umweltbundesamt

Austria's Annual Greenhouse Gas Inventory 1990–2006

Submission under Decision 280/2004/EC

umweltbundesamt

AUSTRIA'S ANNUAL GREENHOUSE GAS INVENTORY 1990–2006

Submission under Decision 280/2004/EC

REPORT
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VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten zu den Treibhausgas (THG)-emissionen in Österreich. Er folgt in Format und Inhalt den verbindlichen Anforderungen des THG-Überwachungssystems 280/2004/EG[1] der EU zur Umsetzung des Kyoto-Protokolls. Dieses System umfasst die jährliche Übermittlung von aktualisierten THG-Emissionsdaten mit 15. Jänner an die Europäische Kommission. Mit diesem Bericht wird der dafür notwendige Emissionsbericht in englischer Sprache im dafür geforderten CRF[2]-Berichtsformat wiedergegeben. Eine detaillierte Darstellung der Daten wird der Europäischen Kommission in digitaler Form übermittelt[3].

Der THG-Trend

Die Gesamtmenge an Treibhausgasemissionen liegt im Jahr 2006 bei 91,1 Millionen Tonnen CO_2 Äquivalente. Dies entspricht einer Verminderung um 2,2 Millionen oder 2,3 % gegenüber dem Vorjahr und einem Anstieg von 15,1 % gegenüber dem Kyoto-Basisjahr 1990.

Eine detaillierte Analyse des Trends und der treibenden Kräfte der Zeitreihe wird im Klimaschutzbericht des Umweltbundesamts zu finden sein (voraussichtliche April 2008).

Rechtlicher Hintergrund

Diese Daten wurden entsprechend den Beschlüssen der Vertragstaatenkonferenzen des *Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen* (UN Framework Convention on Climate Change – UNFCCC, BGBl. Nr. 414/1994) erhoben. Sie umfassen Emissionen und Senken bezüglich der direkten Treibhausgase CO_2, CH_4, N_2O, HFC, PFC und SF_6, sowie der indirekten Treibhausgase NO_x, NMVOC, CO und SO_2.

Die Erhebung der Daten berücksichtigt außerdem die Ergebnisse der jährlichen Überprüfung durch die UNFCCC im Rahmen der so genannten UNFCCC-Tiefenprüfung. Im Februar 2007 fand die letzte dieser Tiefenprüfungen der Österreichischen Treibhausgas-Inventur durch internationale Fachexperten statt. Die Ergebnisse dieser Prüfung liegen vollständig vor und flossen bereits teilweise in das Inventurverbesserungsprogramm 2007 ein.

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[1] Entscheidung Nr. 280/2004/EG des Europäischen Parlaments und des Rates vom 11. Februar 2004 über ein System zur Überwachung der Treibhausgasemissionen in der Gemeinschaft und zur Umsetzung des Kyoto-Protokolls.

[2] Common Reporting Format der UNFCCC.

[3] Der vorliegende Bericht beinhaltet die folgenden Elemente des THG-Überwachungssystems 280/2004/EG: Zusammenfassung des Nationalen Inventur-Berichtes im Sinne des Artikels 3 (1) f; Artikel 3 (1) i: methodische Verbesserungen („Recalculations"); Artikel 3 (1) j: Indikatoren; Artikel 3 (1) k: Informationen zu Änderungen des Nationalen Inventursystems; Artikel 3 (1) g: Informationen des Registers; und Artikel 3 (1) h: Informationen über juristische Personen, die befugt sind, sich an den Mechanismen nach den Artikeln 6, 12 und 17 des Kyoto-Protokolls unter Beachtung der einschlägigen nationalen oder gemeinschaftlichen Bestimmungen zu beteiligen.

Das Umweltbundesamt bereitete sich auf die Anforderungen vor, die sich aus der Klimarahmenkonvention und vor allem aus dem Inkrafttreten des Kyoto-Protokolls am 16. Februar 2005 ergeben. Entsprechend Artikel 5.1 des Kyoto-Protokolls wurde ein Nationales System eingerichtet, dessen Ziel es u. a. ist, 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 17020 sind integrierter Teil des NISA.

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998 erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z.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.

Datengrundlage

Das Umweltbundesamt führt jährlich eine Inventur des Ausstoßes von Luftschadstoffen durch, die als Grundlage für die Erfüllung der nationalen und internationalen Berichtspflichten herangezogen wird. Diese *Österreichische Luftschadstoff-Inventur* (OLI) wird erforderlichenfalls auch für zurückliegende Jahre aktualisiert, um eine vergleichbare Zeitreihe zur Verfügung zu haben. Die in diesem Bericht dargestellten Emissionsdaten ersetzen somit die publizierten Daten vorhergehender Berichte.

Der vorliegende Bericht hat folgende Datengrundlagen:

Inventur	Datenstand	Berichtsformat
OLI 2007	Dezember 2007	IPCC Common Reporting Format (CRF)

1 INTRODUCTION

This report updates the Austrian greenhouse gas inventory data for the years up to 2006.

The greenhouse gas inventory is submitted to the European Commission by the Austrian Federal Government in fulfilment of Austria's obligations under Article 3 of Decision 280/2004/EC ("Monitoring Decision"; replacing Decision 389/1992/EEC amended by Decision 296/1999/EEC) 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 and to evaluate the progress towards meeting the greenhouse gas reduction commitments under the UNFCCC and the Kyoto Protocol.

According to the above mentioned decision and guidelines and the reporting requirements, which are the same as under the United Nations Framework Convention on Climate Change (UNFCCC), Member States are obliged to determine their anthropogenic emissions by sources and removals by sinks in accordance with the methodologies accepted by the IPCC and agreed upon by the Conference of the Parties to the UNFCCC.

The greenhouse gas inventory has to be submitted to the Commission 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 preparation of the community inventory report (Article 3 (1) f). The elements of the so called "Short-NIR" are further specified in Article 4 of the Implementing Provisions to 280/2004/EC (Commission Decision 2005/166/EC).

This report was prepared to fulfil the reporting obligations of Article 3 (1) f ("Short-NIR") and of Article 3 (1) i-k (Information on recalculations, reporting on indicators and information on changes of the national systems) of the Monitoring Decision. Since 2008 the reporting under Article 3 (1) g (information from the national registry) and 3 (1) h (information on legal entities authorised to participate in mechanisms of the Kyoto Protocol) has been obligatory and is included in this report.

2 EMISSION TRENDS

Under the burden sharing agreement of the European Union, Austria is committed to a reduction of its greenhouse gases by 13% below 1990 levels by 2008–2012. Table 1 shows the summary of Austria's anthropogenic greenhouse gas emissions 1990–2006.

Table 1: Austria's anthropogenic greenhouse gas emissions by gas

Greenhouse gas emissions	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
	CO_2 equivalents (Gg)								
CO_2	62 085	63 965	65 928	70 200	72 115	78 271	77 529	79 515	77 283
CH_4	9 184	8 543	7 622	7 507	7 381	7 383	7 224	7 071	6 937
N_2O	6 298	6 640	6 284	6 159	6 161	6 087	5 374	5 353	5 397
HFCs	23	267	596	694	781	863	897	908	858
PFCs	1 079	69	72	82	87	102	126	125	136
SF_6	503	1 139	633	637	641	594	513	286	480
Total (without LULUCF)	**79 172**	**80 624**	**81 136**	**85 279**	**87 166**	**93 300**	**91 663**	**93 260**	**91 090**

Austria's total greenhouse gases show an increase of 15.1% from the base year to 2006 (CO_2: +24.5%). In the period from 2005 to 2006 Austria's total greenhouse gas emissions decreased by 2.3%, CO_2 emissions decreased by 2.8%. Figure 1 presents the trend in total GHG emissions 1990–2006 in comparison to Austria's Kyoto reduction target of 13% from the base year 1990 (BY). Emissions and removals from land use, land-use change and forestry (LULUCF) are excluded.

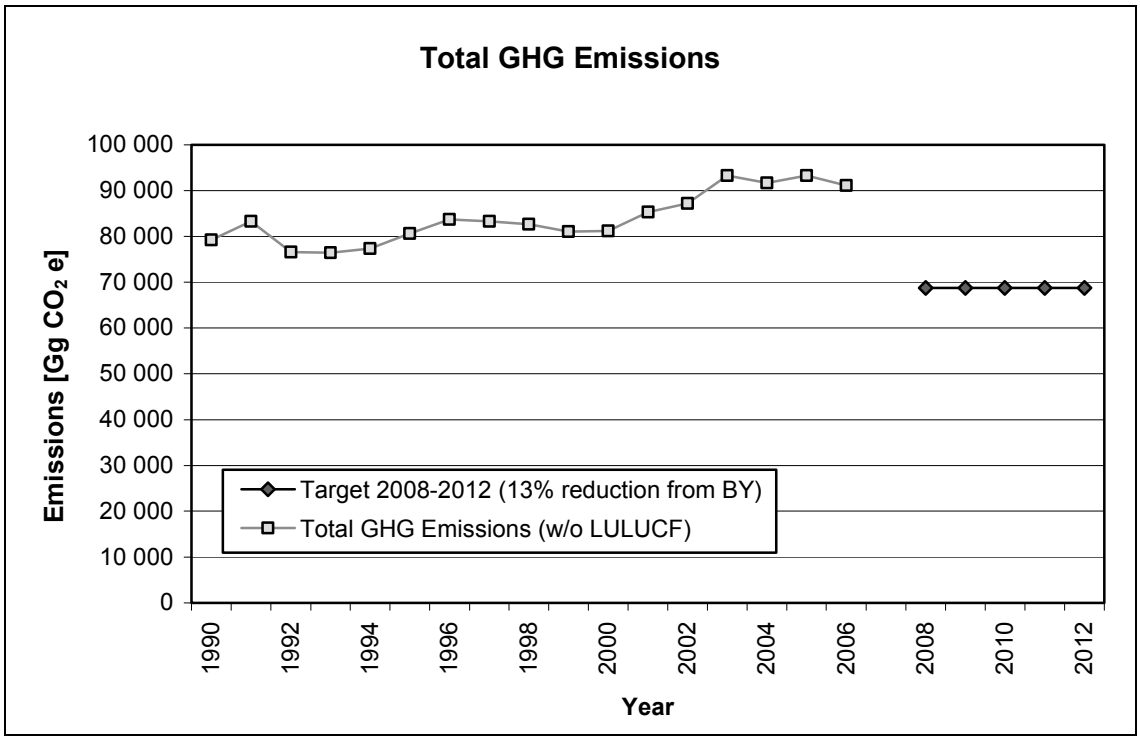

Figure 1: Trend in total GHG emissions 1990–2006

Table 2 presents a summary of Austria's anthropogenic greenhouse gas emissions by sector for the period from 1990 to 2006:

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

Greenhouse gas source and sink categories	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
	CO_2 equivalents (Gg)								
1. Energy	55 728	58 049	59 653	64 017	65 381	71 630	70 953	72 424	69 845
2. Industrial Processes	10 111	9 729	10 034	9 907	10 591	10 662	9 987	10 300	10 773
3. Solvent and Other Product Use	515	422	414	436	435	415	399	364	385
4. Agriculture	9 169	9 240	8 385	8 330	8 209	8 021	7 876	7 854	7 889
5. Land-Use Change and Forestry *	-14 341	-17 114	-18 025	-20 746	-16 972	-18 329	-18 487	-18 119	-18 154
6. Waste	3 648	3 183	2 651	2 589	2 550	2 572	2 447	2 318	2 197
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA

** Net emissions*

Austria's greenhouse gas emissions by sector in the base year and in 2006 as well as their share and trend are presented in the following table.

