umweltbundesamt

AUSTRIA'S ANNUAL NATIONAL GREENHOUSE GAS INVENTORY 1990 - 2003

Submission under Decision 280/2004/EC

SERIES
BE-262

Vienna, 2005

Project Manager
Michael Anderl

Authors
Michael Anderl
Andrea Edelmann
Alexandra Freudenschuß
Doris Halper
Agnes Kurzweil
Stephan Poupa
Daniela Wappel
Peter Weiss
Manuela Wieser

Editing
Manfred Ritter

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

Printed on recycling paper

ISBN 3-85457-762-1

VORWORT

Der vorliegende Bericht präsentiert die neueste Entwicklung an Treibhausgasemissionen (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 an die europäischen Mitgliedstaaten. 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 zusammenfassend wiedergegeben. Eine detaillierte Darstellung der Daten wird der Europäischen Kommission außerdem in digitaler Form übermittelt[3].

Die Gesamtmenge an Treibhausgasemissionen steigt im Jahr 2003 auf 91,6 Millionen Tonnen CO_2 Äquivalente an. Dies entspricht einer Steigerung um 5,1 Millionen oder 5,9% gegenüber dem Vorjahr und einem Anstieg von 16,6% gegenüber dem Kyoto-Basisjahr 1990. Treibende Kraft gegenüber dem Vorjahr ist der Anstieg des wichtigsten Treibhausgases Kohlendioxid (CO_2) in den Sektoren Energieversorgung (CRF-Sektor *1 A 1 + 1 B*) um 2,7 Millionen Tonnen, Verkehr (CRF-Sektor *1 A 3 + 1 A 5*) um 1,7 Millionen Tonnen und Kleinverbrauch (CRF-Sektor *1 A 4*) um 1,0 Millionen Tonnen. Die Entwicklung im Sektor Energieversorgung ist gekoppelt mit einem Anstieg beim Stromverbrauch und einer Verschiebung der Stromerzeugung im Jahr 2003 von Wasserkraft zu den kalorischen Kraftwerken. Die Entwicklung beim Verkehr ist verbunden mit einem stetigen Anstieg der gefahrenen Kilometer von LKW und PKW – verstärkt durch einen hohen Anteil an Tanktourismus aufgrund der niedrigen Kraftstoffpreise in Österreich. Der Anstieg bei der Zahl und Größe der beheizten Wohnungen in Österreich und der relativ kühle Winter im Jahr 2003 sind die wichtigsten treibenden Kräfte im Sektor Kleinverbrauch. Eine detaillierte Analyse der treibenden Kräfte dieser Inventur wird im sogenannten „Kyoto-Fortschrittsbericht", dem Folgebericht zur Inventur, vorraussichtlich im März veröffentlicht werden.

Diese Daten wurden entsprechend den Beschlüssen der Vertragstaatenkonferenzen des *Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen* (BGBl. Nr. 414/1994, UN Framework Convention on Climate Change - UNFCCC) 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 einer sogenannten UNFCCC-Tiefenprüfung. Im Oktober 2004 fand die vorläufig Letzte dieser UNFCCC-Tiefenprüfung der Österreichischen Treibhausgas-Inventur durch internationale Fachexperten statt. Die Ergebnisse dieser Prüfung liegen noch nicht vor, werden aber in das Inventurverbesserungsprogramm 2005 einfließen.

Das UMWELTBUNDESAMT bereitet sich auf zukünftige 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 wird 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 Sys-

---

[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 ausserdem 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 und Artikel 3 (1) k: Informationen zu Änderungen des Nationalen Inventursystems.

tem Austria (NISA) entwickelt, das auf der OLI als zentralem Kern aufbaut und diesen Kern erweitert um ein umfassendes Inventurverbesserungsprogramm und der Einführung eines Qualitätsmanagementsystems entsprechend EN 45004.

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.

Diese 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.

Tabelle 1 fasst den Stand der Daten und das Berichtsformat des vorliegenden Berichtes zusammen.

Tabelle 1: Datengrundlage des vorliegenden Berichts

Inventur	*Datenstand*	*Berichtsformat*
OLI 2004	Dezember 2004	IPCC Common Reporting Format (CRF)

AUSTRIA'S
ANNUAL NATIONAL GREENHOUSE GAS INVENTORY 1990 - 2003

Submission under Decision 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol

Vienna, January 2005

Prepared by UMWELTBUNDESAMT

Title of Inventory	***Austria's Annual National Greenhouse Gas Inventory 1990-2003***
Contact Name	*Manfred Ritter*
Organisation	*UMWELTBUNDESAMT*
Address	*Spittelauer Lände 5* *A-1090 Vienna* *AUSTRIA*
Fax	*+ 43 - 1 - 31304 - 5400*
Phone	*+ 43 - 1 - 31304 - 5951*
E-mail	manfred.ritter@umweltbundesamt.at

TABLE OF CONTENTS

1 INTRODUCTION

This report summarises the Austrian greenhouse gas inventory for the years 1990-2003.

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 the reporting requirements 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 each year, no later than 15 January. Furthermore, Member States have to submit by 15 January elements of their National Inventory Reports (NIRs) 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 in preparation).

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.

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 1990-2003.

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

GREENHOUSE GAS EMISSIONS	Base year(1)	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
	CO_2 equivalent (Gg)										
CO_2 emissions (without LUCF) (6)	61.263	61.263	63.115	66.562	66.527	66.218	64.614	65.454	69.280	70.994	76.213
CH_4	9.798	9.798	9.143	8.959	8.681	8.557	8.366	8.146	8.021	7.856	7.807
N_2O	5.712	5.712	6.138	5.795	5.891	5.974	5.808	5.759	5.731	5.636	5.542
HFCs	555	219	555	637	730	813	867	1.019	1.122	1.219	1.308
PFCs	69	1.079	69	66	97	45	65	72	82	87	103
SF_6	1.139	503	1.139	1.218	1.120	908	684	633	637	641	594
Total (without CO_2 from LUCF) (6)	**78.535**	**78.573**	**80.159**	**83.237**	**83.046**	**82.514**	**80.403**	**81.084**	**84.872**	**86.434**	**91.566**

(1) Base year 1990: CO_2, CH_4, N_2O; base year 1995: HFC, PFC, SF6
(6) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report CO_2 emissions and removals from Land-Use Change and Forestry.

Austria's total greenhouse gases showed an increase of 16.6% from the base year to 2003 (CO_2: +24.4%). In the period from 2002 to 2003 Austria's total greenhouse gases increased by 5.9%, CO_2 emissions increased by 7.4%. The following figure presents the trend in total GHG emissions 1990-2003 in comparison to Austria's Kyoto reduction target of 13% from the base year 1990 (BY). This figure excludes emissions and removals from land-use change and forestry (LUCF).

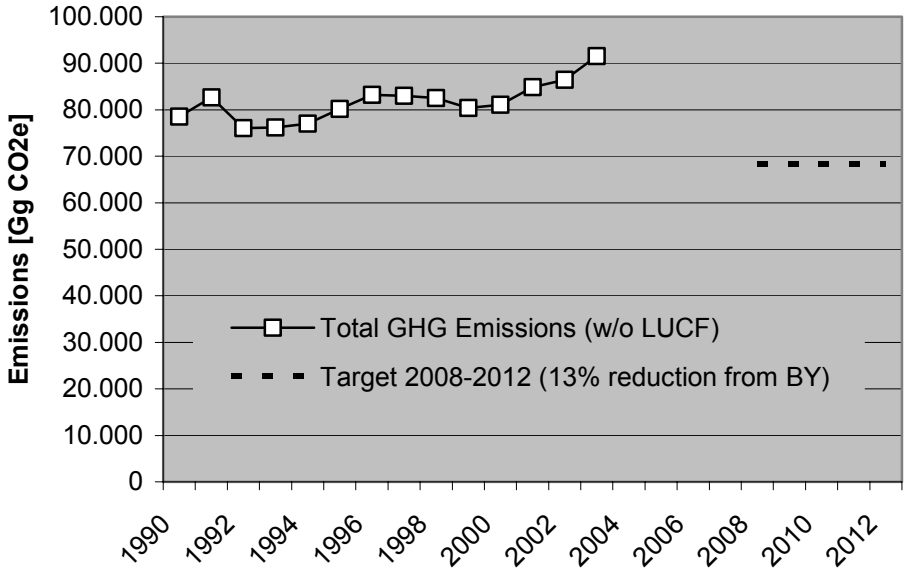

Figure 1: Trend in total GHG emissions 1990-2003

Table 2 (CRF Table 10, sheet 5 of 5) presents a summary of Austria's anthropogenic greenhouse gas emissions by sector for the period from 1990 to 2003:

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

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
	CO_2 equivalent (Gg)										
1. Energy	54.946	54.946	57.201	61.019	60.283	60.287	58.865	59.015	62.928	64.026	69.331
2. Industrial Processes	10.115	10.153	9.876	9.752	10.345	9.897	9.591	10.329	10.234	10.964	11.046
3. Solvent and Other Product Use	515	515	422	405	423	405	391	414	426	426	426
4. Agriculture	8.456	8.456	8.558	8.089	8.145	8.146	7.860	7.724	7.754	7.553	7.349
5. Land-Use Change and Forestry (7)	-9.013	-9.013	-7.046	-5.192	-11.690	-12.707	-12.637	-13.646	-13.345	-11.311	-12.773
6. Waste	4.503	4.503	4.102	3.972	3.850	3.778	3.696	3.602	3.530	3.465	3.415
7. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

(1) Base year 1990: CO2, CH4, N2O; base year 1995: HFC, PFC, SF6
(7) Net emissions

Austria's greenhouse gas emissions by sector in the base year and in 2003 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 and in 2003 as well as their share and trend.

GHG	Base year*	2003	Trend BY*-2003	Base year*	2003
	Emissions [Gg CO_2e]			Share [%]	
Total	**78.535**	**91.566**	**16,6%**	**100%**	**100%**
1 Energy	54.946	69.331	26,2%	70%	76%
2 Industry	10.115	11.046	9,2%	13%	12%
3 Solvent	515	426	-17,3%	1%	0%
4 Agriculture	8.456	7.349	-13,1%	11%	8%
5 LUCF	-9.013	-12.773	41,7%	-11%	-14%
6 Waste	4.503	3.415	-24,2%	6%	4%

Total emissions without LUCF
*1990 for CO2, CH4 and N2O and 1995 for HFC, PFC, and SF6

The dominant sectors are the energy sector, which caused 76% of total greenhouse gas emissions in Austria in 2003 (70% in 1990), followed by the Sector Industrial Processes, which caused 12% of greenhouse gas emissions in 2003 (13% in 1990).

