BERICHTE
BE-217

Umweltbundesamt

BESTANDSAUFNAHME DER EMISSIONEN AN TREIBHAUSGASEN IN ÖSTERREICH VON 1990 BIS 2001

Berichterstattung gemäß Entscheidung des Rates 1999/296/EG

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VORWORT

Im Rahmen der Entscheidung 1999/296/EG des Rates zur *Änderung der Entscheidung 93/389/EWG über ein System zur Beobachtung der Emissionen von CO_2 und anderen Treibhausgasen in der Gemeinschaft*[1] verpflichtete sich Österreich, jährlich bis spätestens 31. Dezember aktualisierte Emissionsdaten an die Europäische Kommission zu übermitteln.

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

Dieser Bericht basiert auf der *Österreichischen Luftschadstoff-Inventur* (OLI) des Umweltbundesamtes und zeigt den Ausstoß von Luftschadstoffen in Österreich von 1990 bis 2001. Er stellt ausserdem die Zusammenfassung des Nationalen Inventur-Berichtes im Sinne der vom MM[1]-Ausschuss am 1. September 2000 beschlossenen Richtlinien ("Guidelines for MS and EC Annual Inventories") dar. Die Methode der Erhebung entspricht den einschlägigen Richtlinien des IPCC[2].

Das Umweltbundesamt bereitet sich momentan auf zukünftige Anforderungen an die OLI vor, die sich aus der Klimarahmenkonvention und dem Kyoto-Protokoll ergeben. Entsprechend Artikel 5.1 des Kyoto-Protokolls wird ein Nationales System eingerichtet, dessen Ziel es u.a. ist, die Qualität der Inventur zu verbessern. Es wurde ein Gesamtkonzept für das Nationale Inventur System Austria (NISA) entwickelt, das auf der OLI als zentralem Kern aufbaut. Weiters wird derzeit ein Qualitätsmanagementsystem entsprechend der Norm EN 45004 aufgebaut bzw. umgesetzt.

Im Oktober 2001 fanden zwei voneinander unabhängige UNFCCC-Tiefenprüfungen der Treibhausgas-Inventur durch internationale Fachexpertengruppen statt. Als Ergebnis dieser Prüfungen wird eine Reihe von Verbesserungen im Rahmen eines langfristigen Programmes bis 2005 durchgeführt.

Mit diesem Bericht wird der, von der Republik Österreich zur Erfüllung der Entscheidung 1999/296/EG zu übermittelnde, Emissionsbericht in englischer Sprache im dafür geforderten CRF[3]-Berichtsformat wiedergegeben. Es handelt sich hierbei um eine Zusammenfassung der wichtigsten Daten mit Anführung der wesentlichsten methodischen Änderungen. Die detailierte Darstellung der Daten wird der Europäischen Kommission in digitaler Form übermittelt. Das Umweltbundesamt wird diese detaillierte Darstellung der Daten in einem eigenen Bericht ("Austria´s National Inventory Report 2003") im Frühjahr 2003 veröffentlichen.

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998 erstellt. Der Umweltbundesamt GmbH 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.

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[1] im Englischen: Monitoring Mechanism of Community CO_2 and Other Greenhouse Gas Emissions (MM)

[2] Intergovernmental Panel on Climate Change, Revised 1996 Guidelines

[3] Common Reporting Format der UNFCCC

Das Umweltbundesamt versteht den vorliegenden Bericht als Beitrag im Rahmen der Wahrnehmung seiner Funktion als Umweltschutzfachstelle des Bundes in Erfüllung der ihm im Umweltkontrollgesetz zugewiesenen Kompetenzen.

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 2002	Dezember 2002	IPCC Common Reporting Format (CRF)

AUSTRIA'S
ANNUAL NATIONAL GREENHOUSE GAS
INVENTORY 1990 - 2001

Submission under the Monitoring Mechanism of Community CO_2 and other Greenhouse Gas Emissions
(1999/296/EC)

Vienna, December 2002

Prepared by the Austrian Federal Environment Agency

CONTENTS

Title of Inventory	***Austria's Annual National Greenhouse Gas Inventory 1990-2001***
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1 INTRODUCTION

This report summarises the Austrian greenhouse gas inventory for 1990-2001. 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 1999/296/EC amending Decision 93/389/EEC for a Monitoring Mechanism of Community CO_2 and other Greenhouse Gas Emissions (MM). 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. It follows the Guidelines for Member States and EC Annual Inventories as adopted by the MM-Committee on 1 September 2000.

According to the decision and these guidelines the reporting requirements are exactly the same as for the UNFCCC, therefore 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 United Nations Framework Convention on Climate Change. The greenhouse gas inventory has to be submitted to the Commission each year, no later than 31 December.

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 1990-2001.