Table 3: Austria's greenhouse gas emissions by sector in the base year (1990) and in 2006 as well as their share and trend

GHG	1990	2006	Trend 1990-2006	1990	2006
	Emissions [Gg CO_2e]			Share [%]	
Total	**79 172**	**91 090**	**15.1%**	**100.0%**	**100.0%**
1 Energy	55 728	69 845	25.3%	70.4%	76.7%
2 Industry	10 111	10 773	6.6%	12.8%	11.8%
3 Solvent	515	385	-25.2%	0.7%	0.4%
4 Agriculture	9 169	7 889	-14.0%	11.6%	8.7%
5 LULUCF	-14 341	-18 154	26.6%	-18.1%	-19.9%
6 Waste	3 648	2 197	-39.8%	4.6%	2.4%

Total emissions without emissions from LULUCF

The dominant sectors are the energy sector, which caused 77% of total greenhouse gas emissions in Austria in 2006 (70% in 1990), followed by the Sector Industrial Processes, which caused 12% of greenhouse gas emissions in 2006 (13% in 1990).

The trend of Austria's greenhouse gas emissions by sector is presented in Figure 2 in relation to emissions in the base year 1990.

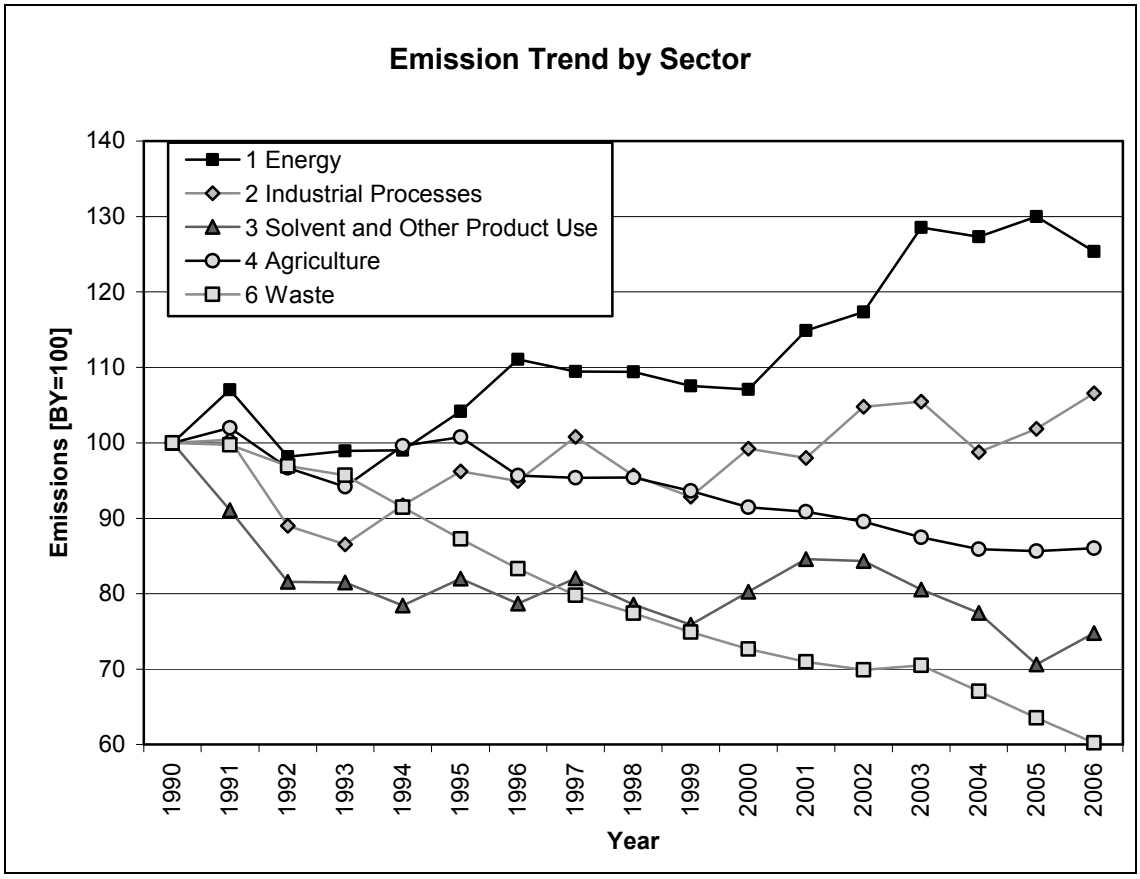

Figure 2: Trend in emissions 1990–2006 by sector in index form (base year = 100)

2.1 Energy (IPCC Category 1)

The trend for greenhouse gas emissions from IPCC category 1 (Energy) shows that emissions increased between 1990 and 1996 and then slightly decreased between 1996 and 2000. The strong increase between 2000 and 2003 is followed by a small decrease of emissions until 2006. In 2006 greenhouse gas emissions from Category *1 Energy* amounted to 69 845 Gg CO_2 equivalents which corresponds to 76.7% of total national emissions.

In 2006, 99.1% of the emissions from this sector originate from fossil fuel combustion (Sector 1.A.), fugitive emissions from fuels (Sector 1.B.) were of minor importance.

CO_2 contributed 97.4% of the total GHG emissions from *Energy*, CH_4 1.4% and N_2O 1.2%.

The most important energy sub-sectors in 2006 were *1.A.3. Transport* with a share of 33 %, followed by *1.A.2. Manufacturing Industries and Construction* (23 %), *1.A.1. Energy Industries* (22 %), and *1.A.4. Other Sectors* (20 %).

The increasing trend in IPCC Category 1 (Energy) is mainly due to a strong increase of emissions from sub-sector *1.A.3. Transport* that almost doubled from 1990 to 2006 with an increase of 82 %. Apart from an increase of road performance (kilometres driven) in Austria, another main reason for this strong increase is the so-called 'tank tourism'. In the early 1990s fuel prices in Austria were higher compared to neighbouring countries, whereas since the mid-1990s it has been the other way round.

Emissions from *1.A.2. Manufacturing Industries and Construction* increased by 17% from 1990 to 2006, due to the increase in fuel consumption (increase of natural gas and fuel waste consumption, whereas consumption of liquid fossil fuels decreased). Between 2005 and 2006 emissions decreased slightly by 0.6 %.

Emissions from sub-sector *1.A.1. Energy Industries* show an increase of 12 % from the base year to 2006. The main drivers for emissions from this sector are total electricity production (which increased about 23% from 1990 to 2006) and an increase in heat production, which tripled over this period due to an increase in the demand for district heating in the residential and commercial sector. Furthermore, the share of biomass used as a fuel in this sector and the contribution of hydro plants to total electricity production, which is generally about 72 % and varied from 65 % to 78 % in the period under observation (depending on the annual water situation), are important drivers. Also the climatic circumstances influence emissions from this sector: a cold winter leads to an increase of heat production.

The increase of heating, demand for hot water generation, climatic circumstances and the change of fuel mix are the most important drivers for emissions from *1.A.4. Other Sectors*. Emissions in 2006 are 6 % lower than in the base year, and 4 % lower than in 2005.

2.2 Industrial Processes (IPCC Category 2)

Greenhouse gas emissions from the industrial processes sector fluctuated during the period 1990–2006 and show a minimum in 1993. In 2006 they were 6.6 % above the level of the base year. In 2006 greenhouse gas emissions from Category *2 Industrial Processes* amounted to 10 773 Gg CO_2 equivalents, which corresponds to 11.8% of total national emissions.

The main sources of greenhouse gas emissions in the industrial processes sector are *Metal Production* and *Mineral Products*, which caused 47 % and 31 % of the emissions from this sector in 2006. The emission trend in this sector follows more or less production figures.

The most important GHG of the industry sector was carbon dioxide with 83.5 % of emissions from this category, followed by HFCs with 8.0 %, SF_6 with 4.5 %, N_2O with 2.6 %, PFCs with 1.3 % and finally CH_4 with 0.2 %.

2.3 Solvent and Other Product Use (IPCC Category 3)

In 2006, 0.4% of total GHG emissions in Austria (385 Gg CO_2 equivalents) originated from *Solvent and Other Product Use*. Greenhouse gas emissions in this sector decreased by 25.2 % from 1990 to 2006 due to decreasing solvent and N_2O use.

57 % of these emissions were indirect CO_2 emissions, 43 % were accounted for by N_2O emissions.

2.4 Agriculture (IPCC Category 4)

Greenhouse gas emissions from the agricultural sector fluctuated in the early 1990s, since 1995 they have shown a steady downward trend. In 2006 emissions from this category were 14 % below the base year level. The decrease is mainly due to decreasing livestock numbers. The fluctuations result from changes in mineral fertilizer sales data which were used as activity data for calculating N_2O emissions from agricultural soils, an important sub-source.