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

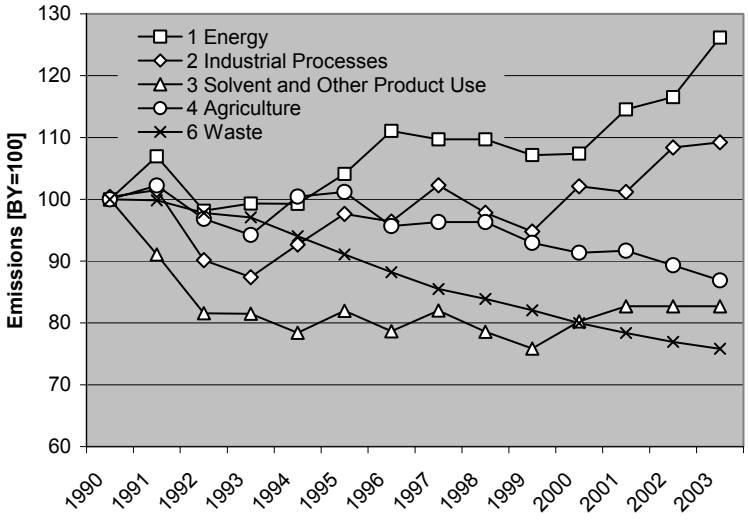

Figure 2: Trend in emissions 1990-2003 by sector in index form (base year = 100)

2.1 Energy (IPCC Category 1)

The trend for greenhouse gas emissions from IPCC category 1 (energy) shows that emissions stabilized between 1996 and 2000, but emissions increased strongly since from 54 946 Gg CO_2 equivalent to 69 331 Gg in 2003, which corresponds to an increase of 26.2%.

99.2% of emissions from this sector in 2003 originated from fossil fuel combustion (Sector *1 A*), fugitive emissions from fuels (Sector *1 B*) are of minor importance.

CO_2 contributes 97.9% to total GHG emissions from *Energy*, N_2O 1.2% and CH_4 0.9%.

The most important energy sub-sectors in 2003 are *1 A 3 Transport* with a share of 33%, followed by *1 A 1 Energy Industries* (23%), *1 A 4 Other Sectors* (22%), and *1 A 2 Manufacturing Industries and Construction* (21%).

The increasing trend from IPCC Category 1 (Energy) is mainly due to a strong increase of emissions from sub-sector *1 A 3 Transport*, which almost doubled from 1990 to 2003 with 82%. Apart from an increase of road performance (miles driven) in Austria, another main reason for this strong increase is tank tourism. In the beginning of the 1990s fuel prices in Austria were higher compared to neighbouring countries, whereas since the middle of the 1990s it is the other way round.

Emissions from sub-sector *1 A 1 Energy* Industries show an increase of 18% from the base year to 2003. The main drivers for emissions from this sector are total electricity production (which increased about 30% from 1990 to 2003; where consumption increased by 40% over this period) and an increase in heat production, which doubled over this period due to an increase of district heating demand 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 75% and varied from 67% to 78% in the observed period (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 space, warmwater heat demand, climatic circumstances and the change of fuel mix are the most important drivers for emissions from *1 A 4 Other Sectors*. However, the effects compensated each other, and emissions in 2003 are on the level of the base year.

Emissions from *1 A 2 Manufacturing Industries and Construction* increased by 9.1% from 1990 to 2003, mainly due to an increase of natural gas and fuel waste consumption, whereas consumption of solid and liquid fossil fuels is quite stable.

2.2 Industrial Processes (IPCC Category 2)

Greenhouse gas emissions from the industrial processes sector fluctuated during the period 1990-2003 and show a minimum in 1993. In 2003 they were 9.2% above the level of the base year. In 2003 greenhouse gas emissions from Category *2 Industrial Processes* amounted to 11 046 Gg CO_2 equivalent.

The main sources of greenhouse gas emissions in the industrial processes sector are *Metal Production* and *Mineral Products*, which caused 41% respectively 28% of the emissions from this sector in 2003. The emission trend in this sector follows production figures to a large extent.

The most important GHG of the industry sector was carbon dioxide with 73.8% of emissions from this category, followed by HFCs with 11.8%, N_2O with 8.0%, SF6 with 5.4%, PFCs with 0.9% and finally CH_4 with 0.1%.

2.3 Solvent and Other Product Use (IPCC Category 3)

In the year 2003, 0.5% of total GHG emissions in Austria (426 Gg CO_2 equivalent) took place in the Solvent and Other Product Use sector.

Greenhouse gas emissions in this sector decreased by almost 20% from 1990 to 1992 and then remained on that level. In 2002 greenhouse gas emissions from *Solvent and Other product Use* were 17.3% below the level of the base year (emissions for 2002 have been reported as a first estimate of emissions from the year 2003).

55% of these emissions were CO_2 emissions, N_2O emissions contributed 45%.

2.4 Agriculture (IPCC Category 4)

Greenhouse gas emissions from the agricultural sector fluctuated at the beginning of the 90ties, since 1995 they show a steady downward trend. In the year 2003 emissions from this category were 13.1% below base year. The decrease is mainly due to decreasing livestock numbers. The fluctuations result from variation of mineral fertilizer sales used as activity data for calculating N_2O emissions from agricultural soils, which is an important sub source.

Emissions from Agriculture amounted to 7 349 Gg CO_2 equivalent in 2003, which corresponds to 8% of national total emissions. In 2003 the most important sub sector *Enteric Fermentation* contributed 42% to total greenhouse gas emissions from the agricultural sector, the second largest sub source *Agricultural Soils* had a share of 36%.

Agriculture is the largest source for both N_2O and CH_4 emissions: 61% of all N_2O emissions and 51% (190.0 Gg CH_4) of all CH_4 emissions in Austria in 2003 originated from this sector. N_2O emissions from *Agriculture* amounted to 10.8 Gg in 2003 (3 360 Gg CO_2 equivalent), which corresponds to 46% of the GHG emissions from this sector, methane contributed 54%.

2.5 LULUCF (IPCC Category 5)

Land use change and forestry is a net sink in Austria. CO_2 removals from that category amounted to 9 013 Gg CO_2 in the base year, which corresponds to 11% of national total GHG emissions (without LULUCF) compared to 14% in the year 2003. The trend in net removals from LULUCF is plus 42% over the observed period.

The main sink is subcategory *5 A Forest Land* with net removals of 13 060 Gg CO_2 in 2003. Small emissions arise from the other subcategories, where emissions from all other subcategories together amounted to 287 Gg CO_2 in 2003.

2.6 Waste (IPCC Category 6)

Greenhouse gas emissions from Category *6 Waste* decreased steadily during the period, mainly as a result of waste management policies: the amount of land filled waste has decreased as well as methane recovery .

In 2003 the greenhouse gas emissions from the waste sector amounted to 3 415 Gg CO_2 equivalent. This was 24% below the level of the base year. The share of emissions from this category in national total emissions was 4% in the year 2003.

The main source of greenhouse gas emissions in the waste sector is solid waste disposal on land, which caused 83% of the emissions from this sector in 2003.

92.4% of all greenhouse gas emissions in 2003 from *Waste* are CH_4 emissions, 7.2% are N_2O and 0.3% CO_2.

3 INDICATORS

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

4 METHOD OF REPORTING AND DATA BASIS

The Austrian greenhouse gas inventory for the period 1990 to 2003 was compiled according to the recommendations for inventories set out in the UNFCCC reporting guidelines according to Decision 3/CP.5, the Common Reporting Format (CRF), the IPCC 1996 Guidelines for National Greenhouse Gas Inventories and the IPCC Good Practice Guidance which specify the reporting obligations according to Articles 4 and 12 of the UNFCCC.

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 data base based on the CORINAIR (CORe INventory AIR)/ SNAP (Selected Nomenclature for sources of Air Pollution) systematic. This nomenclature is designed to estimate not only emissions of greenhouse gases but all kind 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 of continuous improvements, resulting in recalculations as outlined in Chapters 2 and 4. Issues identified in the reviews of the inventory by the UNFCCC are considered for the inventory improvement program, the last in-depth review took place in October 2004.

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) IPCC Table 7A.

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 (excel files).

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 2004	December 2004

4.1 Relation with earlier reported data

As a result of the continuous improvement of Austria's GHG inventory, emissions of some sources have been recalculated based on updated data or revised methodologies, thus emission data for the years 1990 to 2002 submitted this year differ from previously reported data.

The following table presents the recalculation difference with respect to last year's submission by 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

	Base year*	2002
	Recalculation Difference [%]	
TOTAL	+0.7%	+2.1%
CO_2	+0.6%	+1.9%
CH_4	+4.5%	+5.2%
N_2O	-4.6%	-2.0%
HFC, PFC, SF6	+1.5%	+12.2%

Total emissions without LUCF
*1990 for CO_2, CH_4 and N_2O and 1995 for

The main reason for the increase of reported CO_2 emissions are

- An improved estimation methodology of category *1 A 1 b Petroleum Refining*.
- and higher emissions from Industrial Processes mainly due to update of activity data for *2 A 1 Cement Production*.

The main reason for the increase of reported methane emissions are higher emissions from *6 A 1 Solid Waste disposal on Land* which is mainly due to the use of the IPCC default value for methane oxidation instead of a country-specific value previously used.

The main reason for the decrease of reported N_2O emissions are lower emissions from *1 A 3 b Road Transport*. The emission factors have been updated (updated handbook of emission factors (version 2.1).

The main reason for an increase of reported emissions of fluorinated compounds is that during an internal audit several mistakes and inconsistencies were identified and corrected and the data quality could be improved for some sub-sectors using information from industry. Furthermore emissions from 2001 and 2002 were updated using extrapolation techniques and data from industries (previously the same estimated as for 2000 was used for these years).

Furthermore, in this year's submission emissions from industrial electricity and heat autoproducers were shifted from category *1 A 2 f Other* to the corresponding industrial branches of subcategories *1 A 2 a* to *1 A 2 e, 1 A 1 b, 1 A 1 c* and *1 A 4 a.*

A description of these recalculations by sector is given in Chapter 4.5.

Improvements made in response to the issues raised in the UNFCCC review process are summarized in the following table.

Table 6: Improvements made in response to the UNFCCC review process

Energy

1 A 2 Manufacturing Industries and Construction: Sectoral division of natural gas consumption is improved by energy statistics.

1 A 2 a Iron and steel production: Fuel consumption and CO_2 emissions are now corresponding in a more accurate way with pig iron production and process emissions of category *2 C 1 Iron and Steel.*

1 A 1 c Manufacture of Solid Fuels and Other Energy Industries: Includes now emissions from oil/gas extraction and compressors for storage and liquidification of natural gas only.

