabsatz (+ 1,0 % mehr Benzin- und + 2,1 % mehr Dieselkraftstoffe). Insgesamt wurden 8,9 % (energetisch) des verkauften Kraftstoffes durch Biokraftstoffe substituiert. Die Fahrleistung des Pkw-Verkehrs der ÖsterreicherInnen ist gegenüber 2014 stärker gestiegen als jene des inländischen Lkw-Verkehrs. Diesel-Pkw dominieren bei der Pkw-Fahrleistung mit rund 60,8 %.

Gebäude: − 39,9 % seit 1990

Auf den Sektor Gebäude entfallen im Jahr 2015 ca. 8,0 Mio. Tonnen an THG-Emissionen. Das entspricht einem Anstieg um 3,8 % (+ 0,3 Mio. Tonnen CO_2-Äquivalent) gegenüber dem Jahr 2014.

Hauptverantwortlich für diesen Anstieg ist die witterungsbedingte Zunahme der Heizgradtage um 11,6 % gegenüber 2014) mit dem damit verbundenen vermehrten Einsatz der fossilen Energieträger Heizöl (+ 4,2 %), Erdgas (+ 1,4 %) und Kohle (+ 12 %).

Landwirtschaft: − 15,6 % seit 1990

Im Vergleich zu 2014 sind die THG-Emissionen aus der Landwirtschaft um 0,3 % (− 0,02 Mio. Tonnen) gesunken und betragen 8,0 Mio. Tonnen im Jahr 2015. Ursachen dafür sind die geringeren N_2O-Emissionen aus dem Einarbeiten von Ernterückständen aufgrund geringerer Erntemengen 2015, ein leichter Rückgang an Milch- und Mutterkühen sowie der geringere Dieselverbrauch beim landwirtschaftlichen Maschinen.

Abfallwirtschaft: − 25,2 % seit 1990

Im Jahr 2015 wurden vom Sektor Abfallwirtschaft 3,0 Mio. Tonnen CO_2-Äquivalent emittiert und damit geringfügig weniger (− 0,8 % bzw. 0,02 Mio. Tonnen) als 2014.

Der Rückgang ist hauptsächlich auf sinkende Emissionen aus Deponien zurückzuführen, weil Abfälle mit hohen organischen Kohlenstoffgehalt nicht mehr, bzw. nicht mehr ohne Vorbehandlung, deponiert werden. Diese Abfallströme werden zunehmend thermisch (vor)behandelt, wodurch die Emissionen aus der Abfallverbrennung auf 1,4 Mio. Tonnen CO_2-Äquivalent im Jahr 2015 anstiegen.

Fluorierte Gase: + 22,9 % seit 1990

Im Jahr 2015 wurden in Österreich F-Gase im Ausmaß von 2,03 Mio. Tonnen CO_2-Äquivalent emittiert. Damit liegen die Emissionen um 0,7% bzw. 0,01 Mio. Tonnen CO_2-Äquivalent über dem Niveau von 2014.

Im Juli 2014 trat die EU VO Nr. 517/2014 in Kraft, die vorsieht, bis 2030 die Herstellung und den Import von F-Gasen mit hohem THG-Potenzial deutlich zu reduzieren. Dadurch sollte sich der Trend bis 2030 stark rückläufig zeigen.

Daten: Sektoreinteilung und Revisionen

Die Sektoreinteilung folgt der des Klimaschutzgesetzes. Aufgrund der kontinuierlichen Verbesserung der THG-Inventur, die jeweils die ganze Zeitreihe (Daten von 1990 bis 2015) betrifft, können die Emissionen von bisher publizierten Daten abweichen.

1 INTRODUCTION

This report covers the Austrian greenhouse gas (GHG) inventory data for the years 1990 to 2015. It presents GHG data for the first three years under the second commitment period under the Kyoto-Protocol and the first, second and third 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[6] ("*Monitoring Mechanism Regulation*"; MMR) repealing Decision No 280/2004/EC[7] ("*Monitoring Mechanism Decision*") 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[8] 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 in accordance with those 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 the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*[9], and to submit information in accordance with the *Reporting Guidelines (Decision 24/CP.19)*[10] 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.

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_2017') as well as the completed MMR IR reporting templates are not part of this report but submitted separately by upload at EIONET/CDR.

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

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

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

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

[10] 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[11].

Table 1: Status of the present report.

Reporting Obligation	Format	Inventory	Version
Mechanism for monitoring Community greenhouse gas emissions	Common Reporting Format (CRF)	OLI 2016	January 12th 2017

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

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

2 EMISSION TRENDS

In 2015 Austria's total greenhouse gas (GHG) emissions (without LULUCF) amounted to 78.9 Mt CO_2 equivalents (CO_2e). Compared to the base year[12] 1990 GHG emissions increased by 0.1%, compared to 2014 GHG emissions increased by 3.2%.

GHG emissions according to Article 2(1) of Decision No. 406/2009/EC amounted to 49.3 Mt CO_2 equivalents in 2015 (see 'MMR_IR_AnnexX_ESD_AT_2017'), which is 2.2% (1.1 Mt CO_2e) more than in 2014. Emissions were thus below the annual emission allocation (AEA), in 2015 (−2.2 Mt CO_2e), 2014 (−3.9 Mt CO_2e) as well as 2013 (−2.4 Mt CO_2e), the first year of the Effort-Sharing Decision target period[13].

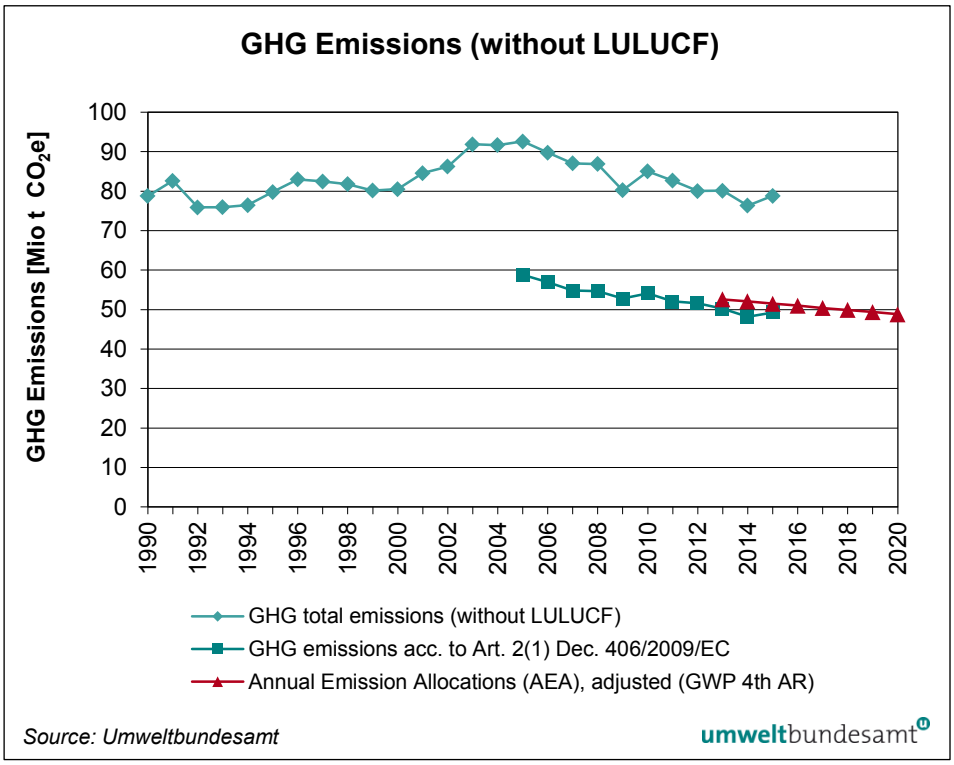


Figure 1: Trend in GHG emissions 1990–2015 without LULUCF.

[12] Austria's base year under the UNFCCC is 1990. Under the Kyoto Protocol the base year for CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 is 1990, for NF_3 it is 2000. Under the EU Effort Sharing Decision, the base year is 2005 (relates only to emissions not included in the EU Emissions Trading Scheme). Unless otherwise specified, references to the base year in this report refer always to 1990.

[13] 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 2014–2015

The key driver for the emissions increase between 2014 and 2015 was the increasing GHG emissions (+2 025 kt CO_2e) from *Energy (CRF 1)*. Reasons for this development are, in particular, a shift in the electricity production from hydroelectric power to gas power plants, as well as the increased use of fuels in transport and the higher heating demand by households (12% more heating degree days in 2015[14] compared to 2014 due to the weather conditions. GHG emissions from *transport (1.A.3)* increased compared to 2014 (+408 kt CO_2e) due to the higher overall amount of (fossil) fuel sold in Austria. The increased use of biofuels in comparison with 2014 could slightly reduce the rise in GHG emissions.

Emissions from *Industrial Processes and Other Product Use (CRF 2)* increased by 3.4% (+543 kt CO_2e) from 2014 to 2015, mainly due to an increased production volume of iron and steel.

Emissions from *Agriculture (CRF 3)* decreased by 0.2% (−16 kt CO_2e) from 2014 to 2015, mainly due to reduced GHG emissions from crop residues.

Net removals from LULUCF (CRF 4) show a decrease by 1.3% from 2014–2015.

Sector *Waste (CRF 5)* continues with the emission trend of recent decades and shows a further decline by 4.8% (−83 kt CO_2e) as a result of reduced landfilling of waste and lower carbon content in deposited waste.