Emissions from Agriculture amounted to 7 889 Gg CO_2 equivalents in 2006, which corresponds to 8.7 % of total national emissions. In 2006 the most important sub-sector *Enteric Fermentation* contributed 41 % of total greenhouse gas emissions from the agricultural sector; the second largest sub-source *Agricultural Soils* has a share of 37 %.

In the Austrian GHG inventory Agriculture is the largest source for both N_2O and CH_4 emissions: in 2006 70 % of total N_2O emissions and 59 % (195 Gg) of total CH_4 emissions in Austria originated from this sector. N_2O emissions from *Agriculture* amounted to 12.2 Gg in 2006 (3 794 Gg CO_2 equivalents), which corresponds to 48 % of the GHG emissions from this sector. The share of methane was 52 %.

2.5 LULUCF (IPCC Category 5)

The Category Land use, land-use change and forestry is a net sink in Austria. Net removals from this category amounted to 14 341 Gg CO_2 equivalents in the base year, which corresponds to 18 % of national total GHG emissions (without LULUCF) compared to 20 % in the year 2006. The trend in net removals from LULUCF is plus 26.6 % over the observed period.

The main sink is subcategory *5.A. Forest Land* with net removals of 19 729 Gg CO_2 in 2006. Small CO_2 and N_2O emissions arise from the other subcategories, where total net emissions amounted to 1 575 Gg CO_2 equivalents in 2006.

2.6 Waste (IPCC Category 6)

Greenhouse gas emissions from Category *6 Waste* decreased steadily during the period 1990–2002, mainly as a result of waste management policies: the amount of landfilled waste has decreased and methane recovery improved. The slight increase from 2002 to 2003 was followed by a decrease until 2006. The trend between 2002 and 2006 is influenced by the amount of deposited waste. In 2006 emissions from this category were 39.8 % below the base year level.

In 2006 the greenhouse gas emissions from the waste sector amounted to 2 197 Gg CO_2 equivalents, which corresponds to 2.4% of total national emissions.

The main source of greenhouse gas emissions in the waste sector is *solid waste disposal on land*, which caused 80.1 % of the emissions from this sector in 2006; the second largest source is *waste water handling* with 14.6 %.

In 2006 the most important GHG of the *Waste* sector was CH_4 with 83.5 % of emissions from this category, followed by N_2O with 15.9 %, and CO_2 with 0.6 %.

3 METHOD OF REPORTING AND DATA BASIS

The Austrian greenhouse gas inventory for the period 1990 to 2006 was compiled according to the recommendations for inventories set out in the UNFCCC reporting guidelines according to Decision 18/CP.8, the Common Reporting Format (CRF), Decision 13/CP.9, the new CRF for the Land Use Change and Forestry Sector, the IPCC 1996 Guidelines for National Greenhouse Gas Inventories, which specify the reporting obligations according to Articles 4 and 12 of the UNFCCC as well as the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.

Regulations under the UNFCCC and the Kyoto Protocol define the new standards for national emission inventories. These standards include more stringent requirements related to transparency, consistency, comparability, completeness and accuracy of inventories. Each Party shall have in place a national system, no later than one year prior to the start of the first commitment period (2008–2012). This national system shall include 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.

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.

The Austrian greenhouse gas inventory is subject to continuous improvement, resulting in recalculations as outlined in Chapters 3.1 and 3.5. Issues identified in the inventory reviews by the UNFCCC are considered in the inventory improvement programme. The last in-depth review took place in February 2007.

Annex 1 to this report presents Austria's greenhouse gas inventory data (CO_2 emissions, CO_2 removals, CH_4, N_2O, HFC, PFC and SF_6) in the format of the CRF Summary Table 10 (Emission Trends).

The complete tables of the Common Reporting Format, including in particular Sectoral Reports, Sectoral Background Tables and a Reference Approach for CO_2 are submitted separately in digital form only (xml file and excel files).

The following table summarises the status of the present report:

Table 4: Status of the present report

Reporting Obligation	Format	Inventory	Version
Mechanism for monitoring Community greenhouse gas emissions	Common Reporting Format (CRF)	OLI 2007	December 2007

3.1 Relation with data reported earlier

As a result of the continuous improvement of Austria’s GHG inventory, emissions of some sources have been recalculated on the basis of updated data or revised methodologies, thus emission data for 1990 to 2005 which are submitted this year differ slightly from data reported previously.

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

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

	1990 (Base year)	2005
	Recalculation Difference [%]	
TOTAL	0.15%	-0.02%
CO_2	0.25%	-0.17%
CH_4	0.04%	0.20%
N_2O	-0.62%	1.86%
HFC, PFC, SF6	0.00%	0.24%

Emissions without LULUCF

CO_2 emissions in all years were recalculated by including combustion related GHG emissions from the gas suppliers 'own usage' in the sectoral approach (1.A.1.c/natural gas). This is the main reason for the increase of reported CO_2 emissions in 1990.

The main reason for the decrease of reported CO_2 emissions in 2005 is correction of fuel consumption double counting in the sector 1.A.2.a Iron and Steel.

The main reason for the increase of reported methane emissions in 2005 is the update of activity data in the sector *6.A.1. Managed Waste Disposal on Land*.

The main reason for the changes of reported N_2O emissions is the update of N_2O emission factors in *1.A.3.b Road Transport*. In 2005 the revision of N-content of crops in sector *4.D.1. Direct Soil Emissions* leads to an additional increase of N_2O emissions.

The main reason for the increase of reported emissions of fluorinated compounds is the update of potential emissions in several 2 F subcategories.

A description of these and other recalculations by sector is given in Chapter 3.5.

The UNFCCC review process of the last submission (NIR 2007) is just about to start. This is why no particular improvements in this submission can be identified in response to issues raised in the UNFCCC review of the last submission.

The figures presented in this report replace data reported earlier by Austria under the reporting framework of the UNFCCC, in particular data which had been included in the inventory chapter of the Fourth National Communication of the Austrian Federal Government (2006) and in Austria's 2006 and 2007 submissions to the UNFCCC (Austrian Greenhouse Gas Emissions 1990–2004 and 1990–2005).

3.2 Information on Completeness

Geographical coverage is complete. There is no part of the Austrian territory that has not been covered by the inventory.

Emissions from most sources specified in the CRF have been estimated. For information on sources not estimated („NE") and emissions included with sources other than those stipulated in the CRF („IE") please refer to Table 9 Completeness of the CRF.

3.3 National Inventory System Austria (NISA)

A Party to the Kyoto Protocol must provide a description of its national system, reported in accordance with the guidelines for the preparation of the 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). This section provides a short summary of the most important items; a detailed description of the NISA can be found in the Austrian Initial Report[4], in Austria's NIR 2007[5] and in the NISA Implementation Report[6].

Austria has a centralized inventory system, with all the work related to inventory preparation being carried out at the single national entity. The most important legal arrangement is the Austrian Environmental Control Act (Umweltkontrollgesetz[7]), which defines the main responsibility for inventory preparation and identifies the Umweltbundesamt as the one single national entity with overall responsibility for inventory preparation. The "Inspection body for GHG inventory" within the Umweltbundesamt is responsible for the compilation of the greenhouse gas inventory.

As far as the process for collecting activity data, for selecting emission factors and methods, and for the development of emission estimates is concerned, specific responsibilities for the different emission source/sink categories ("sector experts") are defined within the inventory system, as well as for all activities related to the preparation of the inventory, including QA/QC, data management and reporting.

Sector experts collect activity data, emission factors and all relevant information needed for finally estimating emissions. The sector experts also have specific responsibilities regarding the choice of methods, data processing and archiving and for contracting studies, if needed. As part of the quality management system the head of the "Inspection body for GHG inventory" approves the methodological choices. Sector experts are also responsible for performing Quality Control (QC) activities that are incorporated in the Quality Management System (QMS).

During the inventory preparation process, all data collected together with emission estimates are fed into a database, where data sources are well documented for future reconstruction of the inventory. 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 UNFCCC.

For inventory management reliable data management 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.

As part of the QMS (Corrective and Preventive Actions) 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 rele-

[4] 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

[5] UMWELTBUNDESAMT (2007) Austria's National Inventory Report, Submission under the United Nations Framework Convention on Climate Change, REP-0084; Umweltbundesamt, Vienna

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

[7] „Umweltkontrollgesetz"; Federal Law Gazette 152/1998

vant technical elements of inventories. Any findings and discrepancies are documented; responsibilities, resources and a time schedule are attributed to each of these in the improvement plan. Measures, which include possible recalculations, are taken by the sector experts.

Parts of the legal and institutional arrangements in place are relevant for data availability for the annual compilation of the GHG inventory. The main data sources used, as well as information on who did the actual calculations, are presented in the following chapter.

3.4 Sources of data

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.

The following table presents the main data sources used for activity data as well as information on who did the actual calculations:

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

Sector	Data Sources for Activity Data	Emission Calculation
Energy	Energy Balance from Statistik Austria; EU-ETS; Steam boiler database;	Umweltbundesamt, plant operators
Industry	National production statistics, import/export statistics; EU-ETS; direct information from industry or associations of industry;	Umweltbundesamt, plant operators F-gases based on a study by: EcoEfficient Technologies, Vienna
Solvent	Import/export statistics, production statistics, consumption statistics;	Umweltbundesamt based on a study by: Forschungsinstitut für Energie und Umweltplanung, Wirtschaft und Marktanalysen GmbH and Institut für industrielle Ökologie[8]
Agriculture	National Studies, national agricultural statistics obtained from Statistik Austria;	Umweltbundesamt based on a study by: University of Natural Resources and Applied Life Sciences, Research Center Seibersdorf
LULUCF	National forest inventory obtained from the Austrian Federal Office and Research Centre for Forest	Umweltbundesamt
Waste	Database on landfills	Umweltbundesamt

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

The main sources for emission factors are:

- national studies for country specific emission factors
- plant-specific data reported by plant operators
- IPCC GPG
- Revised IPCC 1996 Guidelines
- EMEP/CORINAIR Guidebook.

A complete list of data sources for activity and emission data or emission factors used by sector can be found in the National Inventory Report 2008 to be published in spring 2008.