Industrial Processes

2 F Consumption of Halocarbons and SF_6: emissions from 2001 and 2002 were updated using extrapolation techniques (following recommendations from the ERT) and data from industries, previously the same estimated as for 2000 was used for these years.

Agriculture

Animal Category *Other*: In Austria animals of category *Other* which mainly is deer (but not including wild living animals) have been counted from 1993 on. As recommended in the centralized review, in this inventory for the years 1990 to 1992 the animal number of 1993 was used.

Synthetic fertilizer use: The S&A report 2004 noticed high inter-annual variations in N_2O emissions of sector 4 D synthetic fertilizer use. These variations are caused by effects of storage as well as the difference between the calendar year and the agricultural economic year: the amounts of synthetic fertilizers over the years reflect the amounts sold in one calendar year. However, the economic year for the farmer does not corresponded to the calendar year. Not the whole amount purchased is applied in the year of purchase. Considering these effects, in this submission the arithmetic average of each two years was used as fertilizer application data.

4 A, 4 B, 4 D (Non-dairy cattle): The S&A report 2004 noticed high inter-annual variations in the CH_4 and N_2O IEF values between 1992/1993 and 1993/1994. An error regarding activity data of non-dairy cattle for the year 1993 was identified and corrected in this submission.

4 D 3 Atmospheric nitrogen deposition: Following the recommendation of the centralized review (October 2004), in contrast to the last submission also N volatised in housing, storage and pasture was taken into account. Now, in accordance with the IPCC good practice, the value $Frac_{GASM}$ relates to N excreted by livestock and not to $Nex_{\text{left for spreading}}$.

4 F Field burning: As recommended in the Centralized Review 2003 the IPCC methodology using default values was applied.

CRF-Tables, background data:

According to the Centralized Review 2003 emissions from different animal waste management systems (AWMS) are reported under the appropriate AWMS in the CRF.

As recommended in the S&A report 2004 in table 4 B (b) notation keys instead of "0" have been used.

Waste

6 A 1 Managed waste disposal on land: As recommended in the Centralized Review 2004 the IPCC default CH4 oxidation factor (0.1) was applied.

The figures presented in this report replace data reported earlier by Austria under the reporting framework of the UNFCCC. Such earlier data were included in particular in the inventory chapter of the 2001 Third National Climate Report of the UMWELTBUNDESAMT (Austria's Third National Communication, Chapter 4) and in Austria's 2003 and 2004 submissions to the UNFCCC (Austrian Greenhouse Gas Emissions 1990 to 2001, and 1990-2002 respectively).

4.2 Information on Completeness

Geographical coverage is complete. Austria has no territory not 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 in other sources than intended by the CRF ("IE") please refer to Table 9 Completeness of the CRF.

Compared to last year's submission, some additional sources have been included in the inventory; please refer to Chapter 4.5 Methodological Changes for details.

4.3 National Inventory System Austria (NISA)

No changes with respect to the National Inventory System in Austria have occurred since the last reporting period, for a description of NISA please refer to Austria's NIR 2004. Here only a short summary is given:

The Umweltbundesamt is designated as single national entity responsible for preparation of the annual greenhouse gas inventory by law: the Environmental Control Act ("Umweltkontrollgesetz"; Federal Law Gazette 152/ 1998) regulates responsibilities of environmental control in Austria and lists the tasks of the Umweltbundesamt. One task is the preparation of technical expertise and the data basis for fulfilment of the obligations under the UNFCCC and the UNECE LRTAP Convention. Thus the Umweltbundesamt prepares and annually updates the Austrian air emissions inventory ("Österreichische Luftschadstoff-Inventur OLI"), which covers greenhouse gases and emissions of other air pollutants as stipulated in the above mentioned conventions and their protocols.

Within the Umweltbundesamt the department of air emissions, with its head Manfred Ritter, is responsible for preparation of the inventory and all work related to inventory preparation. The department for climate change, with its head Klaus Radunsky, is responsible for the quality management of the greenhouse gas inventory.

Main data sources used as well as information on who did the actual calculations is presented in the following chapter

4.4 Sources of data

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

Table 7: Main data sources for activity data and emission values

Sector	Data Sources for Activity Data	Emission Calculation
Energy	Energy Balance from STATISTIK AUSTRIA, Steam boiler database;	UMWELTBUNDESAMT, plant operators
Industry	National production statistics, import/export statistics, direct information from industry or associations of industry;	UMWELTBUNDESAMT, plant operators Study on emissions of FCs contracted out in 2001 (Contractor: EcoEfficient Technologies, Vienna);
Waste	Database on landfills	UMWELTBUNDESAMT
LUCF	National forest inventory obtained from the Austrian Federal Office and Research Centre for Forest	UMWELTBUNDESAMT
Solvent	Import/ export statistics, production statistics, consumption statistics;	Contractor: Forschungsinstitut für Energie und Umweltplanung, Wirtschaft und Marktanalysen GmbH and Institut für industrielle Ökologie[4]
Agriculture	National Studies, national agricultural statistics obtained from STATISTIK AUSTRIA;	Contractors: University of Natural Resources and Applied Life Sciences, Research Center Seibersdorf

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 2004 to be published in April 2005.

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. Additionally, Annex III presents methodologies for sources that contribute to EC key sources.

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

4.5 Methodological changes with respect to the previous submission

This chapter describes the methodological changes made to the inventory since the previous submission to the UNFCCC (April 2004). Further background information and a complete description of the 2004 inventory are given in Austria's National Inventory Report 2005 which will be published in spring 2005.

4.5.1 Energy (IPCC Category 1)

Combustion Activities (1 A)

Update of activity data:

1 A 1 a Public Electricity and Heat Production: Decrease of liquid and solid fuel consumption due to harmonisation with the energy statistics. In the previous submission activity data from the steam boiler database was taken which was higher than energy statistics. For the years 1990 and 1991 plant specific data is updated according to an publication from the "Bundeslastverteiler". In the previous submission this overhead of plant specific activity data was subtracted from industrial autoproducers which means that this adjustment does not imply changes in total CO_2 emissions from liquid fuels.

1 A 1 b Petroleum Refining: Shift of liquid fuel consumption to industrial autoproducers. Increase of natural gas consumption due to shift of consumption for autoproduction from *1 A 2 f.*

1 A 1 c Manufacture of Solid Fuels and Other Energy Industries: Error correction of double counting emissions from liquid fuel transformation into gasworks gas. Increase of natural gas consumption due to shift of consumption for autoproduction from *1 A 2 f.* Correction of natural gas consumption for oil/gas extraction and storage for 2001 an 2002 which is based on improved energy statistics.

1 A 2 a Iron and Steel: Activity data is now fully taken from the energy balance which is consistent with plant operators information. In the previous submission information about activity data was partly taken from plant operator. Especially for the year 2002 coke oven coke consumption has been corrected and is now consistent with pig iron production.

1 A 2 b, c, d, e: Each subcategory includes consumption for electricity and heat autoproduction which was included in category *1 A 2 f Other* in the previous submission.

1 A 2 f Manufacturing Industries and Construction-Other-Stationary: Now includes consumption for electricity and heat autoproduction not allocated to subcategories *1 A 1 b, 1 A 1 c, 1 A 2 a to 1 A 2 e, 1 A 4 a and 1 a 4 c*.

1 A 3 e Other Transportation (Pipeline compressors): Natural gas consumption is corrected from 1999 on.

1 A 4 a Commercial/Institutional-Stationary

1 A 4 c Agriculture/Forestry/Fishing-Stationary: Both subcategories include consumption for electricity and heat autoproduction which was included in category *1 A 2 f Other* in the previous submission. Revision of final energy consumption for space and warmwater heating based on new statistical surveys of STATISTIK AUSTRIA.

1 A 4 b Residential-Stationary: Revision of final energy consumption for space and warmwater heating.

1 A 2 f Manufacturing Industries and Construction-Other-Stationary: Update of activity data of off road machinery (mainly in construction sector)

1 A 4 c Agriculture/Forestry/Fishing-Mobile: Update of activity data of off road machinery (1990 mainly in forestry sector) due to a new study [Handler, Abschätzung des Dieselverbrauchs in der österreichischen Landwirtschaft, Bundesanstalt für Landtechnik, BLT-Wieselburg 2003]

Improvements of methodologies and emission factors:

1 A 1 b Petroleum Refining: Improved methodology for CO_2 which is now based upon plant specific emission factors and consistent with the energy balance. The new methodology has been approved and checked with the plant operator.

1 A 3 a Civil Aviation: The splitting of the energy data into national and international aviation of 2001 and 2002 has been updated according to the energy balance. The splitting of the energy data of 2003 into national and international aviation has been done according to the flight numbers of arrival and departure flights (Statistic Austria)

1 A 3 b Road Transport: The emission factors used in the inventory for have been updated using the updated handbook of emission factors (version 2.1). The handbook is the result of new measurements.

Fugitive Emissions (1 B)

Update of activity data:

1 B 1 a Coal Mining and *1 B 2 b ii Natural Gas Distribution*:

Activity data for 2002 has been updated.

1 B 2 a Refining/Storage:

Activity data for the whole time series have been updated with data from the national energy balance

4.5.2 Industrial Processes (IPCC Category 2)

Addition of source categories:

2 C 2 Ferroalloys (CO_2) has been added to the inventory.

Changes in the use of Notation Keys:

2 A 5 Asphalt Roofing and *2 A 6 Road Paving with Asphalt:*

emissions are now reported as “IE”, as emissions are already included in the Solvents Sector.

2 A 4 Soda Ash Production and Use:

CO_2 Emissions from Soda Ash Production are now reported as "IE", as coke used in the process is already considered as fuel in the Energy Sector (*1 A 2 c Chemical Industries*).

Update of activity data:

2 B 5 Chemical Industries - Other:

CO_2 emissions from fertilizer production for 1992-1994 have been updated using information from Industry. Emissions from 1990-1991 were recalculated using the average EF from 1993-2003.

2 A 1 Cement Production:

activity and emission data for CO2 emissions from *Cement Production* 1998-2002 have been updated using data from a study based on plant specific data.

2 A 7 a Bricks:

activity data for 2002 has been updated.

2 C 1 Iron and Steel:

Activity data for 2002 has been updated.

Improvements of methodologies and emission factors:

2 B 5 Chemical Industries - Other:

As indicated in the NIR 2004, there had been an inconsistency of the time series for CH_4 emissions from urea production; now the time series has been recalculated to improve time series consistency.

2 C 1 Iron and Steel:

For calculating CO_2 emissions electric arc furnaces now a country specific emission factor is used (previously an emission factor taken from a Swiss publication was applied).