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

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	CO_2 equivalent (Gg)												
CO_2 emissions (without LUCF)[6]	60.113	60.113	63.595	58.455	59.307	59.744	62.627	66.629	66.208	66.333	65.020	64.928	69.120
CH_4	10.672	10.672	10.552	10.280	10.318	10.168	10.074	9.955	9.609	9.442	9.300	9.134	9.074
N_2O	5.804	5.804	6.431	5.247	6.072	6.752	6.360	6.154	6.445	6.252	6.177	6.153	5.951
HFCs	546	4	6	9	12	17	546	625	718	816	870	1.033	1.033
PFCs	16	963	974	576	48	54	16	15	18	21	25	25	25
SF_6	1.175	518	683	725	823	1.033	1.175	1.246	1.148	955	730	677	677
Total (without CO_2 from LUCF)[6]	**78.325**	**78.073**	**82.241**	**75.291**	**76.580**	**77.768**	**80.797**	**84.624**	**84.146**	**83.819**	**82.123**	**81.951**	**85.880**

(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 9,6 % from 1990 to 2000 (CO_2: +15,0 %). In the period from 2000 to 2001 Austria's total greenhouse gases increased by 4,8 %. The CO_2 emissions increased by 6,5 %.

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

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	CO_2 equivalent (Gg)												
1. Energy	48.128	48.128	52.480	48.520	49.320	49.179	51.841	56.383	54.593	55.708	54.286	54.072	57.642
2. Industrial Processes	15.567	15.315	14.965	13.183	13.143	14.024	14.953	14.610	15.749	14.762	14.664	14.877	15.558
3. Solvent and Other Product Use	755	755	669	614	593	594	613	612	638	628	628	628	628
4. Agriculture	8.142	8.142	8.495	7.411	8.070	8.619	8.148	7.867	8.159	7.876	7.764	7.680	7.602
5. Land-Use Change and Forestry[7]	-9.215	-9.215	-13.504	-8.656	-8.982	-7.862	-7.254	-5.385	-7.633	-7.633	-7.633	-7.633	-7.633
6. Waste	5.732	5.732	5.632	5.565	5.453	5.352	5.241	5.153	5.007	4.846	4.781	4.693	4.650
7. Other	0	0	0	0	0	0	0	0	0	0	0	0	0

(7) Net emissions.

2 RELATION WITH EARLIER REPORTED DATA

The emission data reported in this submission (for each of the years from 1990 to 2001) are revised and updated data, derived in line with the most recent findings on the comprehensive estimation of greenhouse gas emissions.

The most substancial revision of this submission is the generation of completely new, consistent time series of the energy balance by STATISTIK AUSTRIA. The national energy balance is the main data supplier for the underlying energy source data. Its activity data are the basis for the calculation of the vast majority of the energy induced emissions. Thus it have been mainly the revisions of the energy balance, which considerably changed the trend of Austrian´s greenhouse gas emissions.

Other improvements which resulted in significant changes of N_2O emissions relate to chemical industry and agriculture.

The figures presented in this report replace data reported earlier by the Austrian Federal Government 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 Austrian Federal Government (Austria's Third National Communication, Chapter 4) and in Austria's 2001 Submission to the UNFCCC (Austrian Greenhouse Gas Emissions 1990 to 2000).

3 SOURCES OF DATA

- The energy balance of STATISTIK AUSTRIA is the main data supplier of Austria´s Greenhause Gas Inventory.
- Information about activity data and emissions for the industry sector is submitted to the Federal Environment Agency by the Association of the Austrian Industries.
- Operators of steam boilers of public electricity and heating plants with more than 50 MW report their emissions and activity data to the UBAVIE. Emissions of the pollutants adressed in the inventory are calculated on the basis of these reported data.
- Operators of landfill sites report their activity data directly to UBAVIE. Emissions of the years 1998-2001 are calculated on the basis of these data.
- Activity data needed for the calculation of non energetic emissions are based on several statistics collected by STATISTIK AUSTRIA and national and international studies.

4 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 2002). Further background information and a complete description of the 2002 inventory is given in the National Inventory Report 2002 which will be published in spring 2003.

ENERGY (1A)

Energy Balance

Until the previous submission 2002 the main data suppliers for the underlying energy source data were the Austrian Institute for Economic Research (WIFO) for the period 1980-1995 and STATISTIK AUSTRIA for the period 1996-2000.

This year STATISTIK AUSTRIA compiled a new energy balance in the IEA format on the basis of the old WIFO energy balance and new information from industry. Inconsistencies of the old energy balance time series were eliminated. Another benefit of the new energy balance is the more detailed fuel types. This results in a recalculation for the whole timeseries of category 1A.