Table *Summary 3* of the CRF (Summary Report for Methods and Emission Factors Used) presents the methods applied and the origin of emission factors used in the present Austrian GHG inventory. The description of methodologies and data sources used for the Community's key sources can be found in the separate file AT_AnnexI_ KS2008.xls. This file follows in structure and content the latest version provided by the Commission to the member states on November 20, 2007.

3.5 Recalculations

This chapter describes the changes made to the inventory since the last submission to the UNFCCC (April 2007). Further background information and a complete description of the 2007 inventory are given in Austria's National Inventory Report 2008, which will be published in spring 2008.

3.5.1 Energy (IPCC Category 1)

Combustion Activities (1 A)

Update of activity data:

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

Energy balance update and corrections:

- Correction of residual fuel oil NCVs from 1995 to 2005 (e.g. +2% in 1999, +1% in 2005).
- Correction of hard coal NCVs from 1999 to 2001 and from 2004 to 2005 (e.g -4.5% in 2000; -0.2% in 2005).
- Correction of brown coal NCVs from 1999 to 2001 and for 2005 (e.g +0.2% in 1999; +3.9% in 2001).
- Correction of petrol coke and 'other oil products' NCVs 1994 to 1996 (+0.2%).

Correction of NCVs affects fuel consumption calculation (conversion of tonnes or cubic metres to TJ) and therefore leads to changes in GHG emission calculations for the respective fuels and periods as mentioned above.

Update of activity data (in 'tonnes' or 'cubic metres' per category) mainly affects the period 1999 to 2004. Transformation input has been revised to improve the compliance between transformation input and electricity and heat production (more reliable efficiencies). National fossil fuel consumption and total CO_2 emissions are not affected by this update but consumption and emissions have been shifted between categories 1.A.1 (public energy plants) and 1.A.2 (auto producer plants) and/or between final energy consumption and transformation input.

Improvement of Reference Approach

Naphtha, anthracite and sub-bituminous coal are now considered separate fuels/flows.

Improved methodology of ETS data input

Improved allocation of ETS reported fuels to IEA fuel definition. Fuel classification is more compliant with energy statistics definitions (e.g. coal reported as 'lignite' with an NCV > 20 GJ/t has been shifted to bituminous coal).

Changes in Allocation

Sinter magnesite plants 2002 to 2005 have been shifted from category 1.A.2.b Non Ferrous Metals to category 1.A.2.f. Other Industry.

1.A.3.b Transport – Road: Update of statistical energy data, particularly the biodiesel consumption.

1.A.3.e Pipeline compressors: Update of 2004 natural gas consumption according to the updated national energy balance.

1.A.4. Mobile Sources: Update of statistical energy data for railways (coal, diesel, electricity) up to 2000.

Improvements of methodologies and emission factors:

1.A.1.c Other Energy Industries – natural gas:

New information from E-Control clarified that 'natural gas distribution losses' in the Energy Balance also includes the natural gas suppliers' 'own usage' of natural gas. Previously it was assumed that 'distribution losses' included statistical differences and therefore no emissions had been calculated from this quantity. The energy balance has been revised from 1990 on and 'own usage' has been shifted to the oil/gas extraction sector. The remaining quantity of distribution losses is now much lower and represents a more reliable quantity of real fugitive losses.

The sectoral approach considers now combustion related GHG emissions from the gas suppliers 'own usage'. This leads to higher consumption (1990: 2382 TJ) and GHG emissions (1990: + 132 Gg CO2) of category 1.A.1.c/natural gas.

1.A.2.a Iron and Steel:

Updated natural gas activity data from 2004 to 2005 has been submitted by the integrated steel plants operator. The plant operator affirms that updated activity data is more consistent with reported CO_2 emissions. This leads to up to -105 Gg less CO_2 emissions for the respective years due to the avoidance of fuel consumption 'double counting'.

1.A.2.f Cement Production:

Update of 2003 to 2004 activity data and emissions according to a 'bottom up' approach (unpublished national study).

1.A.3.b Road Transport:

All emission factors for passenger cars, light goods vehicles and motorcycles have been updated. The source of the new emission factors is the EU project ARTEMIS. In ARTEMIS a new set of real world driving cycles was developed (CADC, Common ARTEMIS Driving Cycle; http://www.trl.co.uk/artemis/introduction.htm). This CADC results for most exhaust gas components in emission factors that are clearly different compared to the former ones (HBEFA; 2004, www.hbefa.net).

1.A.4.b Residential:

Update of heating type split from 2001 onwards by means of 2004 household census data. This affects calculation of CH_4 emissions from residential heating.

Fuel consumption of new biomass heating has been revised from the year 2000 onwards by means of new boiler sales statistics. This affects calculation of CH_4 emissions from residential biomass heating.

Fugitive Emissions (1 B)

Update of activity data:

1.B.1.a Coal Mining: Activity data for 2005 was updated according to information from the Association of Mining and Steel.

1.B.2.a Refining/Storage: Activity data for 2005 was updated according to data from the national energy balance

1.B.2.b Distribution: Length of Distribution Network for 2005 was updated according to updated data from E-Control.

3.5.2 Industrial Processes (IPCC Category 2)

Update of activity data:

2.A.7.a Bricks: Activity data for 2005 was updated.

2.B.1. Ammonia: Natural gas consumption was updated according to data from the national energy balance.

2.C.1. Iron and Steel:

Process-specific CO_2 emissions from pig iron production for 2005 were recalculated as the underlying activity data used for the calculation (non-energy use of coke) was updated in the national energy balance.

2.C.2. Ferroalloys: Activity data for 2005 was updated.

2.F.3. Fire Extinguishers: the stocks of C_4F_{10} and HFC 23 were updated.

2.F.4. Aerosols and 2.F.5 Solvents:

Potential emissions have been updated for the years 2003–2005 according to recalculations of the Austrian GDP in these years.

2.F.7. Semiconductor Manufacture: Potential emissions were updated for 2003 to 2005.

2.F.8. Electrical equipment: Potential emissions were updated for 2005.

Improvements of methodologies and emission factors:

2.F.2. Foam Blowing: HFC 245fa and HFC 365mfc emissions, previously reported as unspecified mix of HFC, were excluded from the GHG Inventory totals, because they are not fluorinated gases as defined in the CRF. They are now reported in CRF Table 9(b) as additional GHG.

3.5.3 Solvent and other Product Use (IPCC Category 3)

Update of activity data:

3.A, 3.B, 3.C and 3.D.5.: NMVOC emissions from solvent use have been updated using short-term economic data provided by Statistik Austria.

3.5.4 Agriculture (IPCC Category 4)

Improvements of methodologies and emission factors:

The revision of the share of dairy cattle held in loose (32%) and tied housing systems (68%) within the NH_3 inventory resulted in slightly lower direct N_2O emissions from animal manure applied to soils and slightly higher indirect N_2O emissions.

The new data on housing system distribution is based on the following study:

AMON, B., FRÖHLICH, M., WEIßENSTEINER, R, ZABLATNIK, B., AMON. T. (2007): Tierhaltung und Wirtschaftsdüngermanagement in Österreich. Endbericht Projekt Nr. 1441 Auftraggeber: Bundesministerium für Land- und Forstwirtschaft, Umwelt- und Wasserwirtschaft, Wien.

4.D.1. Direct Soil Emissions – Crop Residue: N contents of crops were revised, resulting in higher N_2O emissions from 1990 onwards.

3.5.5 LULUCF (IPCC Category 5)

General improvements:

For all LUC categories the areas undergoing conversion are followed up and reported for 20 years. After these 20 years they are accounted for in the remaining categories. Consequently, the whole time series on activity data (consistent area table for land use and land use changes) has been revised.

Update of activity data:

5.B. Cropland:

For the area of perennial cropland national data sources from Statistik Austria since 1960 are used.

For annual cropland a national emission factor for C-stock in biomass was calculated which replaces the IPCC default value.

5.C. Grassland:

For grassland national emission factors for C-stock in biomass (ΔC growth) and below ground biomass were calculated which replace the IPCC default values.

3.5.6 Waste (IPCC Category 6)

Update of activity data

6.A.1. Managed waste disposal on land:

Activity data (1998 to 2005) has been updated. According to the Austrian Landfill Ordinance, the operators of landfill sites have to report their activity data annually. Based on reports received after the due date and updates, the amount of deposited waste changed slightly (<10 %) compared to the previous submission.

According to the recommendation of the ERT, the double counting of deposited waste due to the clean-up of former waste deposits was corrected and resulted in lower amounts of deposited waste in 2002 and 2003.

6.B. Waste Water Handling: The interpolation of the connection rate was corrected and affected N_2O emissions over the whole time series.

6.D. Other:

Sewage sludge is no longer considered a separate waste fraction for composting as it can be assumed that it is already accounted for in the waste fraction undergoing mechanical-biological treatment. Emissions from mechanical-biological treatment are considered in this source category.

Activity Data for mechanical-biological treatment have been updated for the years 2003-2005, as new data were available.

Activity Data for separately collected bio-waste were updated from 2001-2005, because new data from the waste Management Concepts and Plans of the nine Federal Provinces (Bundesländer) were available.

Improvements of methodologies and emission factors:

6.A.1. Managed waste disposal on land: The DOC values for residual waste were updated for the years 2000-2005.

6.B. Waste Water Handling: A new value for the denitrification rate was available so the 2005 value was updated (interpolation between 2004 and 2006) accordingly.

3.6 Quality Assurance and Quality Control (QA/QC)

A quality management system (QMS) has been designed to achieve to the objectives of *good practice guidance*, namely to improve transparency, consistency, comparability, completeness and confidence in national inventories of emissions estimates. The QMS is based on the International Standard ISO 17020 *General Criteria for the operation of various types of bodies performing inspections*. The QMS ensures that all requirements of a type A inspection body as stipulated in ISO 17020 are met, which include strict independence, impartiality and integrity. Since December 2005 the Umweltbundesamt has been accredited as inspection body (Id.No.241) in accordance with the Austrian Accreditation Law.

The implementation of QA/QC procedures as required by the IPCC-GPG support 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-GPG Chapter 8 ”Quality Assurance and Quality Control”, and goes beyond. It also 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).

The Austrian Quality Management System is described in detail in Austria’s NIR 2007[5].