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	53 028	13 663	8 189	-12 153	3 925	NO*
1995	54 520	13 606	8 038	-13 428	3 651	NO
2000	55 422	14 642	7 506	-16 249	2 963	NO
2001	59 746	14 523	7 449	-19 179	2 865	NO
2002	60 885	15 166	7 336	-14 323	2 863	NO
2003	66 544	15 308	7 189	-4 925	2 867	NO
2004	66 711	14 863	7 170	-9 287	2 930	NO
2005	67 134	15 612	7 104	-10 756	2 791	NO
2006	63 798	16 252	7 077	-5 404	2 671	NO
2007	60 470	16 941	7 118	-5 746	2 543	NO
2008	59 992	17 274	7 226	-4 545	2 431	NO
2009	56 771	13 948	7 245	-4 419	2 285	NO
2010	59 881	15 926	7 094	-5 911	2 158	NO
2011	57 424	16 085	7 146	-6 211	2 043	NO
2012	55 321	15 697	7 077	-5 657	1 942	NO
2013	55 285	15 978	7 059	-4 537	1 829	NO
2014	51 326	16 133	7 184	-4 909	1 739	NO
2015	53 351	16 676	7 168	-4 848	1 656	NO

** not occurring*

[14] Although still clearly below the long-term average since 1990

The most important GHG in Austria is carbon dioxide (CO_2) with a share of 85% in 2015. The CO_2 emissions primarily result from combustion activities. Methane (CH_4), which mainly arises from stock farming and waste disposal, contributes 8.3% to national total GHG emissions, and nitrous oxide (N_2O) with agricultural soils as the main source contributes another 4.5% in 2015. 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	62 293	10 514	4 342	2	1 183	471	0
1995	64 207	9 640	4 425	353	83	1 100	6
2000	66 346	8 447	4 354	714	88	575	11
2001	70 457	8 278	4 230	863	116	629	11
2002	72 199	8 125	4 232	969	102	613	11
2003	77 861	8 056	4 221	1 072	126	549	22
2004	78 165	8 050	3 633	1 158	158	484	27
2005	79 369	7 808	3 633	1 146	163	494	28
2006	76 684	7 674	3 630	1 152	172	453	33
2007	74 028	7 547	3 644	1 196	230	367	59
2008	73 805	7 410	3 824	1 249	208	373	53
2009	67 646	7 313	3 599	1 309	36	342	5
2010	72 547	7 211	3 399	1 483	78	336	4
2011	70 287	7 000	3 489	1 536	74	307	4
2012	67 721	6 883	3 449	1 613	51	312	9
2013	67 956	6 788	3 440	1 603	49	305	10
2014	64 204	6 650	3 507	1 643	53	313	11
2015	66 724	6 575	3 517	1 662	50	309	13

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

The dominant sector regarding GHG emissions in Austria is *Energy*, causing 68% of total national GHG emissions in 2015 (67% in 1990), followed by the sectors *Industrial Processes and Other Product Use* (21% in 2015) and *Agriculture* (9.1% in 2015).

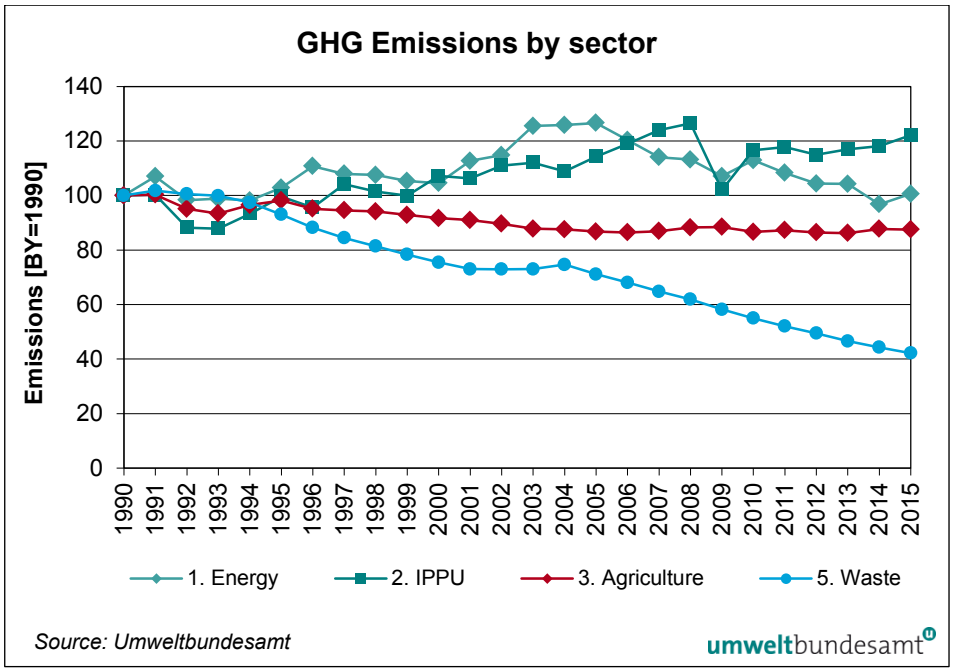
GHG	1990	2015	Trend 1990–2015	1990	2015
	Emissions [kt CO_2e]			Share [%]	
Total	**78 805**	**78 851**	**+0.1%**	**100.0%**	**100.0%**
Energy	53 028	53 351	+0.6%	67.3%	67.7%
IPPU	13 663	16 676	+22.1%	17.3%	21.1%
Agriculture	8 189	7 168	−12.5%	10.4%	9.1%
LULUCF	-12 153	−4 848	−60.1%	–	–
Waste	3 925	1 656	−57.8%	5.0%	2.1%

Table 4: Austria's greenhouse gas emissions by sector 1990 and 2015 as well as their share and trend.

Total emissions without emissions from sector LULUCF

In 2015 emissions from *Industrial Processes and Other Product Use* were 22% higher than in 1990. GHG emissions from *Energy* increased by 0.6% between 1990 and 2015. The other sectors show decreasing GHG emissions. The most significant decreases occurred in sectors *LULUCF* (decrease of net removals) and *Waste*.

Figure 2: Trend in emissions 1990–2015 by sector in index form (1990 = 100).



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

2.1 Energy

In 2015, greenhouse gas emissions from sector *Energy* amounted to 53 351 kt CO_2 equivalents which correspond to 68% 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 42% in 2015, followed by *energy industries* (20%), *manufacturing industries and construction* (20%), and the sub-category *other sectors* (17%). The most important **greenhouse gas** is CO_2, contributing 98% to the total sectoral GHG emissions, followed by N_2O (1.1%) and CH_4 (1.1%).

From 2014 to 2015, emissions from this sector increased by 3.9%. Main driver for the emissions increase from *energy industries* was the higher electricity production by gas power plants. The main driver for increasing emissions from *other sectors* was the compared to 2014 higher heating demand of households (heating degree days increased by 11.6%). Increasing emissions from *transport* are due to higher consumption of fossil fuels, in particular diesel. The increase in emissions of *manufacturing industries* was mainly driven by higher natural gas and fuel oil consumption.

The **overall trend** in GHG emissions from the sector *Energy* shows increasing emissions with a plus of 0.6% from 1990 to 2015, although a decreasing trend can be observed since 2005. 2015 emissions from road transport are 61.5% higher than 1990. 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 electricity from hydro and wind power plants
- the economic situation as reflected in the gross domestic product (GDP)

Trend 1990–2015 by sub-category

In 2015 emissions from sub-category ***energy industries*** were 21% 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 27% (2015), the contribution of hydro and wind power plants to total public electricity production increased from 69% (1990) to 79% (2015). Electricity consumption increased by 47% since 1990 but since 2002 the increase is mainly covered by electricity imports.

Energy related GHG emissions from ***manufacturing industries and construction*** increased by 5.8% from 1990 to 2015, mainly in the chemical and other industries. Fuel consumption increased by 36% 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 (only +6%) compared to the increase in fuel combustion.

Transport showed a strong increase in GHG emissions since 1990 (+62%) 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 emissions 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 2015, however, total fuel sales have nearly reached again the level of 2005.

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 2015 were 39% lower than in 1990. This reduction is mainly attributable to the declining consumption of heating oil and coal and the increase in the consumption of biomass and natural gas as well as the growing importance of district heating and the modernisation of heating systems. Total fuel consumption of this sub-category decreased by 17% since 1990.

Fugitive emissions decreased by 32% since 1990 due to the closure of coal mines until 2006. There have been no coal-mining activities in Austria since 2007.

2.2 Industrial Processes and Other Product Use

In 2015, greenhouse gas emissions from *Industrial Processes and Other Product Use* amounted to 16 676 kt CO_2 equivalents, which correspond to 21% of total national emissions.

The most important **sub-categories** of this sector are *metal industry* and *mineral industry*, generating 65% and 16% of total sectoral emissions (2015). The most important **greenhouse gas** of this sector is CO_2 with a contribution of 86% to total sectoral emissions (2015), followed by HFCs with 10%, SF_6 with 1.9%, N_2O with 1.1%, PFCs and CH_4 with 0.3% each. NF_3 contributes 0.1% to total emissions from this sector.

From 2014 to 2015, overall emissions from this sector increased by 3.4%, mainly due to an increased production volume of iron and steel. The sub-category *chemical industry* shows the largest decrease in emissions between 2014 and 2015 (−2.1%), primarily due to a decrease in ammonia (and nitric acid) production.

The **overall trend** in GHG emissions from *Industrial Processes and Other Product Use* shows increasing emissions of 22% from 1990 to 2015. Within this period, emissions fluctuated, with 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 31.7% higher GHG emissions in 2015 compared to 1990 and (iv) a strong increase of HFC emissions in the period 1992 to 2015 from 5.6 to 1 662 kt CO_2 equivalents.

Trend 1990–2015 by sub-category

The largest increase in GHG emissions between 1990 and 2015 can be observed in the *metal industry* due to increased emissions from iron and steel production (+62.5%). In sub-categories *mineral industry* and *chemical industry*, emissions declined by 11.4% and 49% respectively during that period. Emissions of *fluorinated gases* increased by 21% since 1990, brought on by increasing emissions of HFCs (+559% since 1995) used as cooling agents that replaced Ozone Depleting Substances. Emissions from *solvent use* dropped by 48%, due to legal measures controlling solvent content of products and their use.

2.3 Agriculture

In 2015, greenhouse gas emissions from *Agriculture* amounted to 7 168 kt CO_2 equivalent, which correspond to 9.1% of total national emissions.

The **most important sub-categories** of this sector are *enteric fermentation* (58%) and *agricultural soils* (29%). The sector agriculture is the largest source for both N_2O and CH_4 emissions: in 2015 71% (8.3 kt) of total N_2O emissions and 69% (183 kt) of total CH_4 emissions in Austria originated from this sector. 64% of GHG emissions from the sector are CH_4, 34% are N_2O and 1.6% are CO_2 emissions.

From 2014 to 2015 emissions decreased by 0.2%, mainly due to reduced GHG emissions from crop residues. In 2015 crop production was significantly lower compared to the previous year because of the unfavourable weather conditions (drought and heat), which resulted in crop shortfalls. Furthermore, livestock numbers of dairy and suckling cows also decreased slightly in 2015 compared to the year before.

The **overall trend** in GHG emissions from *Agriculture* is decreasing, with a decrease of 12% from 1990 to 2015. 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 the volatility in price.

2.4 LULUCF

In 2015, net removals from the category LULUCF amounted to −4 848 kt CO_2 equivalents, which correspond to 6.1% of the national total GHG emissions (without LULUCF) in 2015 compared to 15% in the base year.

With regard to the **overall trend** of net removals from LULUCF, the removals decreased by 60% 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 −4 302 kt CO_2 equivalents in 2015. *Harvested Wood Products (4.G)* is the second largest sink category and contributed −1 599 kt CO_2 equivalents. In 2015, CH_4 and N_2O emissions amounted to 133 kt CO_2 equivalents. Total net emissions arising from the other non-forest sub-sectors (excluding HWPs) amounted to 1 053 kt CO_2 equivalents in 2015.