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

2 C 3 Aluminium Production:

Activity data used for calculation of PFC and CO_2 emissions from *Aluminium Production* has been harmonized.

2 F Consumption of Halocarbons and SF_6:

During an internal audit several mistakes and inconsistencies were identified and corrected and the data quality could be improved for some sub-sectors using information from industry. Furthermore emissions from 2001 and 2002 were updated using extrapolation techniques (following recommendations from the ERT) and data from industries, previously the same estimated as for 2000 was used for these years.

4.5.3 Agriculture (IPCC Category 4)

Update of activity data:

Animal Category *Other*:

In Austria animals of category *Other* which mainly is deer (but not wild living animals) have been counted from 1993 on. As recommended in the centralized review, the animal number of 1993 was used for the years 1990 to 1992.

Animal Category *Soliped*:

In the last submissions the number of soliped of the years 2000 to 2002 was based on expert judgement. For transparency reasons in this inventory the 1999 value was held constant until 2002. In the current inventory a new 2003 value of animal category *Soliped* is available.

Improvements of methodologies and emission factors:

Synthetic fertilizer use:

The S&A report 2004 noticed high inter-annual variations in N_2O emissions of sector 4 D synthetic fertilizer use. These variations are caused by effects of storage as well as the difference between the calendar year and the agricultural economic year: the amounts of synthetic fertilizers over the years reflect the amounts sold in one calendar year. However, the economic year for the farmer does not corresponded to the calendar year. Not the whole amount purchased is applied in the year of purchase. Considering these effects, in this submission the arithmetic average of each two years was used as fertilizer application data.

4 A, 4 B, 4 D (Non-dairy cattle):

The S&A report 2004 noticed high inter-annual variations in the CH_4 and N_2O IEF values between 1992/1993 and 1993/1994. An error regarding activity data of non-dairy cattle for the year 1993 was identified and corrected in this submission.

4 B In the last submissions, the N_{ex} and VS_{ex} values from 1999 to 2003 were extrapolated on the basis of the published N_{ex} and VS_{ex} data with a corresponding milk yield of 5000 kg. In this year's calculations also the corresponding N_{ex} and VS_{ex} values of a milk yield of 6000 kg published in [GRUBER & STEINWIDDER, 1996] were considered. The values were calculated via interpolation.

4 D 3 Atmospheric nitrogen deposition:

Following a recommendation of the centralized review (October 2004), in contrast to the last submission also N volatised in housing, storage and pasture was taken into account. Now, in accordance with the IPCC good practice, the value $Frac_{GASM}$ relates to N excreted by livestock and not to $Nex_{\text{left for spreading}}$.

4 F 1 a Field burning (Cereals / Wheat):

As recommended in the Centralized Review 2003 the IPCC methodology using default values was applied.

CRF-Tables, background data:

According to the Centralized Review 2003 emissions from different animal waste management systems (AWMS) are reported under the appropriate AWMS in the CRF.

As recommended in the S&A report 2004 in table 4.B (b) notation keys instead of "0" have been used.

4.5.4 LULUCF (IPCC Category 5)

Addition of source or sink categories:

5 B 1, 5 C 1:

CO_2 emissions and removals from cropland and grassland management (categories *5 B 1* and *5 C 1*) including liming have been added to the inventory, the estimate for 1990 was reported for all years.

Update of activity data:

Activity data for forest areas since 1997 have been updated according to the data of a new forest inventory (period 2000/2002).

Improvements of methodologies and emission factors:

Land use changes from and to forest land have been considered in the inventory, based on results of the new forest inventory.

4.5.5 Waste (IPCC Category 6)

Update of activity data

6 A 1 Managed waste disposal on land:

The Activity data was updated. According to the Austrian Landfill Ordinance the operators of landfill sites have to report their activity data annually. Due to reports after the due date there are minor changes of the activity data in this submission compared to previous submission.

An error in the calculation of the formation potential of landfill gas was identified and corrected.

6 B Waste Water Handling:

The number of inhabitants and the daily protein intake were updated according to STATISTIK AUSTRIA and FAO statistics respectively.

6 D Compost production:

Activity data was updated and interpolated for years where no data was available.

Improvements of methodology:

6 A 1 Managed waste disposal on land:

As recommended in the Centralized Review 2004 the IPCC default CH4 oxidation factor (0.1) was applied.

6 B Waste Water Handling

Emissions of N_2O have been recalculated taking into account the increasing amount of waste water treated in waste water treatment plants and the increasing amount of denitrification. The data were taken from the Austrian reports on water pollution control (GEWÄSSERSCHUTZBERICHTE 1993 –1996).

4.6 Quality Assurance and Quality Control (QA/QC)

A quality management system (QMS) has been designed to ensure conformity with IPCC-GPG quality requirements. The QMS has been drawn up according to the European Standard ISO EN 45004:1995: 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 EN 45004 are met, which include strict independence, impartiality and integrity. The Quality Assurance and Quality Control (QA/QC) procedures within the QMS correspond to the QA/QC system outlined in the IPCC-GPG Chapter 8.

With the Kyoto Protocol entering into force, pressure upon national GHG emission inventories is assumed to increase, for this reason a management system in the form of a QMS according to ISO EN 45004 is believed to ensure accuracy and credibility of emission data which form the basis for the international emissions trading scheme.

The Austrian Quality Management System is described in detail in Austria's NIR 2004. Since the last submission, the application for accreditation has been made - accreditation is expected for 2005.

4.7 Uncertainty Assessment

A first comprehensive uncertainty analysis was performed in the form of a pilot study by WINIWARTER & RYPDAL[5], 2001 on greenhouse gases CO_2, CH_4, and N_2O for the years 1990 and 1997. Information on this uncertainty estimate using Monte Carlo Analysis can be found in Austria's NIR 2004.

This year updated uncertainty estimates for all key sources of the inventory are provided. They are based on estimates made in the first uncertainty analysis as described in the NIR 2004 and on expert judgement by experts preparing the relevant part of the inventory (references and detailed explanations will be provided in the NIR 2005). They are presented in Annex II.

4.8 Comparison of the Sectoral Approach with the Reference Approach

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

Table 8 shows the comparison of CO_2 emissions from the two approaches. Note that in relation to previous submission the fractions of carbon stored were changed from 100% to IPCC default values except for coke oven coke, for which a fraction of 0.7% of total consumption is considered to be stored in steel. This leads to a significant deviation of the two approaches.

[5] 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.

Table 8: Comparison of CO_2 emissions of the two approaches

Year	Reference Approach				Sectoral Approach				
	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	28 565	15 914	12 238	56 716	28 051	13 907	11 088	379	53 425
1991	30 984	16 770	12 939	60 693	30 551	14 515	11 686	373	57 126
1992	30 072	12 952	12 705	55 729	29 323	10 683	11 749	551	52 306
1993	31 114	11 649	13 399	56 163	30 742	9 563	12 250	371	52 926
1994	30 359	11 808	13 782	55 950	30 114	9 488	12 868	430	52 900
1995	30 919	13 496	15 048	59 463	30 315	10 844	13 957	423	55 540
1996	33 392	13 665	16 017	63 073	32 941	10 827	15 109	482	59 359
1997	32 869	14 446	15 437	62 752	32 147	11 416	14 573	542	58 677
1998	35 144	12 634	15 848	63 626	34 290	9 022	14 887	467	58 666
1999	33 179	12 678	16 125	61 982	32 332	9 325	15 038	535	57 229
2000	32 305	14 240	15 388	61 934	31 689	10 685	14 461	617	57 452
2001	34 704	14 765	16 309	65 778	33 863	11 305	15 371	754	61 292
2002	35 534	15 048	16 494	67 076	35 013	11 272	15 340	754	62 420
2003	38 645	15 684	17 834	72 163	38 166	12 131	16 569	754	67 624

Table 9 shows the percentual difference of the two approaches which yearly average is 6.9% for total CO_2.

Table 9: Deviation of CO_2 emissions of the two approaches

Year	Liquid	Solid	Gaseous	Total
1990	1.82%	14.44%	10.37%	6.16%
1991	1.41%	15.54%	10.72%	6.24%
1992	2.55%	21.24%	8.14%	6.54%
1993	1.21%	21.82%	9.38%	6.12%
1994	0.82%	24.45%	7.10%	5.76%
1995	1.99%	24.45%	7.81%	7.06%
1996	1.37%	26.21%	6.01%	6.26%
1997	2.25%	26.55%	5.93%	6.94%
1998	2.49%	40.03%	6.46%	8.46%
1999	2.62%	35.99%	7.23%	8.31%
2000	1.94%	33.27%	6.42%	7.80%
2001	2.49%	30.61%	6.10%	7.32%
2002	1.49%	33.50%	7.52%	7.46%
2003	1.25%	29.29%	7.63%	6.71%

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

Reasons for deviation of CO_2 emissions:

- In the reference approach the IPCC default net calorific values are used. In the sectoral approach country specific net calorific values are taken to calculate the energy consumption.
- The selected emission factors (carbon content) of the two approaches are different.
- Liquid Fuels: Energy balance is mass balanced but not carbon balanced. 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 considers a share of feed stocks used for plastics production and solvent production as non-carbon-stored. In the sectoral approach a share of emissions from waste incineration of plastics is included in category *1 A 1 a Public Electricity and Heat Production*. Emissions from solvents use are included in category *3 Solvent an Other Products Use*. In the sectoral approach a share of municipal solid waste without energy recovery is considered in category 6C for the years 1990 and1991.
- Solid fuels: 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*.
- Gaseous fuels: National approach uses sector 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 as an additional fuel type (e.g. municipal solid waste, hazardous waste and industrial fuel waste)

Simple approach of quantification the deviation:

By quantifying the deviation between the two approaches with a simple approach it may be seen that the resulting rest-difference of total CO_2 emissions is less than -3 % for all years. Note that this may be interpreted that the sectoral approach plus the process emissions would be even higher than the reference approach.

At current is not possible to quantify the amount of solvents and plastics products which are imported or exported by products, bulk or waste. Furthermore it is known that petrol coke is imported and used for carbide production but not considered in the energy balance.

Table 10: Quantification of deviation between the two approaches

Year	Natural Gas (1)	2 B Chemical Industry(3)	2 C Metal Production	3 Solvent Use	Total	Remaining total deviation(2)
1990	376	427	3 725	283	4 811	-2.7%
1991	422	436	3 688	237	4 783	-2.0%
1992	418	409	3 158	188	4 173	-1.3%
1993	374	437	3 143	187	4 141	-1.6%
1994	420	404	3 398	172	4 394	-2.4%
1995	576	489	3 908	190	5 163	-2.1%
1996	383	484	3 694	173	4 734	-1.6%
1997	343	475	4 083	190	5 091	-1.6%
1998	449	521	3 887	172	5 029	-0.1%
1999	571	492	3 749	158	4 970	-0.4%
2000	416	484	4 185	181	5 266	-1.3%
2001	154	462	4 144	194	4 954	-0.7%
2002	350	469	4 637	194	5 650	-1.5%
2003	390	518	4 532	194	5 634	-1.5%

(1) Deviation due to the use of different carbon emissions factors, losses and statistical differences.