3.7 Uncertainty Assessment

After a first uncertainty analysis in 2000[9] and sector-specific uncertainty updates by expert judgements in the following years, a second comprehensive uncertainty analysis was performed by WINIWARTER in 2007 (in publication) on the greenhouse gases CO_2, CH_4, N_2O, HFC, PFC and SF_6 for 1990 and 2005. Information on the general results of this uncertainty analysis can be found in Austria's NIR 2007. Sector-specific information will be updated in Austria's NIR 2008, which will be published in spring 2008. Table 7 shows the key results of the latest uncertainty evaluation of the Austrian GHG Inventory using the Tier 2 approach (Monte-Carlo Analysis).

Table 7: Key results of the second comprehensive study on Austrian GHG inventory uncertainty

Random uncertainty		**CO_2**	**CH_4**	**N_2O**	**PFC**	**HFC**	**SF_6**	**Total GHG emissions**
1990	Mean value	61.93	9.18	6.24	1.08	0.02	0.50	78.96
	Standard deviation	0.43	0.72	2.53	0.26	0.01	0.04	2.68
	2σ	**1.4%**	**15.8%**	**81.1%**	**48.7%**	**49.6%**	**16.8%**	**6.8%**
2005	Mean value	79.67	7.05	5.22	0.12	0.91	0.29	93.26
	Standard deviation	0.79	0.53	2.18	0.01	0.25	0.03	2.40
	2σ	**2.0%**	**15.1%**	**83.5%**	**11.3%**	**54.2%**	**24.1%**	**5.1%**

Uncertainty calculation and reporting according to IPCC GPG (2000) Table 6.1 for key categories is presented in Annex II.

3.8 Comparison of the Sectoral Approach with the Reference Approach

In the following, CO_2 emissions from the sectoral and reference approach are compared and explanations for the differences are provided.

Table 8 shows CO_2 emissions calculated from the two approaches.

Table 8: CO_2 emissions by type of fuel

Year	**Reference Approach**				**Sectoral Approach *1 A Fuel Combustion***				
	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	**Total [Gg CO_2]**	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	Other [Gg CO_2]	**Total [Gg CO_2]**
1990	28 302	15 917	12 238	**56 457**	28 138	13 924	11 301	732	**54 094**
1991	30 837	16 771	12 939	**60 547**	30 615	14 518	11 940	805	**57 878**
1992	29 870	12 957	12 705	**55 532**	29 349	10 666	12 000	956	**52 972**
1993	30 933	11 650	13 399	**55 982**	30 758	9 495	12 453	675	**53 381**
1994	30 181	11 810	13 782	**55 774**	30 127	9 379	13 111	820	**53 437**
1995	30 771	13 499	15 048	**59 318**	30 336	10 741	14 339	839	**56 255**
1996	33 210	13 511	16 017	**62 738**	32 950	10 760	15 287	1 073	**60 070**

[9] WINIWARTER, W.; RYPDAL, K. (2001): Assessing the Uncertainty Associated with National Greenhouse Gas Emission Inventories: A Case Study for Austria, Atmospheric Environment 35 (2001) 5425–5440.

Year	Reference Approach				Sectoral Approach *1 A Fuel Combustion*				
	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	**Total [Gg CO_2]**	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	Other [Gg CO_2]	**Total [Gg CO_2]**
1997	32 653	14 318	15 437	**62 408**	32 150	11 318	14 720	1 017	**59 205**
1998	34 935	12 550	15 848	**63 333**	34 274	8 905	15 136	818	**59 133**
1999	32 921	12 478	16 125	**61 524**	32 617	9 195	15 406	820	**58 037**
2000	32 035	14 151	15 388	**61 574**	31 812	10 443	14 684	866	**57 804**
2001	34 435	14 581	16 309	**65 325**	34 209	11 249	15 629	1 009	**62 096**
2002	35 402	14 880	16 494	**66 776**	35 318	11 133	15 792	1 205	**63 450**
2003	38 276	15 970	17 833	**72 079**	38 554	12 607	17 070	1 372	**69 603**
2004	38 069	15 725	17 622	**71 416**	38 221	12 225	16 915	1 576	**68 937**
2005	38 912	15 705	19 307	**73 924**	38 602	11 897	18 508	1 410	**70 417**
2006	38 698	15 803	17 605	**72 106**	37 521	11 872	16 792	1 633	**67 818**

Table 9 shows the difference (in percent) between reference and sectoral approach CO_2 emissions.

Table 9: Difference (in %) of CO_2 emissions by type of fuel

Year	Liquid	Solid	Gaseous	Total
1990	0.58%	14.31%	8.29%	4.37%
1991	0.73%	15.52%	8.36%	4.61%
1992	1.78%	21.47%	5.87%	4.83%
1993	0.57%	22.70%	7.60%	4.87%
1994	0.18%	25.92%	5.12%	4.37%
1995	1.44%	25.67%	4.94%	5.45%
1996	0.79%	25.57%	4.77%	4.44%
1997	1.56%	26.50%	4.87%	5.41%
1998	1.93%	40.94%	4.71%	7.10%
1999	0.93%	35.71%	4.67%	6.01%
2000	0.70%	35.50%	4.80%	6.52%
2001	0.66%	29.62%	4.35%	5.20%
2002	0.24%	33.65%	4.44%	5.24%
2003	-0.72%	26.67%	4.47%	3.56%
2004	-0.40%	28.63%	4.18%	3.60%
2005	0.80%	32.01%	4.31%	4.98%
2006	3.14%	33.12%	4.84%	6.32%

Positive numbers indicate that CO_2 emissions from the reference approach are higher than emissions from the sectoral approach.

3.8.1 Explanation of differences

- In the reference approach IPCC default net calorific values are used except for bituminous coal and lignite. In the sectoral approach country-specific net calorific values are used for all types of fuels.

- The selected carbon emission factors (carbon content) of the two approaches are different, especially for coal.
- *Liquid Fuels:* The energy balance is mass-balanced but not carbon balanced. The fuel category *Other Oil* is an aggregation of several fuel types and therefore it is difficult to quantify a reliable carbon emission factor for the reference approach. The reference approach takes a share of feedstock used for plastics and solvent production as non-carbon stored. In the sectoral approach emissions from waste incineration including plastics and waste oil are included in *Other Fuels*. Emissions from solvent use are included in category *3. Solvent and Other Products Use*. In the sectoral approach a share of municipal solid waste without energy recovery is considered in category *6.C.* for 1990 and 1991.
- *Diesel:* In the Reference Approach CO_2 emissions from diesel are fully accounted for as fossil emissions while in the sectoral approach the share of mixed biofuel is accounted for as biogenic.
- *Solid fuels:* The reference approach includes process emissions from blast furnaces and steel production which are included in category *2.C. Metal Production* as well as process emissions from carbide production which are included in category *2.B.4. Carbide Production*. In the sectoral approach plant-specific CO_2 emission factors have been used for large coal boilers since 2005.
- *Gaseous fuels:* The national approach uses country specific carbon contents and heating values different to IPCC default factors. Process emissions from ammonia production are included in category *2.B.1. Ammonia Production*.
- *Other fuels:* The sectoral approach considers waste an additional fuel type (e.g. municipal solid waste, hazardous waste and industrial fuel waste).
- *Carbon Stored:* The reference approach uses IPCC default values for "fractions of carbon stored".

3.8.2 Quantification of differences

By quantifying the difference between the two approaches the remaining difference is between -1.0 to +1.6%. Currently it is not possible to quantify all fossil carbon flows such as solvents and plastic products which are imported or exported by products, bulk or waste.

Table 10 shows the differences that can be easily quantified. Positive numbers indicate CO_2 emissions not included in the sectoral approach. Negative numbers indicate CO_2 emissions which are not considered by the reference approach. The remaining differences are mainly due to the use of country-specific emission factors and NCVs within the sectoral approach and the use of "default fractions of carbon stored" within the reference approach.

Table 10: Quantification of differences.

Year	Natural Gas[(1)] [Gg CO_2]	2 B 1 Ammonia Production[(3)] [Gg CO_2]	Coke Oven Coke[(4)] [Gg CO_2]	Other Fuels [Gg CO_2]	Biofuels[(5)] [Gg CO_2]	Total [Gg CO_2]	Remaining difference[(2)]
1990	162	826	2 704	-732	0	2 960	-1.0%
1991	168	884	2 722	-805	0	2 969	-0.5%
1992	167	595	2 458	-956	0	2 263	0.5%
1993	171	831	2 526	-675	0	2 854	-0.5%
1994	177	556	2 767	-820	0	2 680	-0.6%
1995	194	583	3 136	-839	0	3 075	0.0%
1996	205	597	2 918	-1 073	0	2 648	0.0%

1997	196	591	3 316	-1 017	0	3 086	0.2%
1998	200	585	3 214	-818	0	3 181	1.6%
1999	203	590	3 102	-820	0	3 075	0.7%
2000	193	582	3 489	-866	0	3 398	0.6%
2001	204	551	3 449	-1 009	0	3 194	0.1%
2002	205	573	3 879	-1 205	0	3 451	-0.2%
2003	220	625	3 721	-1 372	0	3 194	-1.0%
2004	218	570	3 650	-1 576	0	2 862	-0.5%
2005	239	598	4 128	-1 410	250	3 804	-0.4%
2006	217	638	4 206	-1 633	877	4 305	0.0%

(1) Deviation due to the use of different carbon emission factors and distribution losses.

(2) Negative numbers indicate that CO_2 emissions from the reference approach are lower than emissions from the sectoral approach.

(3) Process emissions of natural gas used for ammonia production.

(4) Process emissions of coke oven coke used in blast furnaces. Emissions are allocated to 2.C.1. Iron and Steel Production.

(5) Share of biofuel in diesel.

4 ADDITIONAL REPORTING UNDER ARTICLE 3 OF DECISION 280/2004/EC

4.1 Article 3 (1) g

Not applicable because no AAUs, RMUs, ERUs or CERs have been issued or transferred to the Austrian registry.

4.2 Article 3 (1) h

Austria has authorised Kommunalkredit Public Consulting GmbH (Türkenstraße 9, 1092 Vienna) to participate in the mechanisms according to Article 6 and 12 of the Kyoto Protocol.