Regarding **LULUCF activities pursuant to Decision No 529/2013/EU**, Austria decided to account only for greenhouse gas emissions and removals from af-/reforestation, deforestation and forest management.

The activity which contributes most to GHG removals is forest management which amounts to −3 851 kt CO_2 equivalents in 2015 (including HWPs). Afforestation/reforestation (incl. HWPs) contribute to emission removals as well (−2 074 kt CO_2 equivalents), whereas emissions from deforestation amount to 517 kt CO_2 in 2015.

2.5 Waste

In 2015, greenhouse gas emissions from *Waste* amounted to 1 656 kt CO_2 equivalent, which correspond to 2.1% of total national emissions.

The **most important sub-category** of the waste sector is *solid waste disposal*, which caused 78% of the emissions from this sector in 2015, followed by *waste water treatment and discharge* (11%) and *biological treatment of solid waste* (11%). The most important **greenhouse gas** is CH_4 with a share of 85% in emissions from *waste* (2015), followed by N_2O with 15% and CO_2 with 0.1%.

From 2014 to 2015 GHG emissions continued to decrease (−4.8%) 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 58% from 1990 to 2015. 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 pre-treated before deposition (without exceptions).

3 RECALCULATIONS

This chapter describes the changes made since the last submission to the UNFCCC and supplements the tabular format on recalculations as set out in Annex III to the Commission Implementing Regulation (EU) No 749/2014 ('MMR-IRArticle8_Recalculations_AT_2017').

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 ESD (EC) and the UNFCCC 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 included for each of them in the improvement plan (specified for each sector).

3.2 Implications (level, trend)

As can be seen in Figure 3, Austria's GHG emissions reported this year in sum differs only slightly from the data submitted last year. The national total (excl. LULUCF) for the base year is 0.1% (40 kt CO_2e) lower than reported last year; the national total (excl. LULUCF) for 2014 is +0.1% (49 kt CO_2e) higher than the value submitted last year.

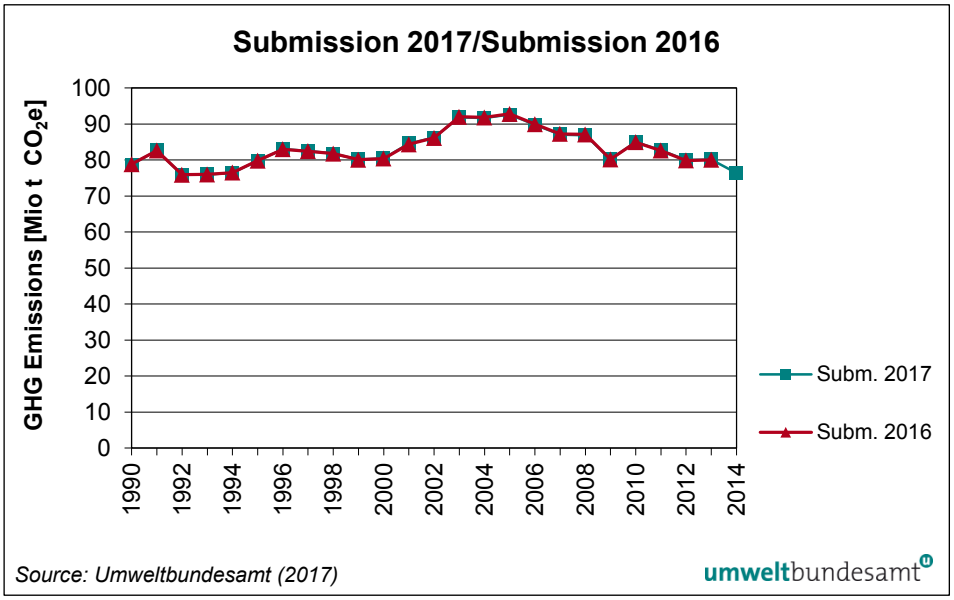


Figure 3: Comparison Submission 2017/Submission 2016 (Recalculations).

National total emissions (excluding LULUCF) for the base year **1990** have been slightly revised downwards since last years' submission (−40 kt CO_2e), mainly because of the revised estimate submitted for *Waste* (5.A Solid Waste Disposal) due to a recommendation by the Technical Expert Review Team.

Revised total emissions for **2014** are higher (+49 kt CO_2e) than the value submitted last year, mainly because of revisions of the energy balance (sector *Energy*). Emissions from *Agriculture* show in total higher emissions to be explained with revised emissions from crop residues and livestock numbers of horses. The higher emissions from sector *IPPU* are mainly due to revisions in the iron and steel production.

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

	National Total GHG emissions without LULUCF			
	Submission 2017	**Submission 2016**	**Recalculation Difference**	
	[kt CO_2e]	**[kt CO_2e]**	**[kt CO_2e]**	**[%]**
1990*	78 805	78 845	-40	-0.05%
1991	82 631	82 637	-6	-0.01%
1992	75 925	75 931	-6	-0.01%
1993	75 968	75 988	-21	-0.03%
1994	76 501	76 503	-2	0.00%
1995	79 815	79 813	6	0.01%
1996	83 031	83 009	26	0.03%
1997	82 494	82 474	23	0.03%
1998	81 790	81 771	21	0.03%
1999	80 171	80 107	65	0.08%
2000	80 534	80 429	104	0.13%
2001	84 584	84 381	204	0.24%
2002	86 251	86 130	121	0.14%
2003	91 908	92 018	-111	-0.12%
2004	91 674	91 836	-162	-0.18%
2005	92 642	92 810	-169	-0.18%
2006	89 798	89 981	-183	-0.20%
2007	87 072	87 241	-169	-0.19%
2008	86 923	87 101	-178	-0.20%
2009	80 249	80 191	57.9	0.07%
2010	85 059	84 946	113	0.13%
2011	82 697	82 627	70	0.09%
2012	80 038	79 897	141	0.18%
2013	80 150	80 043	108	0.13%
2014	76 381	76 333	49	0.06%

	Submission 2017		Submission 2016		Recalculation Difference	
THG	**1990**	**2014**	**1990**	**2014**	**1990**	**2014**
	[Mt CO_2e]		**[Mt CO_2e]**		**[Mt CO_2e]**	
Total	**78.80**	**76.38**	**78.84**	**76.33**	**−0.04**	**0.05**
Energy	53.03	51.33	52.92	51.42	0.11	−0.09
IPPU	13.66	16.13	13.66	16.08	0.00	0.06
Agriculture	8.19	7.18	8.10	7.07	0.08	0.11
Waste	3.93	1.74	4.16	1.76	−12.15	−4.91

Table 6: Recalculations per sector.

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). 2014 emissions of N_2O, CH_4, and fluorinated compounds were revised upwards, whereas emissions of CO_2 were slightly revised downwards.

	1990 (Base year)	2014
	Recalculation Difference [%]	
Total	**−0.05%**	**0.06%**
CO_2	−0.01%	−0.09%
CH_4	−0.80%	+0.40%
N_2O	+1.13%	+2.34%
HFC, PFC, SF_6, NF_3	0.00%	+0.02%

without emissions from LULUCF

Table 7: Recalculations per gas.

3.3 Sectoral recalculations

The following section provides explanations for sectoral recalculations. Further background information and a complete description of the recalculation for the period 1990-2014 will be given in Austria's National Inventory Report 2017.

3.3.1 Energy

3.3.1.1 Stationary sources

Update/Improvement of activity data

The energy balance was revised by Statistik Austria for the years 1990 to 2014 with the following main implications on energy consumption and CO_2 emissions:

- Gross natural gas consumption has been revised for the years 1999 (+0.7 PJ) and for 2002−2008 (between −0.8 to −5.9 PJ). The revision was due to harmonisation with official total natural gas consumption as published by the Austrian Energy regulator (e-Control). The revision affected the 'own use' of the energy sector as well as the 'final energy consumption'. As a result of the 2014 energy data revision about 17 kt CO_2 from manufacturing industries − gaseous fuels were shifted to energy industries (1.A.1) and about 35 kt CO_2 were shifted to other sectors (1.A.4).

- For liquid fuels minor revisions have been made for the whole time series because of a switch from national energy balance to the Eurostat/IEA dataset which has rounded values. For 2000−2003 up to 165 kt of CO_2 from liquid fuels have been switched from gaseous fuels to liquid fuels within category 1.A.1.b refinery because of the revision of refinery fuels within the energy balance. For the years 2005 and 2006 larger amounts of CO_2 emissions (656 and 346 kt) have been shifted from category 1.A.4.b residential to category 1.A.4.a commercial/institutional.
- For solid fuels minor revisions have been made for the years 2002−2014 with the largest change in 2014, where about 60 kt CO_2 have been shifted from 1.A.2.a Iron and Steel to category 2.C.1 Iron and Steel Production due to a revision of the energy balance which affected calculation of CO_2 emissions from blast furnaces.
- For 'other fuels' the major revision took place for the year 2014 where a shift of 'industrial waste' to municipal solid waste' has been reported by energy statistics which resulted in 45 kt lower CO_2 emissions from 'other fuels' in category 1.A.1.a public electricity and heat production. Other revisions of the energy balance resulted in 21 kt lower CO_2 emissions from 1.A.2.c Chemicals Industries – other fuels for the year 2014 and 28 kt lower CO_2 emissions for the year 2009.

Other methodological improvements

According to previous recommendations of UNFCCC and ESD reviews the default emission factors for N_2O as included in the IPCC 2006 Guidelines have been applied for all fuels and categories and CH_4 default emission factors have been applied for almost all fuels and categories (with the exception of residential biomass and gasoil heating and fuel waste incineration). The total effect of this revision is almost negligible for N_2O with about −0.2 kt lower N_2O emissions in 2014 and −0.1 kt lower N_2O emissions in 1990 while the revision of CH_4 emission factors resulted in +1.3 kt higher CH_4 emissions in 2014 and + 6.1 kt higher CH_4 emissions in 1990 (mostly from solid fuels).

3.3.1.2 Mobile sources

Update/Improvement of activity data

Road transport (1.A.3.b)

For the year 2014 marginal changes in emissions (−0.001%) are caused by revised levels for liquefied petroleum gas (LPG) and biogas in the national energy balance.

Rail transport (1.A.3.c)

For the year 2014 small changes in emissions (+0.5%) are caused by revised levels for diesel in the nation al energy balance.

3.3.1.3 Fugitive Emissions

1.B.2.a.4 refining/storage

Recalculations in CH_4 emissions in the category 1.B.2.a.4 (refining/storage) for the year 2014 are due to revisions in the Energy balance (+0.05 kt CO_2e).

1.B.2.b.5 distribution of natural gas

Activity Data of reported pipeline length for the years 2013 and 2014 was corrected for category 1.B.2.b.5 (distribution) and results in recalculations of +0.02 kt CO_2eq in 2013 and –0.12 kt CO_2e in 2014.