More than 80 % of Austria's greenhouse gas emissions are caused by energy consumption, Revisions of the national energy balance have a great influence on the national emission trend. In comparison to the submission from January 2002 lower energy related CO_2 emissions have been estimated for the base year and the whole time series.

Public Electricity and Heat Production (1A1a)

Total fuel consumption has been taken from the new energy balance. In comparison with previous energy balances it reports a considerably lower consumption of fuel oil of thermoelectric power conversion (-250.000 t), resulting in e.g 800.000 tons lower CO_2 emissions in the year 1990.

For the year 2000 the emission declarations of combustion plants >= 50 MW have been updated.

Emissions of waste incineration for energy purposes reported in the previous submission under categories 6C1 and 1A5 are now reported under category 1A1a.

Natural gas so far double counted under categories 1A1a and 1A1b is now reported in sector 1A1b only. (-442.500 t CO_2 in sector 1A1a in 1990)

Petroleum refining (1A1b)

Liquid fuel consumption of refineries has been taken from the new energy balance. Natural gas consumption which in previous submissions was allocated under category 1A2f is now reported under category 1A1b.

Manufacture of Solid Fuels and Other Energy Industries (1A1c)

Emissions from coal consumption of the mining industry which formerly were included in category 1A2f are now included in category 1A1c.

Manufacturing Industries and Construction (1A2)

Emissions from the different industry branches so far included under category 1A2f are now reported under the corresponding categories 1A2b to 1A2e.

Iron and Steel (1A2a)

Energy consumption of iron and steel industry has been updated according to the new energy balance and information of the plant operators. Natural gas and residual fuel oil consumption which in previous submissions were considered under category 1A2f are now reported under category 1A2a.

Other (1A2f)

In previous submissions all emissions from fuel combustion in industry except iron and steel industry were included. In this submission only emissions from industry which are not considered under the categories 1A2a to 1A2e are included.

The new energy balance includes a more detailed description of fuel application increasing transparency and thus avoiding double counting of previous submissions under sector 1A2f:

Coke:
Coke so far double counted under categories 1A2f and 1A2a is now reported in sector 1A2a only. (-45.000 t CO_2 in sector 1A2f in 1990)
Fuel oil:
Fuel oil so far double counted under categories 1A2f and 1A2a is now reported in sector 1A2a only. (-283.000 t CO_2 in sector 1A2f in 1990)
Natural gas
Natural gas so far double counted under categories 1A2f and 1A2a is now reported in sector 1A2a only. (-547.800 t CO_2 in sector 1A2f in 1990)

Aviation (1A3a), International Bunkers

The following study is the basis of the recalculations of CO_2, CO, NO_x, HC, SO_2 and CH_4 emissions:

> Kalivoda M., Kudrna M.: "Air Traffic Emission Calculation for Austria 1990-2000"; on contract to the Federal Environment Agency Austria, 2002. Unpublished report.

In this new study emissions from aviation have been recalculated for the time series 1990 to 2000. The study has been performed to improve the accuracy of data concerning the movements and associated emissions.

CO_2, CO, NOx, HC and SO_2:
For the air transport class IFR (Instrument Flight Rules) the very detailed methodology from the CORINAIR guidebook in an advanced version has been used (based on the MEET model[4]). Emissions for VFR (Visual Flight Rules) have been calculated using average emission factors, an average fuel flow per hour and annual flight hours reported from Austrocontrol. For military flights the consumed fuel and average emission factors have been used. The calculation of the emissions of military flights does not distinguish between LTO and cruise.

CH_4:
For IFR domestic LTO and IFR international LTO the CH_4 emissions have been calculated assuming a 9.6 % weight-share of CH_4 in the total HC emissions. For the aircraft cruise it was not possible to obtain good enough estimates for CH_4 emission factors. Therefore no calculation has been carried out.

N_2O:
Emissions have been calculated using the emission factors of the very simple methodology specified in the emission inventory guidebook. These emission indices are given in [kg N_2O / LTO] for LTO and [kg N_2O / t fuel] for cruise.

The number of LTO cycles has been reported by STATISTIK AUSTRIA. The split international/national LTOs has been calculated by disaggregating the total number of movements

[4] European Commission:"MEET – Methodology for calculating transport emissions and energy consumption"; DG VII, European Communities, Belgium 1999.

according to the ratio of fuel used for IFR domestic LTO and IFR international LTO (assuming an equal fuel consumption for domestic and international LTO).

Assignment of the calculated emissions to the SNAP codes:
The SNAP category "Domestic LTO" includes emissions from IFR domestic LTO, VFR and Military. The SNAP category "international LTO" corresponds with the IFR international LTO. The SNAP category "domestic cruise" corresponds with the IFR domestic cruise. The SNAP category "international cruise" corresponds with the IFR international cruise but is adjusted for reasons of conformity with national energy statistics.