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

(3) Excluding carbide production.

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	Base year[1] (Gg)	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
1. Energy	**53.527,09**	**53.527,09**	**55.667,06**	**59.430,39**	**58.797,95**	**58.807,61**	**57.399,85**	**57.616,58**	**61.475,09**	**62.586,99**	**67.857,30**
A. Fuel Combustion (Sectoral Approach)	53.425,06	53.425,06	55.540,03	59.359,36	58.677,44	58.665,78	57.229,31	57.452,05	61.292,36	62.419,95	67.624,26
1. Energy Industries	13.622,41	13.622,41	12.677,57	13.762,22	13.371,32	12.897,76	12.258,63	12.275,76	13.423,01	13.347,79	16.030,35
2. Manufacturing Industries and Construction	12.970,71	12.970,71	13.904,54	13.777,76	16.121,87	14.589,73	13.556,77	14.298,68	14.064,14	14.394,72	14.163,39
3. Transport	12.404,87	12.404,87	14.466,30	16.042,44	14.977,02	17.182,90	16.596,33	17.735,29	18.886,06	20.973,52	22.692,33
4. Other Sectors	14.392,05	14.392,05	14.459,03	15.738,00	14.170,10	13.952,94	14.775,96	13.097,37	14.882,92	13.662,92	14.702,00
5. Other	35,02	35,02	32,59	38,94	37,13	42,45	41,62	44,95	36,23	41,00	36,19
B. Fugitive Emissions from Fuels	102,03	102,03	127,03	71,03	120,51	141,83	170,53	164,53	182,73	167,03	233,04
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	102,03	102,03	127,03	71,03	120,51	141,83	170,53	164,53	182,73	167,03	233,04
2. Industrial Processes	**7.432,16**	**7.432,16**	**7.248,43**	**6.948,86**	**7.528,56**	**7.226,96**	**7.044,61**	**7.645,23**	**7.599,70**	**8.202,61**	**8.151,09**
A. Mineral Products	3.242,73	3.242,73	2.825,81	2.738,24	2.938,01	2.784,78	2.770,53	2.928,28	2.946,53	3.055,39	3.060,20
B. Chemical Industry	464,46	464,46	514,86	516,90	507,83	555,63	524,86	532,29	509,05	510,25	558,88
C. Metal Production	3.724,97	3.724,97	3.907,75	3.693,72	4.082,72	3.886,54	3.749,22	4.184,65	4.144,13	4.636,97	4.532,01
D. Other Production	NA	NA	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	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Solvent and Other Product Use	**282,67**	**282,67**	**189,88**	**172,81**	**190,09**	**172,24**	**158,37**	**181,02**	**193,60**	**193,60**	**193,60**
4. Agriculture	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Rice Cultivation	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
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land-Use Change and Forestry [3]	**-9.013,33**	**-9.013,33**	**-7.046,36**	**-5.191,59**	**-11.690,45**	**-12.707,10**	**-12.637,45**	**-13.645,91**	**-13.344,77**	**-11.310,96**	**-12.772,55**
A. Changes in Forest and Other Woody Biomass S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Forest and Grassland Conversion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Abandonment of Managed Lands	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. CO_2 Emissions and Removals from Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**20,70**	**20,70**	**10,09**	**10,40**	**10,70**	**10,99**	**11,31**	**11,28**	**11,24**	**11,27**	**11,27**
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Waste-water Handling	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Waste Incineration	20,70	20,70	10,09	10,40	10,70	10,99	11,31	11,28	11,24	11,27	11,27
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Total Emissions/Removals with LUCF [4]	**52.249,29**	**52.249,29**	**56.069,09**	**61.370,87**	**54.836,85**	**53.510,71**	**51.976,69**	**51.808,21**	**55.934,87**	**59.683,51**	**63.440,70**
Total Emissions without LUCF[4]	**61.262,62**	**61.262,62**	**63.115,45**	**66.562,46**	**66.527,30**	**66.217,81**	**64.614,14**	**65.454,12**	**69.279,64**	**70.994,47**	**76.213,26**
Memo Items:											
International Bunkers	**885,97**	**885,97**	**1.327,42**	**1.466,42**	**1.525,57**	**1.578,21**	**1.541,67**	**1.674,93**	**1.647,45**	**1.526,14**	**1.451,90**
Aviation	885,97	885,97	1.327,42	1.466,42	1.525,57	1.578,21	1.541,67	1.674,93	1.647,45	1.526,14	1.451,90
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**
CO_2 Emissions from Biomass	**9.750,10**	**9.750,10**	**11.217,02**	**11.940,19**	**12.022,34**	**11.436,51**	**12.734,05**	**12.017,13**	**13.410,61**	**13.296,77**	**14.665,91**

Table A.I -2: Emission Trends CH_4

GREENHOUSE GAS SOURCE AND SINK CATEG	Base year[1]	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
	(Gg)										
Total Emissions	**466,56**	**466,56**	**435,37**	**426,61**	**413,40**	**407,48**	**398,37**	**387,92**	**381,93**	**374,11**	**371,74**
1. Energy	**35,56**	**35,56**	**33,46**	**35,35**	**30,76**	**30,15**	**30,32**	**28,89**	**30,27**	**29,70**	**31,11**
A. Fuel Combustion (Sectoral Approach)	22,34	22,34	19,51	20,43	15,94	15,36	15,32	14,31	15,53	14,82	15,82
1. Energy Industries	0,15	0,15	0,16	0,19	0,19	0,19	0,16	0,17	0,19	0,21	0,31
2. Manufacturing Industries and Construction	0,39	0,39	0,45	0,46	0,50	0,47	0,46	0,47	0,47	0,49	0,47
3. Transport	2,91	2,91	1,99	1,82	1,63	1,56	1,40	1,29	1,19	1,14	1,07
4. Other Sectors	18,88	18,88	16,90	17,96	13,63	13,13	13,30	12,38	13,68	12,98	13,96
5. Other	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	13,22	13,22	13,96	14,92	14,82	14,80	15,01	14,58	14,74	14,88	15,29
1. Solid Fuels	0,52	0,52	0,28	0,24	0,24	0,24	0,24	0,27	0,26	0,39	0,39
2. Oil and Natural Gas	12,70	12,70	13,68	14,68	14,58	14,55	14,76	14,31	14,49	14,49	14,91
2. Industrial Processes	**0,36**	**0,36**	**0,34**	**0,35**	**0,36**	**0,39**	**0,35**	**0,35**	**0,32**	**0,36**	**0,35**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	0,35	0,35	0,33	0,34	0,35	0,38	0,34	0,35	0,32	0,35	0,34
C. Metal Production	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Other Production	NA	NA	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	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Solvent and Other Product Use	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
4. Agriculture	**219,15**	**219,15**	**211,77**	**208,45**	**206,11**	**205,52**	**201,19**	**197,73**	**195,49**	**191,25**	**189,97**
A. Enteric Fermentation	170,15	170,15	164,02	161,60	159,25	158,15	156,28	154,15	151,58	148,74	147,32
B. Manure Management	48,60	48,60	47,25	46,34	46,35	46,86	44,39	43,06	43,41	42,02	42,16
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	0,33	0,33	0,44	0,45	0,45	0,45	0,45	0,45	0,43	0,43	0,43
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0,07	0,07	0,07	0,06	0,07	0,07	0,07	0,06	0,07	0,07	0,06
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land-Use Change and Forestry	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
A. Changes in Forest and Other Woody Biomass S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Forest and Grassland Conversion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Abandonment of Managed Lands	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. CO_2 Emissions and Removals from Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**211,49**	**211,49**	**189,80**	**182,46**	**176,17**	**171,42**	**166,51**	**160,94**	**155,84**	**152,80**	**150,31**
A. Solid Waste Disposal on Land	197,34	197,34	174,64	167,23	160,94	156,13	151,14	145,55	140,39	137,27	134,71
B. Waste-water Handling	13,64	13,64	14,12	14,14	14,15	14,17	14,19	14,23	14,28	14,36	14,42
C. Waste Incineration	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Other	0,52	0,52	1,04	1,09	1,08	1,12	1,18	1,16	1,17	1,17	1,19
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Memo Items:											
International Bunkers	**0,01**	**0,01**	**0,02**	**0,02**	**0,03**	**0,03**	**0,03**	**0,03**	**0,03**	**0,03**	**0,02**
Aviation	0,01	0,01	0,02	0,02	0,03	0,03	0,03	0,03	0,03	0,03	0,02
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	IE	IE	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 CATEG	Base year[1] (Gg)	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total Emissions	**18,43**	**18,43**	**19,80**	**18,69**	**19,00**	**19,27**	**18,73**	**18,58**	**18,49**	**18,18**	**17,88**
1. Energy	**2,17**	**2,17**	**2,68**	**2,73**	**2,71**	**2,73**	**2,67**	**2,55**	**2,64**	**2,63**	**2,65**
A. Fuel Combustion (Sectoral Approach)	2,17	2,17	2,68	2,73	2,71	2,73	2,67	2,55	2,64	2,63	2,65
1. Energy Industries	0,15	0,15	0,16	0,16	0,15	0,17	0,17	0,18	0,20	0,20	0,22
2. Manufacturing Industries and Construction	0,51	0,51	0,55	0,54	0,59	0,57	0,58	0,55	0,55	0,55	0,53
3. Transport	0,55	0,55	1,02	1,00	0,94	0,99	0,91	0,89	0,88	0,91	0,91
4. Other Sectors	0,95	0,95	0,94	1,03	1,03	0,99	1,01	0,93	1,00	0,96	0,98
5. Other	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Industrial Processes	**2,94**	**2,94**	**2,77**	**2,82**	**2,78**	**2,89**	**2,98**	**3,07**	**2,54**	**2,60**	**2,85**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	2,94	2,94	2,77	2,82	2,78	2,89	2,98	3,07	2,54	2,60	2,85
C. Metal Production	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Other Production	NA	NA	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	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Solvent and Other Product Use	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**	**0,75**
4. Agriculture	**12,43**	**12,43**	**13,26**	**11,97**	**12,31**	**12,36**	**11,73**	**11,52**	**11,77**	**11,41**	**10,84**
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	2,54	2,54	2,50	2,45	2,43	2,42	2,38	2,34	2,32	2,28	2,27
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	9,90	9,90	10,76	9,52	9,88	9,93	9,34	9,18	9,44	9,13	8,57
E. Prescribed Burning of Savannas	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
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land-Use Change and Forestry	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
A. Changes in Forest and Other Woody Biomass S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Forest and Grassland Conversion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Abandonment of Managed Lands	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. CO_2 Emissions and Removals from Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**0,13**	**0,13**	**0,34**	**0,42**	**0,45**	**0,54**	**0,61**	**0,68**	**0,79**	**0,79**	**0,80**
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Waste-water Handling	0,05	0,05	0,19	0,26	0,30	0,38	0,44	0,51	0,62	0,62	0,62
C. Waste Incineration	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Other	0,08	0,08	0,15	0,16	0,15	0,16	0,17	0,17	0,17	0,17	0,18
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Memo Items:											
International Bunkers	**0,03**	**0,03**	**0,05**	**0,05**	**0,05**	**0,06**	**0,05**	**0,06**	**0,06**	**0,05**	**0,05**
Aviation	0,03	0,03	0,05	0,05	0,05	0,06	0,05	0,06	0,06	0,05	0,05
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	**IE**	**IE**	**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	Base year[1] (Gg)	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
Emissions of HFCs[5] - CO_2 equivalent (Gg)	555,26	219,16	555,26	637,15	729,62	812,53	866,99	1.019,00	1.122,34	1.218,92	1.308,22
HFC-23	0,0011	0,0002	0,0011	0,0014	0,0015	0,0012	0,0014	0,0017	0,0019	0,0021	0,0022
HFC-32	0,0001	0,0000	0,0001	0,0002	0,0004	0,0007	0,0010	0,0019	0,0026	0,0034	0,0041
HFC-41	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-43-10mee	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-125	0,0015	0,0000	0,0015	0,0057	0,0110	0,0143	0,0151	0,0198	0,0276	0,0349	0,0415
HFC-134	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-134a	0,4128	0,1671	0,4128	0,4576	0,5068	0,5594	0,5941	0,6348	0,6720	0,7065	0,7386
HFC-152a	0,0001	0,0000	0,0001	0,0003	0,0006	0,0007	0,0006	0,4897	0,4991	0,5085	0,5191
HFC-143	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-143a	0,0004	0,0000	0,0004	0,0025	0,0056	0,0079	0,0089	0,0125	0,0200	0,0269	0,0332
HFC-227ea	0,0000	0,0000	0,0000	0,0001	0,0001	0,0002	0,0004	0,0005	0,0008	0,0011	0,0014
HFC-236fa	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-245ca	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Emissions of PFCs[5] - CO_2 equivalent (Gg)	68,74	1.079,24	68,74	66,27	96,83	44,75	64,54	72,33	82,15	86,87	102,54
CF_4	0,0060	0,1410	0,0060	0,0058	0,0085	0,0027	0,0048	0,0063	0,0063	0,0064	0,0069
C_2F_6	0,0032	0,0177	0,0032	0,0031	0,0045	0,0029	0,0036	0,0033	0,0044	0,0041	0,0051
C_3F_8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0011	0,0014
C_4F_{10}	0,0001	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
$c\text{-}C_4F_8$	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
C_5F_{12}	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
C_6F_{14}	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Emissions of SF_6[5] - CO_2 equivalent (Gg)	1.139,16	502,58	1.139,16	1.218,05	1.120,15	907,99	683,96	633,31	636,62	640,83	593,52
SF_6	0,05	0,02	0,05	0,05	0,05	0,04	0,03	0,03	0,03	0,03	0,02