3.3.2 Industrial Processes and Other Product Use

Update of activity data

2.B.1 Ammonia Production

Due to updated data of urea used in traffic from 2005–2014 which have to be subtracted from emissions from ammonia production, the timeline has changed.

2.C.1. Iron and Steel Production

The allocation in the energy balance (IEA Joint questionnaire) for 2014 was revised by Statistik Austria, emissions which were former occurring in the sector 1.A.2.a are now allocated to 2.C.1.a.

2.C.3. Aluminium Production

Plant specific data have been updated for 2014.

2.C.5 Lead production

Revision of the statistical data for secondary lead production in Austria for 2013 and 2014.

2.D.2. Paraffin Wax Use

It was decided to use the mean of produced candles over the past 8 years for the years from 1990-2007, where no production data is available, rather than assume that production is constant over time.

2.F.1.e Mobile Air Conditioning

Updated information on the amount of air conditioning in buses was added for the year 2014.

2.F.1.f Stationary Air Conditioning

Updated statistical information on the amount of heat pumps sold in the year 2014.

2.F.4.b Aerosols- Other

Timeline changed due to a correction of an error in the calculation sheet.

2.G.4. Other

The slight changes in CO_2 emissions of the use of AdBlue© (marginal increases up to 2011, reductions from 2011 onwards) are not caused by changes in vehicle technology but by the use of the latest NEMO version.

The use of the newest NEMO version (4.0.0 from November 2016) results in slight shifts between fuel consumption in inland and fuel export, which causes revised AdBlue© consumptions in fuel export due to the fact of the specific fleet composition in fuel export.

Improvements of methodologies and emission factors

2.A.1 Cement Production and 2.A.2. Lime Production

Due to a more specific description in the EZG it was possible to allocate limestone used for waste gas purification to 2.A.4 Other Process Uses of Carbonates (for the years 2013 and 2014).

2.A.3 Glass Production

According to a recommendation of the annual review report, emissions from 1990-2004 were recalculated using the unrounded emission factor with all decimals provided in the IPPC 2006 Guidelines.

2.A.4.c Magnesia Sinter Production

According to a recommendation of the annual review report, the allocation changed, the emissions were former allocated to the category 2.A.4.d.

3.3.3 Agriculture

Update of activity data

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

Revised numbers of horses have been implemented in the inventory. New data have been provided by the Ministry of Agriculture and published in (BMLFUW 2016). Data were derived from interviews of relevant experts (e.g. from breeding associations) considering additional information from the data base of horses of the Ministry of Health and Women's Affairs.
Numbers of horses used in previous inventories for the years from 2004 to 2014 published in (BMLFUW 201515) were based on agricultural structural surveys and INVEKOS data. However, it was found, that they did not fully cover all horse-owners in Austria.

Horse numbers reported for the years before 2004 are based on livestock accountings and were assessed to be representative for Austria. The revision resulted in increased animal numbers for horses from 2004 onwards.

3.G Liming

The cropland area for the year 1996 was corrected leading to higher CO_2 emissions (+441 t).

[15] Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (2000–2014): Grüner Bericht 2015. Bericht über die Situation der österreichischen Land- und Forstwirtschaft. Grüner Bericht gemäß § 9 des Landwirtschaftsgesetzes BGBl. Nr. 375/1992. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Wien. www.gruenerbericht.at.

Improvements of methodologies and emission factors

3.A Enteric Fermentation, 3.B Manure Management (CH4, N2O)

Due to a correction of a linkage error the gross energy intake of dairy cattle for 2014 has been slightly revised downwards resulting in slightly decreased emissions of CH_4 and N_2O (3.A.1.1: -7.4 t CH_4 in 2014, 3.B.1.1: -0.03 t CH_4 and -0.001 t N_2O in 2014).

3.B Manure Management (N_2O indirect)

Revisions within Austria's NH_3 and NO_x inventory and revised horse numbers resulted in slightly increased indirect N_2O emissions from N volatilization in sector manure management (+7.2 t in 2014).

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

Animal manure applied to soils (CRF 3.D.a.2.a)

Austria's agriculture model is based on the N-flow concept. Therefore revisions within Austria's air emission inventory affect calculations of Austria's GHG inventory.

The implementation of new NO_x emission factors according to the EMEP EEA GB 2016 within Austria's air emission inventory led to slightly decreased N_2O emissions in sector 3.D Agricultural Soils. However, due to the revision of horse numbers N_2O emissions increased from 2004 onwards (+15.2 t in 2014).

Urine and dung deposited by grazing animals (*CRF 3.D.a.3*)

Revised horse numbers resulted in increased N_2O emissions from 2004 onwards (+5.6 t in 2014).

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

Dry matter fractions of maize, potato, sugar beet, silo maize, rape, sunflower, soja bean, fodder bean, peas and oil pumpkin have been revised according to the national values used in the survey of Austria's official harvest statistics. Revisions resulted in increased N_2O emissions for the whole time series (+57.1 t in 2014).

Indirect N_2O emissions from managed soils (CRF 3.D.b – N_2O)

The use of new NO_x emission factors according to the EMEP EEA GB 2016 within Austria's air emission inventory resulted in higher indirect N_2O emissions from atmospheric deposition (+34.5 t in 2014).

The revision of dry matter fractions of crops within category 3.D.a.4 caused slightly increased indirect N_2O emissions from N-leaching and run-off (+8.9 t in 2014).

3.F Field burning of agricultural residues (CH_4, N_2O)

Improved consistency with parameters (residue/crop product) used in source category 3.D.a.4 Crop residues resulted in slightly revised estimates for the entire time series (+0.9 t CH_4 and +0.02 N_2O in 2014).

Additional Sources

3.D.a.6 Cultivation of organic soils (i.e. histosols)

In accordance with revisions carried out in sector LULUCF (please refer also to LULUCF sector below, category 4.C Grassland) N_2O emissions of organic soils were estimated for the first time for the whole time series on basis of the methods in the IPCC (2013) Wetland Supplement. As required in the CRF, N_2O emissions were reported under sector 3.D Agricultural Soils (+0.1 kt N_2O for 2014).

3.3.4 LULUCF

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

4.A Forest land

A minor calculation error for the forest area of 2014 was corrected which affected the carbon stock gains in forest land remaining forest land of 2014.

The soil C stocks of settlement areas were recalculated (see information under “Settlement” below). Consequently the annual soil C stock changes of LUC areas from settlement to forest land and the total time series of removals of this sub-category changed.

The N_2O emissions of LUC lands from grassland to forest land associated with C stock losses in the mineral soil were calculated in submission 2017 for the total time series for the first time.

4.B Cropland

An updated assessment of the LUC areas from grassland to annual and perennial cropland and vice-versa on basis of the IACS system was carried out. On basis of this new assessment these areas of land-use changes changed for the most recent years, but also for the whole time series and consequently the areas remaining in the category. This is associated with slight changes in the emissions/removals of the cropland category of the whole time series.

A calculation error in the cleared and consequently lost biomass of perennial cropland remaining perennial cropland was corrected.

A minor calculation error in the dead wood losses due to deforestation to cropland was corrected.

The areas of organic cropland management since 1999 were revised on basis of new statistics which caused slight changes in the soil C stock changes due to this management type.

In addition, some calculation errors in the estimates for the years 1996, 2012 and 2014 were corrected which caused insignificant changes in the results of the emission/removal figures for 1996 and for the time series after 1996 due to the impact on the soil C stock changes across transition periods.

4.C Grassland

An updated assessment of the LUC areas from grassland to annual and perennial cropland and vice-versa on basis of the IACS system was carried out. On basis of this new assessment these areas of land-use changes changed for the most recent years, but also for the whole time series and consequently the areas remaining in the category. This is associated with slight changes in the emissions/removals of the grassland category of the whole time series.

The estimates of the emissions from organic soils were updated on basis of the new default emission factors provided in the IPCC (2013) Wetland Supplement. In addition, related off-site emissions as well as CH_4 and N_2O emissions of organic soils were estimated for the first time for the whole time series on basis of the methods in the IPCC (2013) Wetland Supplement. Particularly, the significant higher emission factor for the C stock losses in organic soils according to the IPCC (2013) Wetland Supplement results in significant higher emissions of the grassland subcategory (grassland remaining grassland).

4.D Wetlands

No revisions of the time series.

4.E Settlements

The soil C stocks of settlement areas were recalculated on basis of a new assessment and a revision of the share of sealed land in the settlement category. Consequently, the annual soil C stock changes of LUC areas from the categories forest land, cropland and grassland to settlements changed and the related emissions of the whole time series became significantly higher.

In addition, the share of LUC areas to settlement from cropland and grassland was adjusted on basis of the revised figures of the cropland and grassland areas and land-use change areas between these categories which have an impact on the “available” cropland and grassland for matching the steady increase in settlement area.

N_2O emissions associated with C stock losses in soil from land-use changes to settlement were estimated in submission 2017 for the first time for the whole time series.

4.F Other lands

N_2O emissions associated with C stock losses in soil from land-use changes from forest land to other land were estimated in submission 2017 for the first time for the whole time series.

4.G HWPs

The HWP production for the year 2014 has been revised by the FAO and therefore the value reported for HWPs for the year 2014 has changed by 1%.

LULUCF KP estimates

The Af-/reforestation, deforestation time series was revised. The soil C stocks of settlement areas were recalculated (see information under “Settlement” above). Consequently the annual soil C stock changes of af-/deforestation areas from settlement and deforestation areas to settlement changed.

N_2O emissions associated with C stock losses in soil of afforestation areas from grassland and deforestation areas to settlement and other land were estimated in submission 2017 for the first time for the whole time series.

The HWP production for the year 2014 has been revised by the FAO and therefore the value reported for HWPs at af-/deforestation areas and forest management areas for the year 2014 has changed. In addition, the shares of HWPs produced from wood of the af-/reforestation, deforestation and forest management areas slightly changed due to the correction of a calculation error.

3.3.5 Waste

Update of activity data

5.A Solid Waste Disposal

A small correction was made on the amounts of deposited construction waste and tar paper for the year 2010, having a slightly increasing effect on emissions from 2011 onwards.

5.D Wastewater Treatment and Discharge

Information on the connection rate of the Austrian population to wastewater treatment plants became available for the year 2014, changing the share of the population disposing its wastewater to septic tanks and thus affecting emissions (CH_4, N_2O) from this source in 2014 and 2013 (due to interpolation between 2012 and 2014). For this reason also the IEF of N_2O applied for the whole time period was slightly adapted as it is calculated by dividing the measured N_2O value for 2013 (result of the RelaKO measurement programme) by the number of inhabitants connected to treatment plants. Furthermore, data (2014) on nitrogen flows into and out of municipal wastewater treatment plants became available from the EMREG register, also changing the N values for 2013 (interpolated).