4.3 Article 3 (1) j

Indicators pursuant to Article 3 (1) j of the Monitoring Decision are reported in Annex III. Emission data are consistent with the CRF; denominators are taken from official Austrian statistics.

4.4 Article 3 (1) k

The national inventory system is unchanged compared to the description given in chapter 3.3 and in the Austrian Initial Report under the Kyoto Protocol[10].

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

ANNEX I: EMISSION TRENDS

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

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

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

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

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

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

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

Table A.I-1: Emission Trends CO_2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
					Gg				
Total Emissions/Removals with LULUCF	**47 491.96**	**46 595.74**	**47 642.84**	**49 189.39**	**54 878.11**	**59 677.67**	**58 774.41**	**61 127.40**	**58 860.72**
Total Emissions without LULUCF	**62 084.94**	**63 965.22**	**65 928.38**	**70 200.00**	**72 115.08**	**78 271.39**	**77 529.03**	**79 515.42**	**77 282.75**
1. Energy	**54 196.26**	**56 381.94**	**57 968.98**	**62 278.91**	**63 616.64**	**69 836.06**	**69 147.11**	**70 622.12**	**68 049.56**
A. Fuel Combustion (Sectoral Approach)	54 094.24	56 254.91	57 804.44	62 096.17	63 449.60	69 603.02	68 937.08	70 417.09	67 817.52
1. Energy Industries	13 792.26	12 918.65	12 352.81	14 127.97	13 670.35	16 116.27	16 351.11	16 095.94	15 426.28
2. Manufacturing Industries and Construction	13 445.48	14 167.55	14 491.12	14 413.51	14 776.25	15 190.16	15 275.23	15 907.97	15 812.24
3. Transport	12 425.58	14 484.10	17 745.11	18 903.08	20 761.41	22 683.80	23 289.61	24 013.77	22 807.93
4. Other Sectors	14 395.90	14 652.02	13 170.45	14 608.55	14 199.69	15 523.49	13 914.54	14 279.29	13 645.61
5. Other	35.02	32.59	44.95	43.07	41.90	89.31	106.59	120.13	125.46
B. Fugitive Emissions from Fuels	102.03	127.03	164.53	182.73	167.03	233.04	210.04	205.04	232.04
1. Solid Fuels	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
2. Oil and Natural Gas	102.03	127.03	164.53	182.73	167.03	233.04	210.04	205.04	232.04
2. Industrial Processes	**7 579.11**	**7 382.43**	**7 766.11**	**7 693.74**	**8 260.57**	**8 205.30**	**8 155.93**	**8 690.90**	**8 999.94**
A. Mineral Products	3 269.05	2 856.93	2 958.13	2 976.77	3 085.41	3 072.98	3 162.59	3 119.86	3 294.35
B. Chemical Industry	585.10	583.65	587.27	539.50	551.22	592.50	530.27	557.38	599.25
C. Metal Production	3 724.96	3 941.84	4 220.70	4 177.48	4 623.93	4 539.83	4 463.06	5 013.66	5 106.34
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	282.67	189.88	181.02	215.09	225.62	217.76	213.72	190.14	220.99
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
	Gg								
D. Agricultural Soils [(2)]									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. Land Use, Land-Use Change and Forestry	-14 592.98	-17 369.48	-18 285.53	-21 010.61	-17 236.98	-18 593.72	-18 754.62	-18 388.02	-18 422.04
A. Forest Land	-16 154.02	-18 764.87	-19 499.81	-22 174.09	-18 355.42	-19 807.51	-19 780.45	-19 753.40	-19 729.23
B. Cropland	1 564.17	1 616.00	1 770.76	1 741.42	1 822.73	1 892.49	1 788.96	1 851.32	1 876.76
C. Grassland	-841.71	-957.62	-1 045.90	-1 007.25	-1 112.01	-1 091.64	-1 174.06	-1 081.37	-1 148.69
D. Wetlands	188.67	243.70	281.30	289.53	297.77	306.00	314.55	307.34	328.77
E. Settlements	-160.04	-250.63	-370.20	-420.86	-432.99	-418.32	-415.17	-209.76	-233.79
F. Other Land	809.95	743.93	578.31	560.63	542.95	525.26	511.56	497.85	484.15
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	26.89	10.97	12.26	12.26	12.26	12.26	12.26	12.26	12.26
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
B. Waste-water Handling									
C. Waste Incineration	26.89	10.97	12.26	12.26	12.26	12.26	12.26	12.26	12.26
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(please specify)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:									
International Bunkers	885.97	1 327.42	1 674.93	1 628.55	1 526.13	1 305.01	1 531.80	1 730.71	1 810.00
Aviation	885.97	1 327.42	1 674.93	1 628.55	1 526.13	1 305.01	1 531.80	1 730.71	1 810.00
Marine	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass	9 770.31	11 218.88	12 478.52	13 252.15	13 431.49	13 626.13	13 935.52	15 084.46	16 481.89

Table A.I-2: Emission Trends CH_4

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
					Gg				
Total Emissions/ Removals with LULUCF	**437.35**	**406.81**	**362.94**	**357.48**	**351.49**	**351.56**	**344.02**	**336.74**	**330.32**
Total Emissions without LULUCF	**437.34**	**406.81**	**362.94**	**357.48**	**351.47**	**351.56**	**344.02**	**336.73**	**330.31**
1. Energy	**40.45**	**42.94**	**42.06**	**43.07**	**43.34**	**44.03**	**45.36**	**46.37**	**47.01**
A. Fuel Combustion (Sectoral Approach)	22.13	20.46	15.13	15.75	14.93	15.05	14.26	14.42	13.73
1. Energy Industries	0.16	0.16	0.16	0.20	0.21	0.24	0.27	0.23	0.30
2. Manufacturing Industries and Construction	0.40	0.45	0.48	0.49	0.50	0.54	0.57	0.59	0.62
3. Transport	3.07	2.99	1.89	1.75	1.68	1.57	1.41	1.27	1.11
4. Other Sectors	18.50	16.87	12.60	13.31	12.54	12.70	12.00	12.32	11.70
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	18.32	22.48	26.93	27.32	28.42	28.98	31.10	31.96	33.28
1. Solid Fuels	0.52	0.28	0.27	0.26	0.30	0.25	0.05	0.00	0.00
2. Oil and Natural Gas	17.80	22.21	26.66	27.07	28.11	28.74	31.05	31.96	33.28
2. Industrial Processes	**0.71**	**0.69**	**0.70**	**0.67**	**0.71**	**0.70**	**0.70**	**0.75**	**0.92**
A. Mineral Products	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA
B. Chemical Industry	0.70	0.68	0.70	0.67	0.70	0.69	0.70	0.75	0.92
C. Metal Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other Production									
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use									
4. Agriculture	**230.02**	**220.14**	**206.62**	**204.44**	**200.09**	**198.54**	**196.89**	**195.70**	**194.99**
A. Enteric Fermentation	179.13	171.16	161.87	159.48	156.59	154.92	154.61	153.34	152.85
B. Manure Management	50.49	48.48	44.23	44.46	43.05	43.15	41.82	41.93	41.68
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
	Gg								
D. Agricultural Soils [2]	0.33	0.44	0.45	0.43	0.38	0.41	0.37	0.37	0.41
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.07	0.07	0.06	0.07	0.07	0.06	0.09	0.06	0.06
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**
A. Forest Land	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
B. Cropland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
F. Other Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**166.16**	**143.04**	**113.57**	**109.29**	**107.33**	**108.29**	**101.06**	**93.90**	**87.39**
A. Solid Waste Disposal on Land	160.79	137.79	109.68	105.62	103.87	105.04	97.59	90.31	83.79
B. Waste-water Handling	4.85	4.21	2.68	2.42	2.18	1.93	1.95	1.96	1.97
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	0.52	1.04	1.21	1.25	1.29	1.32	1.53	1.63	1.63
7. Other *(please specify)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:									
International Bunkers	0.01	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
Aviation	0.01	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
Marine	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass									

Table A.I-3: Emission Trends N_2O

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
					Gg				
Total Emissions/ Removals with LULUCF	**21.13**	**22.25**	**21.11**	**20.72**	**20.73**	**20.49**	**18.20**	**18.14**	**18.27**
Total Emissions without LULUCF	**20.32**	**21.42**	**20.27**	**19.87**	**19.88**	**19.64**	**17.33**	**17.27**	**17.41**
1. Energy	**2.20**	**2.47**	**2.58**	**2.69**	**2.75**	**2.80**	**2.75**	**2.67**	**2.61**
A. Fuel Combustion (Sectoral Approach)	2.20	2.47	2.58	2.69	2.75	2.80	2.75	2.67	2.61
1. Energy Industries	0.15	0.16	0.17	0.20	0.20	0.23	0.25	0.22	0.24
2. Manufacturing Industries and Construction	0.52	0.55	0.57	0.56	0.55	0.52	0.50	0.49	0.51
3. Transport	0.58	0.81	0.91	0.94	1.02	1.06	1.03	1.00	0.93
4. Other Sectors	0.95	0.94	0.93	0.99	0.97	0.99	0.96	0.95	0.92
5. Other	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
B. Fugitive Emissions from Fuels	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA
1. Solid Fuels	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA
2. Oil and Natural Gas	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA
2. Industrial Processes	**2.94**	**2.77**	**3.07**	**2.54**	**2.60**	**2.85**	**0.91**	**0.88**	**0.90**
A. Mineral Products	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA	IE,NA
B. Chemical Industry	2.94	2.77	3.07	2.54	2.60	2.85	0.91	0.88	0.90
C. Metal Production	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Other Production									
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**0.75**	**0.75**	**0.75**	**0.71**	**0.67**	**0.64**	**0.60**	**0.56**	**0.53**
4. Agriculture	**13.99**	**14.89**	**13.05**	**13.02**	**12.93**	**12.43**	**12.07**	**12.08**	**12.24**
A. Enteric Fermentation									
B. Manure Management	3.24	3.16	2.98	2.95	2.89	2.87	2.86	2.83	2.82