ANNEX II: UNCERTAINITY ASSESSMENT FOR KEY SOURCES

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 2004 submission. The key source analysis of the 2005 submission will be presented in the NIR 2005[6].

Sources of uncertainties will be explained in the NIR 2005. Furthermore, it is planned to include a Tier 1 uncertainty estimate to estimate the total uncertainty of the National Total in the NIR.

Table A.II: Uncertainties for Key Sources of the Austrian GHG Inventory (KS Assessment 2004)

IPCC Category	Description	Gas	AD	EF	Combined
			Uncertainty[7] [%]		
1 A 1 a gaseous	Public Electricity and Heat Production	CO_2	2	0.5	2.1
1 A 1 a liquid	Public Electricity and Heat Production	CO_2	0.5	0.5	0.7
1 A 1 a other	Public Electricity and Heat Production	CO_2	10	20	22.4
1 A 1 a solid	Public Electricity and Heat Production	CO_2	0.5	0.5	0.7
1 A 1 b gaseous	Petroleum refining	CO_2	2	0.5	2.1
1 A 1 b liquid	Petroleum refining	CO_2	0.5	0.5	0.7
1 A 1 c liquid	Manuf. of Solid fuels and Other Energy Ind.	CO_2	0.5	0.5	0.7
1 A 1 c gaseous	Manuf. of Solid fuels and Other Energy Ind.	CO_2	2	0.5	2.1
1 A 2 gaseous	Manufacturing Industries and Construction	CO_2	2	0.5	2.1
1 A 2 mob-liquid	Manufacturing Industries and Construction	CO_2	0.5	0.5	0.7
1 A 2 solid	Manufacturing Industries and Construction	CO_2	0.5	0.5	0.7
1 A 2 stat-liquid	Manufacturing Industries and Construction	CO_2	0.5	0.5	0.7
1 A 2 other	Manufacturing Industries and Construction	CO_2	10	20	22.4
1 A 3 b diesel oil	Road Transportation	CO_2	0.5	0.5	0.7
1 A 3 b gasoline	Road Transportation	CO_2	0.5	0.5	0.7
1 A 3 b gasoline	Road Transportation	N_2O	10	40	41.2
1 A 3 e gaseous	Transport-Other	CO_2	2	0.5	2.1
1 A 4 mob-diesel	Other Sectors	CO_2	0.5	0.5	0.7
1 A 4 biomass	Other Sectors	CH_4	10	50	51.0
1 A 4 gaseous	Other Sectors	CO_2	2	0.5	2.1
1 A 4 stat-liquid	Other Sectors	CO_2	0.5	0.5	0.7
1 A 4 solid	Other Sectors	CO_2	0.5	0.5	0.7
2 A 1	Cement Production	CO_2	5	5	7.1
2 A 2	Lime Production	CO_2	5	5	7.1
2 A 3	Limestone and Dolomite Use	CO_2	15	2	15.1

[6] Austria's National Inventory Report 2005, 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).

[7] referring to 2 standard deviations (95% confidence interval)

IPCC Category	Description	Gas	AD	EF	Combined
			Uncertainty[f] [%]		
2 A 7 b	Magnesite Sinter Plants	CO_2	5	5	7.1
2 B 1	Ammonia Production	CO_2			5.0
2 B 2	Nitric Acid Production	N_2O			3.0
2 C 1	Iron and Steel Production	CO_2	5	5	7.1
2 C 4	SF6 used in Al and Mg Foundries	SF_6	20	0	20.0
2 C 3	Aluminium production	PFCs	5	2	5.4
2 C 3	Aluminium production	CO_2	5	20	20.6
2 F 6	Semiconductor Manufacture	FCs	5	10	11.2
2 F 1/2/3	ODS Substitutes	HFCs	20	50	53.9
2 F 8	Other Sources of SF6	SF_6	25	50	55.9
3	Solvent and Other Product Use	CO_2	15	10	18.0
3	Solvent and Other Product Use	N_2O	50	0	50.0
4 A 1	Cattle	CH_4			8.0
4 B 1	Cattle	N_2O	10	75	75.7
4 B 1	Cattle	CH_4	10	69	70.1
4 B 8	Swine	CH_4	10	70	70.7
4 D	Agricultural Soils	N_2O			24.0
6 A 1	Managed Waste disposal	CH_4	15	30	33.5

Note: Uncertainties for activity data for stationary combustion of IPCC Category *1 A Fuel Combustion* were estimated for gross inland consumption.

ANNEX III: INFORMATION ON METHODOLOGIES FOR EC KEY SOURCES

This annex presents methodologies, data sources and emission factors used in the Austrian GHG Inventory for EC key sources for the purpose of Article 4(1)(b) of the Monitoring Decision.

Abbreviations used are explained at the end of the table.

Table A.III -1: Summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source [1]**	**Method applied [2]**	**Activity data [3]**	**Emission factor [4]**	**Key source [1]**	**Method applied [2]**	**Activity data [3]**	**Emission factor [4]**	**Key source [1]**	**Method applied [2]**	**Activity data [3]**	**Emission factor [4]**
1. Energy												
A. Fuel Combustion												
1. Energy Industries												
a. Public Electricity and Heat Production	**Yes**	C	NS, PS	CS	No				**Yes**	C	NS,PS	CS
b. Petroleum Refining	**Yes**	C	NS, PS	PS	No				No			
c. Manufacture of Solid Fuels and Other Energy Industries	**Yes**	C	NS	CS	No				No			

Table A.III -1: Summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source** [1]	**Method applied** [2]	**Activity data** [3]	**Emission factor** [4]	**Key source** [1]	**Method applied** [2]	**Activity data** [3]	**Emission factor** [4]	**Key source** [1]	**Method applied** [2]	**Activity data** [3]	**Emission factor** [4]
2. Manufacturing Industries and Construction	**Yes**	C	NS	CS, PS	No				No			
a. Iron and Steel	No				No				No			
b. Non-Ferrous Metals	No				No				No			
c. Chemicals	No				No				No			
d. Pulp, Paper and Print	No				No				No			
e. Food Processing, Beverages and Tobacco	No				No				No			
f. Other *(as specified in table 1.A(a)s2)*	No				No				No			

Table A.III -1: Summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)
3. Transport	No				No				No			
a. Civil Aviation	**Yes**	CS	NS	CS	No				No			
b. Road Transportation	**Yes**	M	NS	CS	**Yes**	M	NS, Q	CS	**Yes**	M	NS, Q	CS
c. Railways	**Yes**	M	NS	CS	No				No			
d. Navigation	**Yes**	M	NS	CS	No				No			
e. Other Transportation *(as specified in table 1.A(a)s3)*	**Yes**	C	NS	CS	No				No			

Table A.III -1: Summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)
4. Other Sectors	No				No				No			
a. Commercial/Institutional	**Yes**	C	NS	CS	No				No			
b. Residential	**Yes**	C	NS	CS	**Yes**	C	NS	CS	**Yes**	C	NS	CS
c. Agriculture/Forestry /Fisheries	**Yes**	C	NS	CS	No				No			
5. Other	**Yes**	M	AS	CS	No				No			
a. Stationary	No				No				No			
b. Mobile	No				No				No			