Improvements of methodologies and emission factors

5.A Solid Waste Disposal

Austria has adapted its DOC of residual waste for the historical years 1950–1989 in response to the recommendation by the TERT in the course of the ESD comprehensive review 2016 (AT-5A-2016-0002). The organic carbon of mixed waste from households and similar sources (residual waste) to landfills increases in line with the higher share of organic waste deposited. In previous submissions emission estimates for the years 1950 to 1999 were based on Umweltbundesamt 2003[16]. However, detailed and transparent waste composition data for this early time series was lacking and the derivation of the originally used DOC was not sufficiently described in the literature. In this years' submission, the DOC of 1990 (200 g/kg residual waste) – verified by waste composition data – was thus taken as proxy for earlier years (1950–1989), as recommended by the TERT. This revision is in accordance with the revised estimate provided to the TERT in June 2016.

5.C Waste Incineration

According to a UNFCCC 2016 review recommendation the combustion efficiency of municipal solid waste and hospital waste incineration has been changed from 95% to 100% following the IPCC 2006 Guidelines. The change has been made because country specific combustion efficiency values are not available.

[16] UMWELTBUNDESAMT (2003): Rolland, C. & Scheibengraf, M.: Biologisch abbaubarer Kohlenstoff im Restmüll. Berichte, Bd. BE-236. Umweltbundesamt, Wien.

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[17] 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[18], in Austria's NIR 2016[19] and in the NISA Implementation Report[20].

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[21]), 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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[17] 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

[18] 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.

[19] Umweltbundesamt (2016): Austria's National Inventory Report 2016, Submission under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol. Reports, Bd. REP-0565. Umweltbundesamt, Vienna.

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

[21] „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

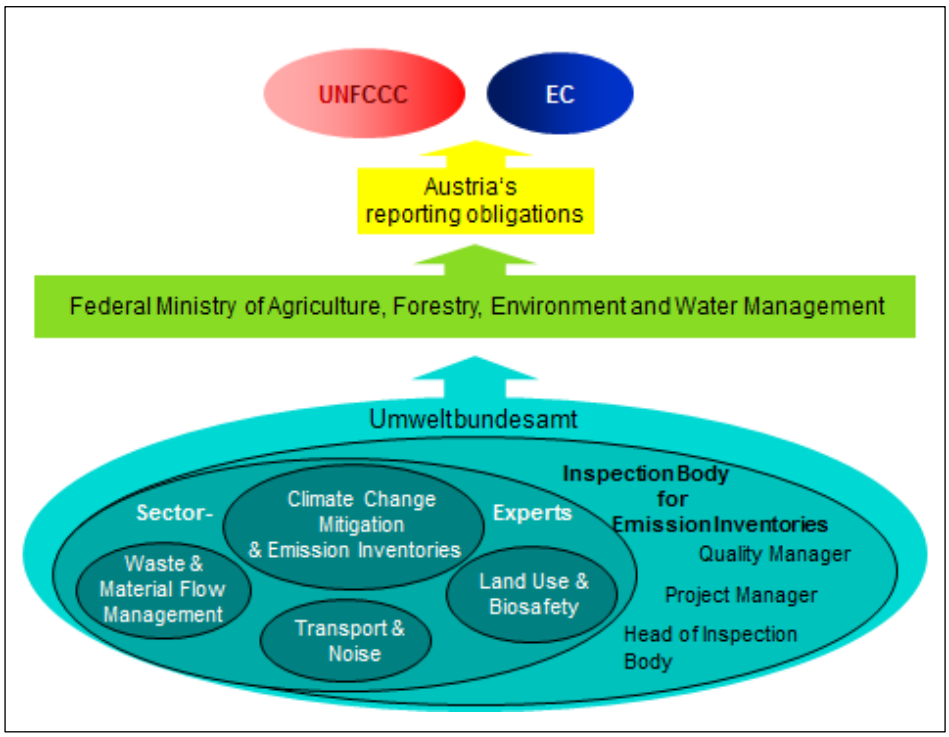

Figure 4: Responsibilities within the Austrian National Inventory System Austria.

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 providers were agreed:

1. Statistik Austria

- Statistical yearbook (public)
- National Energy balance (comprehensive/detailed Energy balance and IEA/Eurostat questionnaire)
  - **Long-term Contract** with the 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 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 Statistik Austria and AustroControl)

  Procedural arrangement:
  - close cooperation Umweltbundesamt – Statistik 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)

BMLFUW 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)
- forest fire statistics

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

  - EDM 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 Office and Research Centre for Forests (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)
- Forest soil modelling

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

4. Research institutions:

a. TU Graz (Graz University of Technology)

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

    Procedural arrangement: close cooperation Umweltbundesamt – TU Graz

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

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

    Procedural arrangement: close cooperation Umweltbundesamt – BOKU

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

- Activity data, emission data and relevant parameters; information on the process and abatement technology
  - no formal agreements were made but it is 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 (for unpublished studies a detailed description of the methodologies is given in the NIR):

Table 8: Main data sources for activity data.

Sector	Data Sources for Activity Data
Energy	• Energy Balance from Statistik Austria; • EU-ETS; • Steam boiler database; • direct information from industry or associations of industry
Transport	• Energy Balance from Statistik Austria • Yearly growth rates of transport performance on Austrian roads from Austrian Ministry for Transport, Technology and Innovation
IPPU	• National production statistics, • import/export statistics; • EU-ETS; • direct information from industry or associations of industry • Short term statistics for trade and services • Austrian foreign trade statistics • Structural business statistics • Surveys at companies and associations
Agriculture	• national Studies • national agricultural statistics obtained from Statistik Austria

Sector	Data Sources for Activity Data
LULUCF	• National forest inventory obtained from the Austrian Federal Office and Research Centre for Forests • Soil inventories by the Federal States and by the Austrian Federal Office and Research Centre for Forests • National agricultural statistics and land use statistics obtained from Statistik Austria
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)

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[22]
- EMEP/EEA air pollutant emission inventory guidebooks[23]
- Handbook emission factors for road transport (HBEFA), Version 3.2 (KELLER, M./WÜTHRICH, P. 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)[24] by decree of the Minister of Economics and Labour[25]. 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.

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).

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

[23] Prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections (TFEIP) and published by the European Environment Agency (EEA). Latest update: http://www.eea.europa.eu/publications/emep-eea-guidebook-2016

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

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

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 2016, some aspects and improvements compared to the previous submission are described below (QMS activities and improvements 2016).

The Quality Manual can be downloaded at:
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 7 sectors defined (Energy, Transport, Fugitive Emissions, IPPU, 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 finally estimate 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.

In cases which exceed the IBE's capabilities or resources, some of its inventory activities are subcontracted, in some cases routinely (e.g. the emission inventory for road transport), in other cases as required (e.g. revision of methodologies for a complex emission source). However, the final assessment of fulfillment of the requirements is made by the IBE.

Subcontracts have so far be concluded with:

- Technical University Graz (road and off-road transport)
- Technical University of Natural Resources and Applied Life Sciences, Research Center Seibersdorf (agriculture)
- Öko-Recherche Büro für Umweltforschung und -beratung GmbH (F-gases)

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 2016

Several changes of the Quality Manual and its quality and technical procedures were made in 2016, e.g. regarding treatment of confidential data, access (rights) to the internal OLI folders, judgement of reliability of input data (emission factors), risk analysis, scope of internal audits or planned participation of sector experts in the international review process. Moreover, the IBE-team was slightly re-arranged, overall increasing the number of experts involved in inventory work. To strengthen the technical competence of the IBE 11 IBE sector experts studied the basic course for reviewers and closed with the exam in December 2016.

Moreover, the following QA/QC activities were done in 2016:

- An input data audit was conducted at the Austrian Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW) to gain background information on quality and procedural arrangements of the main data supplier of LULUCF data
- An input data audit was performed by IBE experts on national production statistics and import/export statistics – sources for solvent emissions – to get insight into the process of data collection and compilation.
- An emergency exercise on data management, i.e. compilation of emission data tables and preparing the submission, was successfully conducted by the deputy of the data manager of the IBE, with the aim of training the expert and testing the quality of the internal documentation on this issue. It is planned to conduct such a dummy inventory compilation as a training every two years to keep the deputy up-to-date and fit for a submission in case of an unplanned absence of the data manager.
- The cooperation (mutual review) with New Zealand (started 2014) was continued in 2016, with focus on QA/QC processes and tools, experiences with the review 2016 and basic exchange on benefits of ISO standards and preparation/certification process.

4.1.4 Changes in the national inventory system

The national inventory system is unchanged compared to the description given in this chapter (4) and in the Austrian Initial Report under the Kyoto Protocol[26].

[26] 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 2016:

Table 9: Changes to the national registry of Austria in 2016.

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 registry administrator and the alternate registry administrator was notified to the Secretariat in 2016.
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	New tables were added to the CSEUR database for the implementation of the CP2 SEF functionality. Versions of the CSEUR released after 6.7.3 (the production version at the time of the last Chapter 14 submission) introduced other minor 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. The database model, including the new tables, is provided in Annex A. 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 6.7.3 of the national registry are listed in Annex B. 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 Annex B). Annex H testing was completed in January 2017 and the test report will provided at a later date. 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	The mandatory use of hard tokens for authentication and signature was introduced for registry administrators.
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 6.7.3 of the national registry are listed in Annex B. 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 attached as Annex B. Annex H testing was carried out in January 2017 and the test report will be provided at a later date.

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_2017'). Emission trends 1990–2015 (Article 7(1) e) are described in Chapter 2. Changes to the national system and the national registry are presented in Chapters 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_2017').

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 2015 is reported as a separate file ('Annex II_AT Indicators_2017') 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 2016 is reported as a separate file ('SEF_AT_CP2_2016_20170109') in xls and xml format 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 2016 has been reported as XML file in the directory 'Concluded transfers 2016' 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 is reported as a separate file ('AT_Art-7-1-i_Mechanisms_2017') by EIONET/CDR upload.

6.5 Article 7 (1) j

According to Article 9 of the Commission Implementation Regulation (EU) No 749/2014 Member States shall report on the status of implementation of each adjustment and each recommendation listed in the most recently published individual UNFCCC review report.

In 2015 no individual UNFCCC review took place. In 2016 a centralised review was conducted, however the review report has not been published yet. Therefore no information on the implementation of recommendations are currently provided in the template ('MMR_IR Article9_recommendations_AT_2017').

The status of implementation of the recommendations from the final review report of the comprehensive review 2016 are included in 'MMR_IR Article9_recommendations_AT_2017'.

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 2014 is reported as a separate file ('MMR_IRArticle10_ETS_AT_2017').

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 2016.

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.

Checks for each air pollutant on the consistency of the data on air emissions could so far not be performed for the year 2015 as data on air emissions are not final yet. Only minor differences are expected due to different reporting requirements regarding air transport and international navigation.