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
	Gg								
C. Rice Cultivation									
D. Agricultural Soils [(2)]	10.75	11.74	10.07	10.07	10.03	9.56	9.21	9.25	9.42
E. Prescribed Burning of Savannas	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
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	**0.81**	**0.82**	**0.84**	**0.85**	**0.85**	**0.85**	**0.86**	**0.87**	**0.86**
A. Forest Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Cropland	0.81	0.82	0.84	0.85	0.85	0.85	0.86	0.87	0.86
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
F. Other Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**0.43**	**0.54**	**0.82**	**0.91**	**0.92**	**0.92**	**1.01**	**1.08**	**1.13**
A. Solid Waste Disposal on Land									
B. Waste-water Handling	0.35	0.40	0.65	0.74	0.74	0.74	0.79	0.85	0.90
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	0.08	0.14	0.17	0.17	0.18	0.18	0.21	0.23	0.23
7. Other *(please specify)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:									
International Bunkers	**0.03**	**0.05**	**0.06**	**0.06**	**0.05**	**0.05**	**0.05**	**0.06**	**0.06**
Aviation	0.03	0.05	0.06	0.06	0.05	0.05	0.05	0.06	0.06
Marine	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass									

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

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006
					Gg				
Emissions of HFCs – Gg CO_2 equivalent	**23.03**	**267.34**	**596.26**	**694.45**	**781.07**	**862.75**	**896.56**	**907.68**	**857.80**
HFC-23	NA,NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-32	IE,NA,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
HFC-41	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-43-10mee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-125	IE,NA,NO	0.00	0.02	0.03	0.03	0.04	0.05	0.05	0.06
HFC-134	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-134a	0.00	0.15	0.31	0.33	0.35	0.37	0.35	0.33	0.29
HFC-152a	IE,NA,NO	0.06	0.11	0.24	0.35	0.43	0.53	0.57	0.42
HFC-143	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-143a	IE,NA,NO	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.05
HFC-227ea	NA,NE,NO	NA,NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-236fa	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-245ca	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed HFCs[5] – (Gg CO_2 equivalent)	20.81	50.17	51.57	53.04	54.34	54.29	51.24	47.55	31.70
Emissions of PFCs – Gg CO_2 equivalent	**1 079.24**	**68.69**	**72.21**	**82.02**	**86.73**	**102.39**	**125.68**	**125.22**	**135.67**
CF_4	0.14	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO
C_2F_6	0.02	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO
C_3F_8	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
C_4F_{10}	NA,NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-C_4F_8	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
C_5F_{12}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_6F_{14}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed PFCs[5] – (Gg CO_2 equivalent)	29.05	68.39	71.98	81.80	86.52	102.20	125.49	125.04	135.50
Emissions of SF_6 – CO_2 equivalent (Gg)	**502.58**	**1 139.16**	**633.31**	**636.62**	**640.83**	**593.52**	**513.12**	**286.50**	**480.24**
SF_6	0.02	0.05	0.03	0.03	0.03	0.02	0.02	0.01	0.02

ANNEX II: TIER 1 UNCERTAINTY ASSESSMENT

This Annex presents activity data and emission factor uncertainty and/or uncertainty of the emission estimate ("combined uncertainty") for key sources of the Austrian GHG inventory, based on the key source assessment of the 2007 submission. The key source analysis of the 2008 submission will be presented in the NIR 2008[11]. Sources of uncertainties will be explained in the NIR 2008.

Table A.II: Uncertainties for Key Sources of the Austrian GHG Inventory (KS Assessment 2007)

IPCC Source category	Gas	AD	EF	Combined	Combined as % of total national emissions in 2005	Introduced into the trend in total national emissions
		Uncertainty [%]				
1.A.1.a liquid: Public Electricity and Heat Production	CO_2	0.5	0.5	0.7	0.01	0.01
1.A.1.a other: Public Electricity and Heat Production	CO_2	10.0	0.5	10.0	0.05	0.09
1.A.1.a solid: Public Electricity and Heat Production	CO_2	0.5	0.5	0.7	0.05	0.05
1.A.1.b liquid: Petroleum refining	CO_2	0.5	0.3	0.6	0.01	0.02
1.A.2.mobile-liquid: Manufacturing Industries and Construction	CO_2	1.0	0.5	1.1	0.01	0.02
1.A.2.other: Manufacturing Industries and Construction	CO_2	10.0	0.5	10.0	0.09	0.16
1.A.2.solid: Manufacturing Industries and Construction	CO_2	1.0	0.5	1.1	0.07	0.10
1.A.2.stat-liquid: Manufacturing Industries and Construction	CO_2	1.0	0.5	1.1	0.02	0.04
1.A.3.a jet kerosene: Civil Aviation	CO_2	5.0	3.0	5.8	0.01	0.02
1.A.3.b diesel oil: Road Transportation	CO_2	5.0	3.0	5.8	1.07	1.61
1.A.3.b gasoline: Road Transportation	CO_2	5.0	3.0	5.8	0.41	0.60
1.A.3.b gasoline: Road Transportation	N_2O	5.0	70.0	70.2	0.12	0.10
1.A.4.biomass: Other Sectors	CH_4	10.0	50.0	51.0	0.14	0.10
1.A.4.mobile-diesel: Other Sectors	CO_2	1.0	0.5	1.1	0.02	0.03
1.A.4.other: Other Sectors	CO_2	10.0	0.5	10.0	0.01	0.01

[11] Austria's National Inventory Report 2008, submission under the United Nations Framework Convention on Climate Change (the NIR is due for reporting under the Monitoring Mechanism (280/2004/EC) by March 15 and will be reported under the UNFCCC by April 15 – it will be published in April).

IPCC Source category	Gas	AD	EF	Combined	Combined as % of total national emissions in 2005	Introduced into the trend in total national emissions
		Uncertainty [%]				
1.A.4.solid: Other Sectors	CO_2	1.0	0.5	1.1	0.01	0.02
1.A.4.stat-liquid: Other Sectors	CO_2	1.0	0.5	1.1	0.09	0.13
1.A.gaseous: Fuel Combustion (stationary)	CO_2	2.0	0.5	2.1	0.42	0.69
1.B.2.b: Natural gas	CH_4	6.0	25.0	25.7	0.16	0.10
2.A.1.: Cement Production	CO_2	5.0	2.0	5.4	0.11	0.17
2.A.2.: Lime Production	CO_2	20.0	5.0	20.6	0.13	0.21
2.A.3.: Limestone and Dolomite Use	CO_2	19.6	2.0	19.7	0.06	0.11
2.A.7.b: Sinter Production	CO_2	2.0	5.0	5.4	0.02	0.02
2.B.1.: Ammonia Production	CO_2	2.0	4.6	5.0	0.03	0.02
2.B.2.: Nitric Acid Production	N_2O	3.0	20.0	20.2	0.06	0.21
2.C.1.: Iron and Steel Production	CO_2	0.5	0.5	0.7	0.04	0.05
2.C.3.: Aluminium production	CO_2	2.0	0.5	2.1	0.00	0.00
2.C.3.: Aluminium production	PFCs	0.0	50.0	50.0	0.00	0.81
2.C.4.: SF6 Used in Al and Mg Foundries	SF6	0.0	5.0	5.0	0.00	0.02
2.F.1/2/3/4/5.: ODS Substitutes	HFCs	0.0	54.0	54.0	0.54	0.62
2.F.7.: Semiconductor Manufacture	FCs	0.0	11.2	11.2	0.04	0.02
2.F.9.: Other Sources of SF6	SF6	0.0	56.0	56.0	0.05	0.05
3.: Solvent and other product use	CO_2	5.0	10.0	11.2	0.02	0.03
4.A.1.: Cattle	CH_4	10.0	20.0	22.4	0.75	0.64
4.B.1.: Cattle	N_2O	10.0	100.0	100.5	0.88	0.40
4.B.1.: Cattle	CH_4	10.0	70.0	70.7	0.36	0.23
4.B.8.: Swine	CH_4	10.0	70.0	70.7	0.31	0.14
4.D.1.: Direct Soil Emissions	N_2O	5.0	150.0	150.1	2.52	1.11
4.D.3.: Indirect Emissions	N_2O	5.0	150.0	150.1	1.80	0.91
6.A.: Solid waste disposal on land	CH_4	12.0	25.0	27.7	0.58	0.81

ANNEX III: INDICATORS

This Annex presents data on indicators pursuant to Article 3 (1) j of the Monitoring Decision (280/2004/EC), a detailed description of the indicators can be found in Annex II of the ”Implementing Provisions” (Commission Decision 2005/166/EC).

Information on all Priority Indicators (including Additional Priority Indicators) is provided; however, data for some Supplementary Indicators was not available (indicated by NA in the cells).

Footnotes are used if the indicators presented below are not fully in line with the definitions as laid down in the Implementing Provisions, and for further explanations.