Table A.III -1: Summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)
B. Fugitive Emissions from Fuels	No				No				No			
1. Solid Fuels	No				No				No			
a. Coal Mining	No				**Yes**	C	NS	C	No			
b. Solid Fuel Transformation	**Yes**	IE	IE	IE	No				No			
c. Other *(as specified in table 1.B.1)*	No				No				No			
2. Oil and Natural Gas	No				No				No			
a. Oil	No				**Yes**	T1	NS	D	No			
b. Natural Gas	No				**Yes**	D	AS	D	No			
c. Venting and Flaring	**Yes**	IE	IE	IE	No				No			
d. Other *(as specified in table 1.B.2)*	No				No				No			

Table A.III 2: Summary report for methods, activity data and emission factors used (industrial processes)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O				HFCs				PFCs				SF_6			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
2. Industrial Processes																								
A. Mineral Products	No				No				No															
1. Cement Production	**Yes**	TS	PS	PS	No				No															
2. Lime Production	**Yes**	CS	PS	PS	No				No															
3. Limestone and Dolomite Use	No				No				No															
4. Soda Ash Production and Use	No				No				No															
5. Asphalt Roofing	No				No				No															
6. Road Paving with Asphalt	No				No				No															
7. Other *(as specified in table 2(I)A-G)*	No				No				No															

Table A.III -2: Summary report for methods, activity data and emission factors used (industrial processes)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O				HFCs				PFCs				SF_6			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)
B. Chemical Industry	No				No				No				No				No				No			
1. Ammonia Production	**Yes**	CS	PS	PS	No				No				No				No				No			
2. Nitric Acid Production	No				No				**Yes**	CS	PS	PS	No				No				No			
3. Adipic Acid Production	No				No				**Yes**	NO	NO	NO	No				No				No			
4. Carbide Production	No				No				No				No				No				No			
5. Other (as specified in table 2(I)A-G)	No				No				Yes				No				No				No			
C. Metal Production	No				No				No								**Yes**	T3b	NS	PS	No			
1. Iron and Steel Production	**Yes**	T2	NS	PS/ D	No				No								No				No			
2. Ferroalloys Production	No				No				No								No				No			
3. Aluminium Production	No				No				No								No				No			
4. SF_6 Used in Aluminium and Magnesium Foundries	No				No				No								No				No			
5. Other *(as specified in table 2(I)A-G)*	No				No				No								No				No			

Table A.III-2: Summary report for methods, activity data and emission factors used (industrial processes)

GREENHOUSE GAS SOURCE AND SINK	**CO_2**				**CH_4**				**N_2O**				**HFCs**				**PFCs**				**SF_6**			
CATEGORIES	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)	**Key source** (1)	**Method applied** (2)	**Activity data** (3)	**Emission factor** (4)
D. Other Production	No																							
1. Pulp and Paper	No																							
2. Food and Drink	No																							
E. Production of Halocarbons and SF6													**Yes**	NO	NO	NO	**Yes**	NO	NO	NO	**Yes**	NO	NO	NO
1. By-product Emissions													No				No				No			
2. Fugitive Emissions													No				No				No			
3. Other *(as specified in table 2(II)*													No				No				No			

Table A.III -2: Summary report for methods, activity data and emission factors used (industrial processes)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O				HFCs				PFCs				SF_6			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)
F. Consumption of Halocarbons and SF6													**Yes**	CS	Q	CS	No				**Yes**	CS	Q	CS
1. Refrigeration and Air Conditioning Equipment													No				No				No			
2. Foam Blowing													No				No				No			
3. Fire Extinguishers													No				No				No			
4. Aerosols/ Metered Dose Inhalers													No				No				No			
5. Solvents													No				No				No			
6. Other applications using ODS substitutes													No				No				No			
7. Semiconductor Manufacture													No				No				No			
8. Electrical Equipment													No				No				No			
9. Other *(as specified in table 2(II)*													No				No				No			
G. Other	**Yes**				No				No				No				No				No			

Table A.III -3: Summary report for methods, activity data and emission factors used (solvent and other product use, agriculture)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
3. Solvent and Other Product Use												
A. Paint Application	No								No			
B. Degreasing and Dry Cleaning	No								No			
C. Chemical Products, Manufacture and Processing	No								No			
D. Other	No								No			
4. Agriculture												
A. Enteric Fermentation					No							
1. Cattle					**Yes**	T2	NS	CS				
2. Buffalo					No							
3. Sheep					**Yes**	T1	NS	D				
4. Other					No							
B. Manure Management					No				No			
1. Cattle					**Yes**	T2	NS	CS	No			
2. Buffalo					No				No			
3. Sheep					No				No			
4. Other					No				No			
8. Swine					**Yes**	T2	NS	CS	No			
12. Solid Storage and Dry Lot					No				**Yes**	T1, T2	NS	D, CS
13. Other					No				**Yes**	T1	NS	D

Table A.III -3: Summary report for methods, activity data and emission factors used (agriculture)

GREENHOUSE GAS SOURCE AND SINK	**CO_2**				**CH_4**				**N_2O**			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
C. Rice Cultivation					No							
D. Agricultural Soils	**Yes**	T 1 a/b	NS	D	No				No			
1. Direct Soil Emissions	No				No				**Yes**	T 1 a/b	NS	D
2. Pasture, range and paddock manure	No				No				**Yes**	T 1 a/b	NS	D
3. Indirect Emissions	No				No				**Yes**	T 1 a	NS	D
4. Other *(as specified in table 4.D)*	No				No				**Yes**	T 1 b	NS	D
E. Prescribed Burning of Savannas					No				No			
F. Field Burning of Agricultural Residues					No				No			
G. Other					No				No			

Table A.III -4: Summary report for methods, activity data and emission factors used (land-use change and forestry, waste, other)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
5. Land-Use, Land-Use Change and Forestry												
A. Forest Land	No				No				No			
1. Forest Land remaining Forest Lands	No				No				No			
2. Land converted to Forest Lands	No				No				No			
B. Cropland	No				No				No			
1. Cropland remaining Cropland	No				No				No			
2. Land converted to Cropland	No				No				No			
C. Grassland	No				No				No			
1. Grassland remaining Grassland	No				No				No			
2. Land converted to Grassland	No				No				No			
D. Wetlands	No				No				No			
1. Wetlands remaining Wetlands	No				No				No			
2. Land converted to Wetlands	No				No				No			
E. Settlements	No				No				No			
1. Settlements remaining Settlements	No				No				No			
2. Land converted to Settlements	No				No				No			

Table A.III -4: Summary report for methods, activity data and emission factors used (land-use change and forestry, waste, other)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
5. Land-Use, Land-Use Change and Forestry												
F. Other Land	No				No				No			
1. Other Land remaining Other Land					No				No			
2. Land converted to Other Land	No				No				No			
G. Other (please specify)	No				No				No			
Harvested Wood Products	No				No				No			
6. Waste												
A. Solid Waste Disposal on Land	No				No							
1. Managed Waste Disposal on Land	No				**Yes**	CS	PS, Q	CS				
2. Unmanaged Waste Disposal Sites	No				**Yes**	NO	NO	NO				
3. Other *(as specified in table 6.A)*	No				No							

Table A.III -4: Summary report for methods, activity data and emission factors used (land-use change and forestry, waste, other)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**	**Key source (1)**	**Method applied (2)**	**Activity data (3)**	**Emission factor (4)**
5. Land-Use, Land-Use Change and Forestry												
6. Waste												
B. Wastewater Handling					No				No			
1. Industrial Wastewater					No				No			
2. Domestic and Commercial Wastewater					**Yes**	CS	Q	CS	No			
3. Other *(as specified in table 6.B)*					No				No			
C. Waste Incineration	**Yes**	C	AS	CS	No				No			
D. Other	**Yes**				No				No			
7. Other (as specified in Summary 1.A)												
Memo Items: (8)												
International Bunkers	No				No				No			
Aviation	No				No				No			
Marine	No				No				No			
CO_2 Emissions from Biomass	No				No				No			

Legend for tables A.III -1 to A.III -4

(1) Key sources of the Community. To be completed by Commission/EEA with results from key category analysis from previous inventory submission.

(2) Use the following notation keys to specify the method applied:

D (IPCC default),	**T1a, T1b, T1c** (IPCC Tier 1a, Tier 1b and Tier 1c, respectively),	**C** (CORINAIR),	**COPERT X** (Copert Model X = Version)
RA (Reference Approach),	**T2** (IPCC Tier 2),	**CS** (Country Specific).	
T1 (IPCC Tier 1),	**T3** (IPCC Tier 3),	**M** (Model)	

If using more than one method within one source category, enumerate the relevant methods. Explanations regarding country-specific methods or any modifications to the default IPCC methods, as well as information regarding the use of

Different methods per source category where more than one method is indicated, should be provided in the documentation box.

(3) Use the following notation keys to specify the sources of activity data used :

NS (national statistics),	**IS** (International statistics),	**AS** (associations, business organizations)
RS (regional statistics),	**PS** (Plant Specific data).	**Q** (specific questionnaires, surveys)

If keys above are not appropriate for national circumstances, use additional keys and explain those in the documentation box.

Where a mix of AD sources has been used, use different notations in one and the same cells with further explanations in the documentation box.

(4) Use the following notation keys to specify the emission factor used:

D (IPCC default),	**CS** (Country Specific),
C (CORINAIR),	**PS** (Plant Specific).

Where a mix of emission factors has been used, use different notations in one and the same cells with further explanations in the documentation box.

Documentation box:

* The full information on methodological issues, such as methods, activity data and emission factors used, can be found in the relevant sector sections of chapter 5 of the NIR. If any additional information is needed

To understand the content of this table, use this documentation box to provide references to the relevant section of the NIR where further details can be found.

* Where a mix of methods/ emission factors has been used within one source category, use this documentation box to specify those methods/emission factors for the various sub-sources where they have been applied

(see also footnotes 2 to 4 to this table).

ANNEX IV: INDICATORS

This Annex presents data of 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 in preparation).

Information on all Priority Indicators (including Additional Priority Indicators) is provided, however, data for some Supplementary Indicators was not available (cells are left blank).