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 2015 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

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

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

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

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 GHG emissions (kt CO_2e).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Emissions/Removals with LULUCF	**66 651.38**	**66 387.16**	**64 284.24**	**81 886.04**	**84 393.85**	**81 326.09**	**82 378.54**	**75 829.32**	**79 148.12**	**76 486.11**	**74 380.91**	**75 612.97**	**71 472.05**	**74 003.29**
Total Emissions without LULUCF	**78 804.65**	**79 814.98**	**80 533.54**	**92 641.65**	**89 798.19**	**87 072.36**	**86 923.07**	**80 248.60**	**85 059.02**	**82 696.89**	**80 037.93**	**80 150.24**	**76 381.33**	**78 850.81**
1. Energy	**53 027.67**	**54 520.01**	**55 421.96**	**67 134.34**	**63 798.13**	**60 470.06**	**59 992.46**	**56 770.71**	**59 880.50**	**57 423.56**	**55 321.00**	**55 284.55**	**51 325.78**	**53 350.86**
A. Fuel Combustion (Sectoral Approach)	52 325.86	54 055.98	54 925.49	66 652.04	63 280.87	59 945.88	59 510.11	56 230.21	59 359.02	56 908.85	54 792.89	54 752.76	50 835.13	52 873.93
1. Energy Industries	13 838.23	12 965.23	12 313.91	16 239.62	15 080.08	13 802.02	13 629.09	12 612.18	13 988.45	13 795.23	12 384.79	11 330.26	9 650.96	10 927.52
2. Manufacturing Industries and Construction	9 889.48	10 336.00	10 080.54	11 795.15	11 415.19	11 068.44	11 460.74	10 946.96	11 543.45	11 476.46	11 254.88	11 110.33	10 395.12	10 467.17
3. Transport	13 975.92	15 886.81	18 818.30	24 933.73	23 626.46	23 829.46	22 406,98	21 726,21	22 529.36	21 875.66	21 660.86	22 820.21	22 179.36	22 587.47
4. Other Sectors	14 586.35	1 4834.55	13 670.94	13 638.96	13 114.07	11 200.35	11 967.13	10 898.16	11 250.51	9 713.68	9 443.98	9 443.00	8 560.18	8 841.70
5. Other	35.87	33.39	41.80	44.58	45.06	45.62	46.17	46.69	47.26	47.82	48.38	48.96	49.51	50.07
B. Fugitive Emissions from Fuels	701.81	464.03	496.47	482.30	517.26	524.18	482.35	540.50	521.48	514.71	528.11	531.80	490.65	476.93
1. Solid Fuels	333.22	36.84	27.19	0.13	0.15	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,NA
2. Oil and Natural Gas	368.59	427.19	469.28	482.17	517.12	524.18	482.35	540.50	521.48	514.71	528.11	531.80	490.65	476.93
C. CO_2 Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes and Other Product Use	**13 663.04**	**13 605.67**	**14 642.04**	**15 612.47**	**16 251.69**	**16 940.67**	**17 273.78**	**13 948.38**	**15 926.15**	**16 084.57**	**15 697.25**	**15 978.01**	**16 133.37**	**16 676.38**
A. Mineral Industry	3 092.46	2 657.39	2 733.20	2 888.79	3 053.33	3 265.67	3 276.09	2 714.92	2 660.68	2 779.36	2 703.56	2 719.69	2 721.94	2 739.63
B. Chemical Industry	1 555.31	1 528.06	1 623.74	943.33	983.43	908.74	1 011.98	792.93	784.46	785.62	759.54	696.58	810.37	793.56
C. Metal Industry	8 177.44	7 842.13	8 482.76	9 576.79	10 049.47	10 546.86	10 740.63	8 403.23	10 227.41	10 245.97	9 901.54	10 261.45	10 255.71	10 772.10
D. Non-Energy Products from Fuels and Solvent Use	348.94	233.95	227.74	210.02	206.43	207.24	202.44	195.82	192.92	195.72	200.11	181.81	181.98	179.01
E. Electronics Industry	133.87	509.61	419.96	352.34	370.08	391.05	370.94	113.86	149.77	119.16	101.25	90.35	96.94	107.05
F. Product Uses as Substitutes for ODS	NO	342.66	708.85	1 140.73	1 146.10	1 186.95	1 239.19	1 306.61	1 481.40	1 534.02	1 610.66	1 600.77	1 641.18	1 659.68

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
G. Other Product Manufacture and Use	355.03	491.86	445.80	500.48	442.84	434.16	432.51	421.01	429.50	424.71	420.58	427.36	425.25	425.36
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	**8 188.91**	**8 038.15**	**7 506.43**	**7 103.85**	**7 077.16**	**7 118.30**	**7 225.72**	**7 244.78**	**7 094.42**	**7 146.13**	**7 077.38**	**7 059.12**	**7 183.51**	**7 167.99**
A. Enteric Fermentation	4 820.53	4 638.25	4 386,67	4 146.58	4 134.62	4 151.50	4 145.31	4 199.70	4 189.65	4 137.41	4 110.16	4 117.37	4 136.34	4 130.84
B. Manure Management	1 025.28	1 010.01	942,49	896.20	892.99	901.45	891.03	903.18	900.51	887,25	879.69	877.81	878.24	876.88
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	2 247.02	2 288.48	2 077.26	1 956.74	1 943.51	1 957.05	2 083.21	2 030.70	1 895.88	2 014.97	1 978.40	1 955.41	2 056.88	2 050.35
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	1.66	1.61	1.45	1.38	1,29	1.33	1.28	1.20	1,15	0.91	0.72	0.67	0.73	0.65
G. Liming	89.97	91.85	90.19	91.19	89.85	89.05	88.33	88.03	87.68	87,24	86.73	86.36	85.87	85.66
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	25.44	23.61
I. Other carbon-containing fertilizers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
J. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Land Use, Land-Use Change and Forestry	**-12 153.27**	**-13 427.82**	**-16 249.29**	**-10 755.62**	**-5 404.34**	**-5 746.26**	**-4 544.53**	**-4 419.28**	**-5 910.90**	**-6 210.78**	**-5 657.02**	**-4 537.26**	**-4 909.28**	**-4 847.52**
A. Forest Land	-10 861.51	-12 215.88	-15 974.73	-8 773.71	-2 958.60	-1 930.52	-1 035.80	-4 473.84	-4 441.05	-4 408.26	-4 375.40	-4 342.26	-4 309.39	-4 301.82
B. Cropland	161.79	34.26	83.85	-140.62	-122.97	-245.35	-221.46	-234.44	-249.91	-257.36	-253.92	-232.69	-190.60	-11.69
C. Grassland	651.20	468.84	473.28	680.11	680.16	682.33	675.70	380.53	379.39	382.19	378.86	381.55	381.58	397.42
D. Wetlands	42.08	30.31	35.80	47.33	37.20	39.34	51.32	68.13	68.79	73.41	69.78	101.17	71.05	58.52
E. Settlements	649.07	585.78	558.08	627.06	622.69	597.02	631.99	538.27	510.61	490.81	501.61	458.45	462.08	431.87
F. Other Land	457.03	389.99	379.73	333.09	324.40	315.72	307.04	221.93	213.76	205.58	197.40	189.35	181.30	177.39
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	-1 092.83	-1 505.29	-1 599.20
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	**3 925.02**	**3 651.16**	**2 963.11**	**2 790.99**	**2 671.21**	**2 543.33**	**2 431.10**	**2 284.73**	**2 157.95**	**2 042.63**	**1 942.30**	**1 828.55**	**1 738.67**	**1 655.58**
A. Solid Waste Disposal on Land	3 643.89	3 355.11	2 666.85	2 437.75	2 313.67	2 183.94	2 073.57	1 929.05	1 802.59	1 686.17	1 582.61	1 477.08	1 381.71	1 293.94
B. Biological Treatment of Solid Waste	35.74	69.09	82.59	151.36	157.38	162.50	163.90	164.89	167.44	169.62	173.73	166.28	172.25	175.15

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
C. Incineration and Open Burning of Waste	28.07	11.15	12.44	12.44	10.29	8.23	6.18	4.12	2.06	2.06	2.06	2.06	2.06	2.06
D. Waste Water Treatment and Discharge	217.32	215.81	201.23	189.44	189.86	188.66	187.46	186.66	185.87	184.79	183.90	183.13	182.65	184.43
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo items:														
International bunkers	**950.23**	**1 410.04**	**1 793.48**	**2 069.35**	**2 148.12**	**2 281.79**	**2 281.45**	**1 978.58**	**2 148.06**	**2 259.09**	**2 163.98**	**2 070.74**	**2 066.86**	**2 206.88**
Aviation	895.54	1 341.95	1 713.23	1 980.31	2 070.31	2 198.56	2 204.85	1 913.35	2 071.02	2 191.30	2 094.55	1 996.28	1 997.57	2 149.68
Navigation	54.68	68.09	80.26	89.04	77.81	83.23	76.60	65.23	77.04	67.79	69.43	74.46	69.29	57.20
Multilateral operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
CO_2 emissions from biomass	**10 420.76**	**11 883.33**	**12 758.15**	**15 790.27**	**17 046.93**	**18 673.49**	**19 945.08**	**20 412.05**	**23 021.95**	**22 403.35**	**23 425.07**	**24 468.61**	**22 200.67**	**23 378.08**
CO_2 captured	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Long-term storage of C in waste disposal sites	**22 778.82**	**25 543.19**	**27 613.89**	**29 341.30**	**29 517.62**	**29 678.61**	**29 794.49**	**29 861.73**	**29 926.26**	**29 998.18**	**30 041.79**	**30 089.86**	**30 135.39**	**30 170.22**