Table A.III: Indicators pursuant to Article 3 (1) j of the Monitoring Decision for the years 1990, 1995, 2000–2006

No	Indicator	Numerator/ Denominator	1990	1995	2000	2001	2002	2003	2004	2005	2006
	Priority Indicators										
1	Total CO_2 intensity of GDP, t/Mio Euro	Total CO_2 emissions, kt	62 085	63 965	65 928	70 200	72 115	78 271	77 529	79 515	77 283
		GDP, Bio Euro (EC95)[12]	163.54	182.04	210.39	212.14	213.96	216.56	221.56	226.08	233.55
2	Energy related CO_2 intensity of GDP, t/Mio Euro	CO_2 emissions from energy consumption, kt	54 094	56 255	57 804	62 096	63 450	69 603	68 937	70 417	67 818
		GDP, Bio Euro (EC95)[12]	163.54	182.04	210.39	212.14	213.96	216.56	221.56	226.08	233.55
3	CO_2 emissions from passenger cars, kt		8 699	9 298	9 666	10 228	11 542	12 401	12 716	12 783	12 600
	Number of kilometres by passenger cars[13], Mkm		41 020	44 987	50 209	54 088	62 132	67 740	70 356	72 229	73 407
4	Energy related CO_2 intensity of industry, t/Mio Euro	CO_2 emissions from industry, kt	13 445	14 168	14 491	14 414	14 776	15 190	15 275	15 908	15 812
		Gross value-added total industry[14], Bio Euro (EC95) [12]	40.85	44.32	52.83	53.54	53.75	54.75	55.74	57.02	60.95
5	Specific CO_2 emissions of households, t/dwelling	CO_2 emissions from fossil fuel consumption households, kt	9 906	9 858	8 805	9 021	8 624	9 207	8 742	9 344	8 666
		Stock of permanently occupied dwellings, 1000	2 947	3 109	3 261	3 284	3 296	3 302	3 429	3 475	3 508
6	CO_2 intensity of the commercial and institutional sector, t/Mio Euro	CO_2 emissions from fossil fuel consumption in commercial and institutional sector, kt	2 651	3 295	2 784	3 925	3 888	4 622	3 451	3 301	3 403
		Gross value-added services, Bio Euro (EC95) [12]	92.03	104.58	118.80	120.01	120.88	122.62	125.94	129.76	132.65
7	Specific CO_2 emissions of public and autoproducer power plants, t/TJ	CO_2 emissions from public and autoproducer thermal power stations[15], kt	13 557	13 311	12 023	14 072	13 588	16 196	16 783	16 703	15 781
		All products –output bypublic and autoproducer thermal power stations, PJ	81.26	88.24	93.44	106.06	103.36	121.40	125.84	131.01	131.84

[12] GDP and Cross Values-Added refer to 2000

[13] Activity data is consistent with emission data (based on fuel sold)

[14] NACE 11 is also included

[15] SNAP 0101 + 0301 Auto-Producers

No	Indicator	Numerator/ Denominator	1990	1995	2000	2001	2002	2003	2004	2005	2006
	Additional Priority Indicators										
1	CO_2 emissions from freight transport on road, kt		2 885	4 293	6 802	7 475	8 184	9 077	9 271	9 830	8 907
	Freight transport on road [16], Mtkm		12 895	28 102	63 442	73 494	83 740	95 082	96 242	105 847	98 168
2	Total CO_2 intensity – iron and steel industry, t/Mio Euro	Total CO_2 emissions from iron and steel, kt	8 511	8 716	9 437	9 368	10 123	10 164	10 181	11 461	11 556
		Gross value-added – iron and steel industry[17], Bio Euro (EC95) [12]	1.97	1.63	2.11	2.34	2.11	1.99	2.02	2.11	2.11
3	Energy related CO_2 intensity – chemical industry, t/Mio Euro	Energy related CO_2 emissions chemical industries, kt	883	1033	1412	1496	1531	1616	1743	1588	1432
		Gross value-added chemical industry, Bio Euro (EC95) [12]	1.59	1.77	2.34	2.12	2.42	2.70	2.67	3.03	3.20
4	Energy related CO_2 intensity – glass, pottery and building materials industry, t/Mio Euro	Energy related CO_2 emissions glass, pottery and building materials[18], kt	1 669	1 520	1 546	1 503	1 630	1 639	1 654	1 656	1 772
		Gross value-added – glass, pottery and buildings materials industry, Bio Euro (EC95) [12]	2.29	2.10	2.29	2.37	2.28	2.30	2.30	2.37	2.50
5	Specific CO_2 emissions of iron and steel industry, t/t	Total CO_2 emissions from iron and steel, kt	8 511	8 716	9 437	9 368	10 123	10 164	10 181	11 461	11 556
		Production of oxygen steel, kt	3 921	4 538	5 183	5 346	5 647	5 707	5 901	6 408	6 487
6	Specific energy related CO_2 emissions of cement industry, t/t	Energy related CO_2 emissions from glass, pottery and building materials[19], kt	1 055	867	866	807	830	821	839	884	1 012
		Cement production, kt	4 679	3 839	4 047	4 035	4 061	4 345	4 356	4 560	4 886

[16] Updated values: Activity data is now consistent with emission data (based on fuel sold)

[17] Total NACE 27 (thus also including non-ferrous metal industries)

[18] SNAP 030311, 030317, 030319

[19] SNAP 030311

No	Indicator	Numerator/ Denominator	1990	1995	2000	2001	2002	2003	2004	2005	2006
	Supplementary Indicators										
1	Specific diesel related CO_2 emissions of passenger cars, g/100km	CO_2 emissions of diesel-driven passenger cars, kt	1 440	2 402	3 965	4 458	5 274	5 960	6 439	6 702	6 731
		Number of kilometres of diesel-driven passenger cars[13], Mio km	7 458	12 689	22 290	25 442	30 498	34 787	37 914	40 295	42 113
2	Specific petrol related CO_2 emissions of passenger cars, g/100km	CO_2 emissions of petrol-driven passenger cars, kt	7 259	6 896	5 700	5 770	6 268	6 441	6 277	6 081	5 868
		Number of kilometres of petrol-driven passenger cars[13], Mio km	33 562	32 298	27 919	28 646	31 634	32 952	32 443	31 934	31 294
3	Specific CO_2 emissions of passenger cars, t/pkm	CO_2 emissions from passenger cars, kt	8 699	9 298	9 666	10 228	11 542	12 401	12 716	12 783	12 600
		Passenger transport by cars[13], Mpkm	55 911	58 236	61 556	65 555	74 465	80 949	83 794	85 772	86 914
4	Specific air-transport emissions, t/passenger	CO_2 emissions from domestic air transport, kt	32.00	57.61	82.11	78.27	77.91	162.27	192.21	217.39	227.20
		Domestic air-passengers[20], Mio	0.137	0.255	0.534	0.576	0.568	0.585	0.606	0.603	0.648
5	Energy related CO_2 intensity – food, drink and tobacco industry, t/Mio Euro	Energy related CO_2 emissions food industries, kt	870	931	1 114	1 057	1 250	1 066	987	831	842
		Gross value-added – food, drink and tobacco industry, Mio Euro (EC95) [12]	2.75	3.27	3.67	3.56	3.74	3.88	3.82	3.86	3.88
6	Energy related CO_2 intensity – paper and printing industry, t/Mio Euro	Energy related CO_2 emissions paper and printing, kt	2 213	2 315	2 347	2 212	2 201	2 365	2 223	2 283	2 183
		Gross value-added – paper and printing industry, Mio Euro (EC95) [12]	2.65	2.92	3.80	4.03	3.85	3.73	3.96	4.12	4.48
7	Specific CO_2 emissions of households for space heating, t/m²	CO_2 emissions for space heating in households, kt	8 907	8 754	7 708	7 858	7 496	7 995	7 590	8 102	7 531
		Surface area of permanently occupied dwellings, Mio m^2	249	272	295	298	303	307	331	337	339
8	Specific CO_2 emissions of commercial and institutional sector for space heating, kg/m²	CO_2 emissions from space heating in commercial and institutional, kt	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Surface area of services buildings, Mio m^2	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Specific CO_2 emissions of public power plants, t/TJ	CO_2 emissions from public thermal power stations[21], kt	10 166	8 898	8 758	10 492	9 828	12 394	12 253	11 991	11 188
		All products output by public thermal power	61.10	61.99	65.68	80.08	76.34	94.96	97.31	101.96	99.97

[20] Number of passengers is not used as activity data for estimating emissions

[21] SNAP 0101

No	Indicator	Numerator/ Denominator	1990	1995	2000	2001	2002	2003	2004	2005	2006
		stations, PJ									
10	Specific CO_2 emissions of autoproducer plants, t/TJ	CO_2 emissions from autoproducers, kt	3 391	4 413	3 265	3 580	3 761	3 803	4 530	4 713	4 593
		All products output by autoproducer thermal power stations, PJ	20.16	26.24	27.76	25.97	27.02	26.44	28.54	29.05	31.86
11	Carbon intensity of total power generation, t/TJ	CO_2 emissions from classical power production, kt	5 771	4 266	6 137	7 214	6 587	8 634	8 013	8 071	7 008
		All products output by public and autoproducer power stations, PJ	32.89	27.24	43.98	51.72	44.20	56.25	51.13	58.18	48.88
12	Carbon intensity of transport, t/TJ	CO_2 emissions from transport, kt	12 426	14 484	17 745	18 903	20 761	22 684	23 290	24 014	22 808
		Total final energy consumption from transport[22], PJ	195.31	225.52	268.23	280.17	298.78	318.36	329.85	343.81	336.72
13	Specific energy related CO_2 emissions of paper industry, t/t	Energy related CO_2 emissions paper and printing industries, kt	2 213	2 315	2 347	2 212	2 201	2 365	2 223	2 283	2 183
		Physical output of paper, kt	2 932	3 599	4 385	4 250	4 419	4 564	4 852	4 950	5 213
14	CO_2 emissions from the industry sector, kt		13 445	14 168	14 491	14 414	14 776	15 190	15 275	15 908	15 812
	Total final energy consumption from industry[23], PJ		228.67	235.52	283.73	284.73	289.61	292.82	304.02	309.80	318.54
15	CO_2 emissions from households, kt		9 906	9 858	8 805	9 021	8 624	9 207	8 742	9 344	8 666
	Total final energy consumption from households[24], PJ		242.43	262.94	258.94	272.03	264.98	278.67	269.31	284.82	276.13

[22] Including Off-Road Transport, Pipelines and International Aviation

[23] Including Heat

[24] Including District heating and Solar thermal

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Im Bericht "Austria's annual greenhouse gas inventory 1990–2006" präsentiert das Umweltbundesamt die neueste Entwicklung der Treibhausgasemissionen in Österreich.

Die Menge an Treibhausgasemissionen liegt im Jahr 2006 bei 91,1 Mio. Tonnen CO_2-Äquivalenten. Dies entspricht einer Verminderung um 2,2 Mio. Tonnen oder 2,3 % gegenüber 2005 und einem Anstieg von 15,1 % gegenüber dem Kyoto-Basisjahr 1990. Treibende Kräfte gegenüber 2005 sind der Rückgang der Kohlendioxid-Emissionen in den Sektoren Verkehr, Energieaufbringung und Raumwärme.

Der englische Bericht folgt in Format und Inhalt den verbindlichen Anforderungen des Treibhausgas-Überwachungssystems 280/2004/EG der EU zur Umsetzung des Kyoto-Protokolls. Darin ist die jährliche Übermittlung von aktualisierten Treibhausgas-Emissionsdaten mit 15. Jänner an die Europäische Kommission verankert.

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