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.IV: Indicators pursuant to Article 3 (1) j of the Monitoring Decision for the years 1990-2003

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Priority Indicators																
1	Total CO_2 intensity of GDP, t/Mio Euro	Total CO_2 emissions, kt	61 263	64 752	59 348	59 900	60 203	63 115	66 562	66 527	66 218	64 614	65 454	69 280	70 994	76 213
		GDP, Bio Euro (EC95)	163.47	169.37	173.36	173.99	178.62	181.99	186.83	190.19	196.93	203.66	210.39	211.86	214.39	216.07
2	Energy related CO_2 intensity of GDP, t/Mio Euro	CO_2 emissions from energy consumption, kt	53 425	57 126	52 306	52 926	52 900	55 540	59 359	58 677	58 666	57 229	57 452	61 292	62 420	67 624
		GDP, Bio Euro (EC95)	163.47	169.37	173.36	173.99	178.62	181.99	186.83	190.19	196.93	203.66	210.39	211.86	214.39	216.07
3	CO_2 emissions from passenger cars, kt		8 799	9 809	9 572	9 405	9 391	9 380	9 096	9 020	9 814	9 543	9 686	10 163	11 476	12 397
	Number of kilometres by passenger cars[8], Mkm		41 732	47 351	46 056	45 243	45 330	45 388	44 331	44 502	49 272	48 577	50 164	53 615	61 756	67 774
4	Energy related CO_2 intensity of industry, t/Mio Euro	CO_2 emissions from industry, kt	12 971	13 379	12 274	12 813	13 818	13 905	13 778	16 122	14 590	13 557	14 299	14 064	14 395	14 163
		Gross value-added total industry[9], Bio Euro (EC95)	27.91	28.68	28.40	28.29	29.54	30.22	30.83	31.60	32.31	33.95	35.05	34.95	34.92	35.60
5	Specific CO_2 emissions of households, t/dwelling	CO_2 emissions from fossil fuel consumption households, kt	10 130	11 089	10 137	10 066	9 258	9 869	10 738	10 050	9 955	10 191	9 620	10 606	10 234	11 087

[8] Activity data is consistent with emission data

[9] NACE 11 is also included

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
		Stock of permanently occupied dwellings, 1000	2 947	2 998	3 016	3 028	3 072	3 109	3 142	3 163	3 191	3 230	3 261	3 284	3 296	3 302
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	2 214	2 367	2 757	2 835	2 404	3 007	3 263	2 381	2 302	2 818	1 798	2 505	1 656	1 823
		Gross value-added services, Bio Euro (EC95)	91.51	94.97	98.53	99.38	101.60	103.95	106.12	107.23	111.11	113.76	117.90	119.16	120.29	121.00
7	Specific CO_2 emissions of public and autoproducer power plants, t/TJ	CO_2 emissions from public and autoproducer thermal power stations[10], kt	11 849	12 205	9 208	9 199	10 151	12 010	12 848	12 601	11 527	11 407	10 529	11 753	11 261	13 459
		All products –output bypublic and autoproducer thermal power stations, PJ	81.26	88.58	74.17	74.17	81.15	88.23	103.12	101.69	100.89	102.75	94.72	106.82	105.73	123.76

[10] SNAP 0101 + 0301 Auto-Producers

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Additional Priority Indicators																
1	CO_2 emissions from freight transport on road, kt		3 081	3 655	3 836	4 183	4 145	4 529	6 388	5 382	6 665	6 225	7 115	7 869	8 577	9 398
	Freight transport on road[8], Mtkm		5 912	6 735	7 048	7 534	7 625	8 228	10 982	9 727	11 767	11 314	12 781	13 985	15 090	16 331
2	Total CO_2 intensity - iron and steel industry, t/Mio Euro	Total CO_2 emissions from iron and steel, kt	8 512	8 151	7 036	7 364	7 887	8 727	8 384	9 482	8 682	8 635	9 445	9 349	10 126	9 675
		Gross value-added - iron and steel industry[11], Bio Euro (EC95)	1.97	1.99	1.77	1.51	1.53	1.63	1.63	1.92	1.89	2.15	2.11	2.34	2.16	2.15
3	Energy related CO2 intensity - chemical industry, t/Mio Euro	Energy related CO2 emissions chemical industries, kt	705	696	784	866	835	889	856	1 069	977	1 232	1 199	1 252	1 224	1 251
		Gross value-added chemical industry, Bio Euro (EC95)	1.59	1.63	1.67	1.78	1.70	1.77	1.82	1.83	1.90	2.06	2.35	2.12	2.24	2.30
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[12], kt	1 443	1 440	1 464	1 415	1 475	1 267	1 261	1 355	1 286	1 269	1 338	1 354	1 362	1 304
		Gross value-added - glass, pottery and buildings materials industry, Bio Euro (EC95)	2.29	2.22	2.16	2.10	2.25	2.10	2.18	2.27	2.12	2.17	2.29	2.34	2.38	2.38
5	Specific CO_2 emissions of iron and steel industry, t/t	Total CO_2 emissions from iron and steel, kt	8 512	8 151	7 036	7 364	7 887	8 727	8 384	9 482	8 682	8 635	9 445	9 349	10 126	9 675
		Production of oxygen steel, kt	3 921	3 896	3 592	3 738	3 968	4 538	4 032	4 718	4 801	4 722	5 183	5 346	5 647	5 707
6	Specific energy related CO_2 emissions of cement industry, t/t	Energy related CO_2 emissions from glass, pottery and building materials[13], kt	1 055	1 038	1 107	1 038	1 089	867	861	958	888	871	938	954	976	878
		Cement production, kt	4 679	4 821	4 822	4 858	4 763	3 839	3 779	3 909	3 668	3 658	4 047	4 035	4 061	4 061

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

[12] SNAP 030311, 030317, 030319

[13] SNAP 030311

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Supplementary Indicators																
1	Specific diesel related CO_2 emissions of passenger cars, g/100km	CO_2 emissions of diesel-driven passenger cars, kt	1 453	1 666	1 783	1 927	2 179	2 402	2 651	2 909	3 370	3 575	3 903	4 311	5 133	5 876
		Number of kilometres of diesel-driven passenger cars[8], Mio km	7 543	8 771	9 381	10 153	11 487	12 657	14 098	15 647	18 337	19 738	21 890	24 550	29 645	34 276
2	Specific petrol related CO_2 emissions of passenger cars, g/100km	CO_2 emissions of petrol-driven passenger cars, kt	7 346	8 143	7 789	7 478	7 212	6 978	6 445	6 110	6 443	5 969	5 782	5 852	6 343	6 521
		Number of kilometres of petrol-driven passenger cars[8], Mio km	34 189	38 580	36 674	35 091	33 843	32 731	30 233	28 855	30 935	28 839	28 274	29 065	32 110	33 498
3	Specific CO_2 emissions of passenger cars, t/pkm	CO_2 emissions from passenger cars, kt	8 799	9 809	9 572	9 405	9 391	9 380	9 096	9 020	9 814	9 543	9 686	10 163	11 476	12 397
		Passenger transport by cars[8], Mpkm	63 787	72 375	70 350	68 657	68 675	68 762	67 161	67 287	74 352	73 157	75 397	80 422	92 448	101 254
4	Specific air-transport emissions, t/passenger	CO_2 emissions from domestic air transport, kt	32	38	43	49	54	58	63	71	77	81	82	67	75	67
		Domestic air-passengers[14], Mio	365 425	735 049	674 699	697 589	714 178	697 822	747 313	749 781	857 149	917 267	1 007 048	1 070 863	1 045 706	1 082 194
5	Energy related CO_2 intensity - food, drink and tobacco industry, t/Mio Euro	Energy related CO_2 emissions food industries, kt	834	906	848	863	916	925	870	1 104	971	930	1 153	1 072	1 241	1 262
		Gross value-added – food, drink and tobacco industry, Mio Euro (EC95)	2.76	2.89	3.09	2.99	3.11	3.27	3.14	3.18	3.42	3.72	3.67	3.59	3.69	3.58
6	Energy related CO_2 intensity - paper and printing industry, t/Mio Euro	Energy related CO_2 emissions paper and printing, kt	2 124	2 566	2 124	2 165	2 620	2 231	2 148	2 925	2 677	2 025	2 176	2 012	1 917	1 857
		Gross value-added – paper and printing industry, Mio Euro (EC95)	2.66	2.50	2.24	2.43	2.68	2.92	2.83	3.04	3.03	3.52	3.80	4.00	3.81	3.70

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

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
7	Specific CO_2 emissions of households for space heating, t/m²	CO_2 emissions for space heating in households, kt	9 002	9 828	8 944	8 831	8 099	8 637	9 394	8 738	8 632	8 826	8 292	9 154	8 823	9 540
		Surface area of permanently occupied dwellings, Mio m2	249	255	258	259	265	272	277	281	284	290	295	298	303	307
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														
		Surface area of services buildings, Mio m2														
9	Specific CO_2 emissions of public power plants, t/TJ	CO_2 emissions from public thermal power stations[15], kt	8 857	9 198	6 275	5 997	6 463	7 546	9 243	9 010	8 047	7 950	7 618	8 873	8 590	10 796
		All products output by public thermal power stations, PJ	61.1	64.0	48.5	50.6	56.3	62.0	75.2	73.2	73.2	73.4	66.2	79.0	79.7	98.8
10	Specific CO_2 emissions of autoproducer plants, t/TJ	CO_2 emissions from auto-producers, kt														
		All products output by auto-producer thermal power stations, PJ														
11	Carbon intensity of total power generation, t/TJ	CO_2 emissions from classical power production, kt														
		All products output by public and autoproducer power stations, PJ														
12	Carbon intensity of transport, t/TJ	CO_2 emissions from transport, kt	12 405	13 997	13 941	14 119	14 082	14 466	16 042	14 977	17 183	16 596	17 735	18 886	20 974	22 692
		Total final energy consumption from transport[16], PJ	195.8	215.8	216.2	219.8	220.5	224.5	243.9	233.8	260.0	253.6	267.6	280.3	301.8	321.7
13	Specific energy related CO_2 emissions of paper industry, t/t	Energy related CO_2 emissions paper and printing industries, kt	2 124	2 566	2 124	2 165	2 620	2 231	2 148	2 925	2 677	2 025	2 176	2 012	1 917	1 857
		Physical output of paper, kt	2 932	3 090	3 252	3 301	3 603	3 599	3 653	3 817	4 009	4 142	4 385	4 250	4 419	4 564

[15] SNAP 0101

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

No.	Indicator	Numerator / Denominator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
14	CO_2 emissions from the industry sector, kt		12 971	13 379	12 274	12 813	13 818	13 905	13 778	16 122	14 590	13 557	14 299	14 064	14 395	14 163
	Total final energy consumption from industry[17], PJ		295	301	294	293	295	298	316	354	340	337	360	375	379	401
15	CO_2 emissions from households, kt		10 130	11 089	10 137	10 066	9 258	9 869	10 738	10 050	9 955	10 191	9 620	10 606	10 234	11 087
	Total final energy consumption from households[18], PJ		301.8	333.9	315.6	322.2	301.8	324.1	354.2	336.1	333.6	340.5	327.7	365.0	354.2	381.2

[17] Including Heat

[18] Including District heating and Solar thermal