Table A.I-2: 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	2014	2015
Total Emissions/Removals with LULUCF	**49 986.36**	**50 633.33**	**49 961.46**	**68 483.02**	**71 148.52**	**68 151.47**	**69 129.30**	**63 094.88**	**66 505.25**	**63 945.09**	**61 932.90**	**63 288.02**	**59 164.40**	**61 743.97**
Total Emissions without LULUCF	**62 292.97**	**64 206.70**	**66 345.61**	**79 369.26**	**76 683.54**	**74 028.29**	**73 805.19**	**67 645.52**	**72 547.42**	**70 286.77**	**67 721.10**	**67 956.09**	**64 204.37**	**66 724.17**
1. Energy	**51 298.74**	**53 115.56**	**54 152.30**	**65 938.94**	**62 603.01**	**59 286.25**	**58 814.75**	**55 619.14**	**58 665.54**	**56 249.27**	**54 129.96**	**54 069.55**	**50 206.87**	**52 198.08**
A. Fuel Combustion (Sectoral Approach)	51 196.58	52 988.35	53 987.58	65 733.71	62 370.77	59 049.01	58 602.50	55 353.90	58 428.29	56 016.02	53 892.71	53 818.30	49 985.62	51 983.83
1. Energy Industries	13 791.07	12 918.37	12 259.93	16 155.44	14 982.26	13 697.59	13 517.56	12 495.39	13 851.46	13 657.87	12 246.33	11 197.64	95 27.23	10 796.34
2. Manufacturing Industries and Construction	9 807.12	10 233.20	9 945.32	11 634.44	11 250.56	10 897.64	11 285.50	10 774.53	11 373.22	11 306.88	11 089.83	10 946.14	10 240.91	10 313.91
3. Transport	13 777.19	15 686.02	18 645.32	24 748.96	23 444.66	23 645.38	22 228.86	21 549.80	22 346.11	21 693.60	21 475.10	22 618.89	21 976.87	22 378.14
4. Other Sectors	13 786.20	14 118.20	13 096.22	13 151.29	12 649.22	10 763.78	11 525.39	10 488.46	10811.22	9 310.82	9 034.06	9 007.66	8 192.09	8 446.37
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	48.52	49.07
B. Fugitive Emissions from Fuels	102.16	127.22	1 64.72	205.23	232.24	237.24	212.24	265.24	237.25	233.25	237.25	251.25	221.25	214.25
1. Solid Fuels	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,NA
2. Oil and Natural Gas	102.16	127.22	164.72	205.23	232.24	237.24	212.24	265.24	237.25	233.25	237.25	251.25	221.25	214.25
C. CO_2 Transport and Storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes and Other Product Use	**10 871.89**	**10 980.22**	**12 082.35**	**13 314.96**	**13 965.52**	**14 626.85**	**14 879.40**	**11 912.27**	**13 772.58**	**13 929.84**	**13 480.66**	**13 776.62**	**13 884.13**	**14 414.76**
A. Mineral Industry	3 092.46	2 657.39	2 733.20	2 888.79	3 053.33	3 265.67	3 276.09	2 714.92	2 660.68	2 779.36	2 703.56	2 719.69	2 721.94	2 739.63
B. Chemical Industry	643.49	669.46	674.08	643.58	666.25	601.61	651.72	587.90	676.79	692.81	662.16	599.41	715.91	699.81
C. Metal Industry	6 787.00	7 419.42	8 447.33	9 572.21	10 037.36	10 546.58	10 740.33	8 402.69	10 227.14	10 245.82	9 897.08	10 252.63	10 240.06	10 769.79
D. Non-Energy Products from Fuels and Solvent Use	348.94	233.95	227.74	210.02	206.43	207.24	202.44	195.82	192.92	195.72	200.11	181.81	181.98	179.01
E. Electronics Industry														
F. Product Uses as Substitutes for ODS														
G. Other Product Manufacture and Use	NO	NO	NO	0.36	2.15	5.76	8.82	10.94	15.05	16.13	17.76	23.07	24.24	26.53
H. Other	NA	NA	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	2014	2015
3. Agriculture	**94.42**	**99.80**	**98.56**	**102.95**	**104.76**	**106.97**	**104.89**	**110.01**	**107.24**	**105.60**	**108.42**	**107.86**	**111.31**	**109.27**
A. Enteric Fermentation														
B. Manure Management														
C. Rice Cultivation														
D. Agricultural Soils														
E. Prescribed Burning of Savannas														
F. Field Burning of Agricultural Residues														
G. Liming	89.97	91.85	90.19	91.19	89.85	89.05	88.33	88.03	87.68	87.24	86.73	86.36	85.87	85.66
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	25.44	23.61
I. Other carbon-containing fertilizers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
J. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Land Use, Land-Use Change and Forestry	**-12 306.62**	**-13 573.37**	**-16 384.15**	**-10 886.24**	**-5 535.02**	**-5 876.82**	**-4 675.89**	**-4 550.64**	**-6 042.17**	**-6 341.67**	**-5 788.20**	**-4 668.07**	**-5 039.97**	**-4 980.20**
A. Forest Land	-10 892.46	-12 246.33	-15 998.58	-87 96.87	-2 982.13	-1 954.11	-1 059.64	-4 497.65	-4 464.83	-4 432.00	-4 399.18	-4 366.17	-4 333.16	-4 326.34
B. Cropland	147.92	20.56	70.46	-153.76	-136.86	-260.51	-237.85	-251.02	-266.60	-274.24	-271.32	-250.66	-209.49	-32.89
C. Grassland	627.41	445.05	449.50	656.33	656.37	658.54	651.91	356.74	355.60	358.40	355.07	357.76	357.79	373.63
D. Wetlands	42.08	30.31	35.80	47.33	37.20	39.34	51.32	68.13	68.79	73.41	69.78	101.17	71.05	58.52
E. Settlements	577.08	522.72	498.16	569.51	565.61	540.82	575.89	481.74	453.73	433.93	444.48	401.85	405.86	376.45
F. Other Land	444.28	375.43	365.82	320.12	312.01	303.89	295.78	211.27	203.62	195.97	188.32	180.80	173.27	169.62
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	-1 092.83	-1 505.29	-1 599.20
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	**27.92**	**11.11**	**12.40**	**12.40**	**10.26**	**8.21**	**6.16**	**4.10**	**2.05**	**2.05**	**2.05**	**2.05**	**2.05**	**2.05**
A. Solid Waste Disposal on Land	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,NA
B. Biological Treatment of Solid Waste														
C. Incineration and Open Burning of Waste	27.92	11.11	12.40	12.40	10.26	8.21	6.16	4.10	2.05	2.05	2.05	2.05	2.05	2.05

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
D. Waste Water Treatment and Discharge														
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
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**	**2 044.04**	**2 040.64**	**2 180.37**
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	1 976.70	2 127.50
Navigation	49.48	61.55	72.39	80.37	70.33	75.44	69.67	59.54	70.53	62.24	63.86	68.60	63.94	52.87
Multilateral operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Table A.I-3: 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	2014	2015
Total Emissions/Removals with LULUCF	**421.54**	**386.53**	**338.85**	**313.29**	**307.92**	**302.84**	**297.35**	**293.47**	**289.39**	**280.96**	**276.30**	**272.48**	**266.95**	**263.96**
Total Emissions without LULUCF	**420.57**	**385.58**	**337.89**	**312.34**	**306.96**	**301.89**	**296.39**	**292.52**	**288.43**	**280.00**	**275.34**	**271.52**	**265.99**	**263.00**
1. Energy	**51.68**	**36.95**	**30.33**	**24.89**	**24.61**	**23.93**	**23.47**	**23.07**	**24.54**	**23.20**	**23.92**	**24.18**	**21.72**	**22.41**
A. Fuel Combustion (Sectoral Approach)	27.70	23.48	17.06	13.81	13.21	12.45	12.67	12.06	13.17	11.94	12.29	12.96	10.94	11.90
1. Energy Industries	0.31	0.35	0.39	0.61	0.70	0.75	0.82	0.91	1.03	1.02	1.04	0.99	0.95	1.02
2. Manufacturing Industries and Construction	0.54	0.60	0.65	0.80	0.82	0.89	0.92	0.93	0.94	0.95	0.91	0.92	0.86	0.88
3. Transport	2.62	1.67	1.05	0.83	0.73	0.67	0.58	0.52	0.48	0.45	0.41	0.39	0.36	0.35
4. Other Sectors	24.23	20.85	14.98	11.56	10.95	10.15	10.34	9.70	10.72	9.53	9.92	10.65	8.77	9.65
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	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	10.78	10.51
1. Solid Fuels	13.33	1.47	1.09	0.01	0.01	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,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	10.78	10.51
C. CO_2 Transport and Storage														
2. Industrial Processes and Other Product Use	**1.40**	**1.38**	**1.40**	**1.45**	**1.92**	**1.90**	**1.88**	**1.84**	**1.87**	**1.87**	**1.87**	**1.96**	**1.87**	**1.88**
A. Mineral Industry														
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	1.87	1.88
C. Metal Industry	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NO,NA,IE	NA,NO,IE	NO,IE,NA
D. Non-Energy Products from Fuels and Solvent Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Electronics Industry														
F. Product Uses as Substitutes for ODS														

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
G. Other Product Manufacture and Use	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NO,NA
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	**216.36**	**207.79**	**195.56**	**184.36**	**183.70**	**184.45**	**183.87**	**186.27**	**185.79**	**183.38**	**182.09**	**182.31**	**183.06**	**182.78**
A. Enteric Fermentation	192.82	185.53	175.47	165.86	165.38	166.06	165.81	167.99	167.59	165.50	164.41	164.69	165.45	165.23
B. Manure Management	23.48	22.21	20.05	18.46	18.28	18.35	18.01	18.24	18.16	17.85	17.66	17.59	17.58	17.52
C. Rice Cultivation	NO	NO	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	NA	NA
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02
G. Liming														
H. Urea application														
I. Other carbon-containing fertilizers														
J. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Land Use, Land-Use Change and Forestry	**0.97**	**0.95**	**0.96**	**0.95**	**0.96**	**0.95**	**0.96**	**0.96**	**0.96**	**0.96**	**0.96**	**0.96**	**0.96**	**0.96**
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	0.01	0.01
B. Cropland	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	NO,IE	NO,IE
C. Grassland	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
D. Wetlands	NO	NO	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	NO	NO
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested Wood Products														
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	**151.13**	**139.45**	**110.61**	**101.63**	**96.73**	**91.61**	**87.17**	**81.34**	**76.24**	**71.55**	**67.45**	**63.06**	**59.34**	**55.93**
A. Solid Waste Disposal on Land	145.76	134.20	106.67	97.51	92.55	87.36	82.94	77.16	72.10	67.45	63.30	59.08	55.27	51.76

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
B. Biological Treatment of Solid Waste	0.52	1.04	1.25	2.48	2.70	2.86	2.94	2.98	3.03	3.06	3.15	3.02	3.15	3.24
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	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	0.96	0.92	0.93
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
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**	**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	0.04	0.05
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	0.00	0.00
Multilateral operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Table A.I-4: 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	2014	2015
Total Emissions/Removals with LULUCF	**15.00**	**15.26**	**14.98**	**12.55**	**12.54**	**12.59**	**13.19**	**12.44**	**11.77**	**12.07**	**11.94**	**11.90**	**12.13**	**12.17**
Total Emissions without LULUCF	**14.57**	**14.85**	**14.61**	**12.19**	**12.18**	**12.23**	**12.83**	**12.08**	**11.41**	**11.71**	**11.58**	**11.54**	**11.77**	**11.80**
1. Energy	**1.47**	**1.61**	**1.72**	**1.92**	**1.95**	**1.97**	**1.98**	**1.93**	**2.02**	**1.99**	**1.99**	**2.05**	**1.93**	**1.99**
A. Fuel Combustion (Sectoral Approach)	1.47	1.61	1.72	1.92	1.95	1.97	1.98	1.93	2.02	1.99	1.99	2.05	1.93	1.99
1. Energy Industries	0.13	0.13	0.15	0.23	0.27	0.29	0.31	0.32	0.37	0.38	0.38	0.36	0.34	0.35
2. Manufacturing Industries and Construction	0.23	0.29	0.40	0.47	0.48	0.50	0.51	0.50	0.49	0.49	0.48	0.47	0.45	0.44
3. Transport	0.45	0.53	0.49	0.55	0.55	0.56	0.55	0.55	0.57	0.57	0.59	0.64	0.65	0.67
4. Other Sectors	0.65	0.65	0.67	0.67	0.64	0.61	0.61	0.56	0.57	0.55	0.54	0.57	0.50	0.52
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	0.00	0.00
B. Fugitive Emissions from Fuels	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NO,IE,NA
1. Solid Fuels	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,NA
2. Oil and Natural Gas	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NA,NO,IE	NO,IE,NA
C. CO_2 Transport and Storage														
2. Industrial Processes and Other Product Use	**3.69**	**3.52**	**3.82**	**1.44**	**1.43**	**1.39**	**1.56**	**1.00**	**0.69**	**0.63**	**0.62**	**0.62**	**0.61**	**0.61**
A. Mineral Industry														
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	0.16	0.16
C. Metal Industry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Non-Energy Products from Fuels and Solvent Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Electronics Industry														

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
F. Product Uses as Substitutes for ODS														
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	0.45	0.45
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	**9.01**	**9.21**	**8.45**	**8.03**	**7.99**	**8.05**	**8.47**	**8.32**	**7.86**	**8.24**	**8.11**	**8.03**	**8.37**	**8.35**
A. Enteric Fermentation														
B. Manure Management	1.47	1.53	1.48	1.46	1.46	1.49	1.48	1.50	1.50	1.48	1.47	1.47	1.47	1.47
C. Rice Cultivation														
D. Agricultural Soils	7.54	7.68	6.97	6.57	6.52	6.57	6.99	6.81	6.36	6.76	6.64	6.56	6.90	6.88
E. Prescribed Burning of Savannas	NO	NO	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	0.00	0.00
G. Liming														
H. Urea application														
I. Other carbon-containing fertilizers														
J. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Land Use, Land-Use Change and Forestry	0.43	0.41	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
A. Forest Land	0.10	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
B. Cropland	0.05	0.05	0.04	0.04	0.05	0.05	0.05	0.06	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	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	0.24	0.21	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
F. Other Land	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
G. Harvested Wood Products														
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Waste	**0.40**	**0.52**	**0.62**	**0.80**	**0.81**	**0.82**	**0.82**	**0.83**	**0.84**	**0.84**	**0.85**	**0.84**	**0.85**	**0.86**
A. Solid Waste Disposal on Land														
B. Biological Treatment of Solid Waste	0.08	0.14	0.17	0.30	0.30	0.31	0.30	0.30	0.31	0.31	0.32	0.30	0.31	0.32
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	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	0.53	0.54	0.54
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
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**	**0.08**	**0.08**
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	0.07	0.07
Navigation	0.02	0.02	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Multilateral operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Table A.I-5: Emission Trends HFCs, PFCs, SF_6 and NF_3

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Emissions of HFCs – kt CO_2 equivalent	**2.44**	**353.45**	**713.63**	**1 145.81**	**1 152.47**	**1 195.89**	**1 248.53**	**1 308.77**	**1 483.45**	**1 536.09**	**1 612.75**	**1 602.88**	**1 643.19**	**1 662.04**
HFC-23 (t)	0.00	0.00	0.00	0.43	0.33	0.41	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
HFC-32 (t)	0.00	0.16	5.67	19.16	20.90	24.67	27.25	32.57	38.92	47.66	53.32	56.65	58.58	68.98
HFC-43-10mee / act (t)	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-125 (t)	0.00	2.22	26.03	68.71	75.54	80.15	88.20	98.44	116.73	126.06	133.42	131.77	134.12	138.59
HFC-134a (t)	0.00	219.62	301.06	409.69	376.54	389.36	394.32	392.12	421.72	439.39	467.89	482.06	502.39	521.33
HFC-143a (t)	0.00	2.37	23.81	58.24	64.24	65.20	71.70	77.52	91.75	92.47	94.43	88.48	88.90	81.84
HFC-152a (t)	0.00	81.68	595.21	204.69	247.82	248.70	87.15	129.37	134.38	0.00	0.00	0.00	0.00	0.00
HFC-227ea (t)	0.00	0.00	0.00	0.31	0.63	0.11	0.00	0.00	0.00	0.74	0.00	0.00	0.02	0.13
HFC-245fa (t)	0.00	0.00	1.50	4.55	2.36	2.31	2.26	2.21	2.16	2.11	2.06	2.01	1.97	1.92
HFC-365mfc (t)	0.00	0.00	1.50	4.63	2.38	2.33	2.28	2.22	2.17	2.12	2.08	2.03	1.98	1.94
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	2.01	2.37
Emissions of PFCs (kt CO_2 equivalent)	**1 182.79**	**83,35**	**87.87**	**163.29**	**172.39**	**230.33**	**208.19**	**36.02**	**78.05**	**73.51**	**50.72**	**49.23**	**53.03**	**49.55**
CF_4 (t)	137.31	0.00	0.00	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 (t)	10.99	0.00	0.00	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 (t)	0.00	0.00	0.00	0.00	0.21	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_4F_{10} (t)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_5F_{12} (t)	0.00	0.00	0.06	0.60	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	53.03	49.55
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**	**304.87**	**312.96**	**309.35**
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	13.37	13.73	13.57
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**	**10.56**	**13.46**
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	0.61	0.78

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[27]; 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, 2005–2015.

No	Indicator	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Priority														
1	Total CO_2 intensity of GDP [t CO_2/Mio Euro]	320	294	261	287	269	250	246	234	246	232	222	222	209	215
2	Energy related CO_2 intensity of GDP [t CO_2/Mio Euro]	263	242	213	238	218	200	195	192	198	185	177	176	163	167
3	Specific CO_2 emissions of passenger cars [g CO_2/km]	203	197	193	187	182	180	177	173	172	170	168	168	167	166
4	Energy related CO_2 intensity of industry [t/Mio Euro]	288	268	231	244	223	205	208	229	235	221	215	211	197	198
5	Specific CO_2 emissions of households [t CO_2/dwelling]	3.4	3.2	2.8	2.2	2.1	1.9	1.9	1.8	2.0	1.7	1.7	1.7	1.4	1.5
6	CO_2 intensity of the commercial and institutional sector [t CO_2/Mio Euro]	23	26	21	28	26	18	21	19	17	13	10	10	11	10
7	Specific CO_2 emissions of public and autoproducer power plants [t CO_2/TJ]	167	151	129	125	120	116	107	98	102	105	101	106	107	102
	Additional Priority														
1	Freight transport on road [g CO_2/ton-km]	110	95	79	74	74	71	71	70	68	68	68	64	64	63
2	Total CO_2 intensity – iron and steel industry [t CO_2/Mio Euro]	2304	1819	1453	1948	2024	1938	1901	3540	3448	3470	3101	3331	3233	3202
3	Energy related CO_2 intensity – chemical industry [t CO_2/Mio Euro]	566	433	404	424	371	320	414	467	438	395	369	337	314	319
4	Energy related CO_2 intensity – glass, pottery and building materials industry [t CO_2/Mio Euro]	607	561	524	549	565	595	646	684	624	621	633	625	635	638

[27] 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	2014	2015
	Priority														
5	Specific CO_2 emissions of iron and steel industry [t CO_2/t production]	2.2	2.0	1.9	1.8	1.8	1.7	1.8	1.9	1.8	1.7	1.7	1.7	1.7	1.7
6	Specific energy related CO_2 emissions of cement industry [t CO_2/t production]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Supplementary														
1	Specific diesel related CO_2 emissions of passenger cars [g CO_2/ km]	186	184	182	179	173	173	173	169	169	168	167	167	166	165
2	Specific petrol related CO_2 emissions of passenger cars [g CO_2/ km]	206	201	199	195	194	190	181	176	173	171	168	167	166	165
3	Passenger transport on road [g CO_2/passenger-km]	149	152	157	157	154	153	150	148	147	146	145	145	144	144
4	Passenger transport by air [kg CO_2/passenger]	234	226	126	111	111	109	99	96	82	93	86	86	86	93
5	Energy related CO_2 intensity – food, drink and tobacco industry [t CO_2/Mio Euro]	181	165	156	161	151	123	137	155	154	160	155	154	151	163
6	Energy related CO_2 intensity – paper and printing industry [t CO_2/Mio Euro]	893	852	689	619	548	510	529	603	621	573	509	478	418	444
7	Specific CO_2 emissions of households for space heating [t CO_2/m²]	33	30	25	20	18	17	17	15	17	14	15	14	12	13
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	NA	NA
9	Specific CO_2 emissions of public power plants [t CO_2/TJ]	166	144	133	115	109	101	94	85	85	88	84	82	77	79
10	Specific CO_2 emissions of autoproducer plants [t CO_2/TJ]	168	169	117	161	157	157	146	140	153	153	142	155	165	152
11	Carbon intensity of total power generation [t CO_2/TJ]	68	59	48	59	57	53	49	43	50	53	42	42	39	42
12	Carbon intensity of transport [t CO_2/TJ]	66	64	64	65	63	62	60	60	61	60	60	61	60	59
13	Specific energy related CO_2 emissions of paper industry [t CO_2/t production]	0.8	0.6	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4
14	Carbon intensity in Industry [kt CO_2 /PJ]	46	46	40	39	37	36	36	36	36	35	35	34	33	33
15	Carbon intensity Households [kt CO_2 /PJ]	41	38	35	30	29	28	28	26	27	25	25	23	22	23

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In "Austria's Annual Greenhouse Gas Inventory 1990–2015" the Umweltbundesamt presents updated figures of greenhouse gas (GHG) emissions in Austria. In 2015, the third year of the second commitment period under the Kyoto-Protocol, GHG emissions amounted to 78.9 million tonnes of CO_2 equivalents. This corresponds to a 0.1% increase against 1990 and a 3.2% increase compared to 2014. Key drivers for the development 2014 to 2015 were the higher electricity production by gas power plants, the increased use of fuels in the transport sector as well as the higher heating demand due to the colder weather conditions. GHG emissions according to Article 2(1) of Decision No. 406/2009/EC ("Effort Sharing Decision") amounted to 49.3 Mt CO_2 equivalents in 2015 and were thus 2.2 Mt CO_2 equivalents below the annual emission allocation (AEA) for 2015. Content and format of this report are in accordance with the obligations under the GHG Monitoring Mechanism Regulation (EU) No. 525/2013.

EMAS
Geprüftes Umweltmanagement
REG.NO. AT- 000484

ISBN 978-3-99004-411-7