Calculation for 2001:
The same emission factors and fuel allocation as in the year 2000 have been used. For the total fuel comsumption, new data reported by STATISTIK AUSTRIA have been used.

Road Transportation (1A3b)

The driving pattern of the vehicle fleet has been recalculated for the whole time series, taking into account the heavy increase of diesel vehicles share in the Austrian passenger car fleet. As a result, total fuel consumption and emissions (especially NO_x and particles) of passenger cars have increased. Emission factors for passenger cars have not been changed.

Due to new data on the driving behaviour in Austria the number of starts per vehicle and day have changed. The cold start emissions have been recalculated.

On the basis of following study, emission factors for heavy duty vehicles (especially for EURO 2 and EURO 3 vehicles) have been revised:

> Hausberger, St.: „Update of the Emission Functions for Heavy Duty Vehicles in the Handbook Emission Factors for Road Traffic"; on contract to the Federal Environment Agency Austria, 2002. Unpublished report.

Other Sectors (1A4)

Energy consumption and disaggregation to sub categories have been updated according to the new energy balance.

Other (1A5)

In the previous submission energy consumption and CO_2-emission from biomass of waste incineration plants were reported under this category. Now these emissions are reported under category 1A1a.

REFERENCE APPROACH

According to the new energy balance, the fueltypes are more detailed. Sign and formula errors of the previous submission have been eliminated.

INDUSTRIAL PROCESSES (2)

Chemical Industries - Nitric Acid Production (2B2)

N_2O emissions from nitric acid production have been revised based upon new validated information made available by the plant operator. The revision has resulted in an increase of about 720.000 t CO_2 equivalents in the base year. The recalculation is based on a new monitoring methodology using validated continous measurements. The previously reported estimates were based on a few unrepresentative samples and an unvalidated monitoring methodology.

Mineral Products (2A): Asphalt Roofing (2A5), Road Paving with Asphalt (2A6)
Other Production (2D): Pulp and Paper (2D1), Chipboard (2D1), Food and Drink (2D2)

Activity data have been updated using updated statistical data.

WASTE (6)

Solid Waste Disposal on Land – Managed Waste Disposal (6A1)

In the period from 1990 to 1997 all activity data were taken from the current *Bundes-Abfallwirtschaftsplan* (Federal Waste Management Plan) and remained unchainged. From 1998 on all operators of landfill sites have to report their activity data directly to UBAVIE (*Deponieverordnungsdatenbank* - Austrian disposal database). Emissions from 1998 to 2001 have been recalculated on the basis of these data.

In the previous inventories for the calculations the standard density of CH_4 at a temperature of 0°C was taken, which didn't reflect the real conditions of landfills for waste. In this inventory the density of CH_4 has been corrected: Not the standard density, but the density at a temperature of 30°C has been taken into account. As a result CH_4 emissions decreased by 9 % in the whole time series.

Waste Incineration – Incineration of Municipal/Industrial Wastes (6C)

Emissions of waste incineration for energy purposes reported in previous submissions under category 6C are now reported under category 1A1a.

Waste Incinaeration - Open Burning of Agricultural Waste (6C)

Data about Austria's vinicultural area have been updated. (Basis: Statistical Yearbooks of Statistik Austria 1986-2002).

The Federal Association of Viniculture *(Bundesweinbauverband Österreich)* reported the amount of residual wood with 1.500-2.500 kg per hectare, the anually burnt wood with 1-3 % of the vinecultural area. For the calculations the upper limits (3 % of 2.500 kg/ha) have been used.

AGRICULTURE (4)

In the previous inventory a very simple methodology using default and constant (for soils: area- based) emission factors was applied. In 2001, UBAVIE contracted the Austrian Research Center Seibersdorf and the Institute for Land-, Environment- and Energy Engineering of the University of Agriculture Vienna to develope new emission estimates for the sectors "Enteric Fermentation", "Manure Management" and "Agricultural Soils".

Especially for the estimation of CH_4 and N_2O emissions the IPCC tier 1 and tier 2 methods were applied, which means a major improvement in comparison to the last year's submission, where CORINAIR (average) values were used.

Following studies are the basis of the revised data:

- Gebetsroither, E.; Orthofer, R. & Strebl, F. (2002): Greenhouse Gas Emissions from Agricultural Soils in Austria. ARC Seibersdorf research. Revised version. November 2002.
- Gebetsroither, E.; Orthofer, R. & Strebl, F., (2002): Greenhouse Gas Emissions from Enteric Fermentation in Austria. ARC Seibersdorf research. July 2002.

- Amon B.; Amon T. & Hopfner-Sixt K. (2002): Emission Inventory for the Agricultural Sector in Austria - Manure Management. Institute of Agricultural, Environmental and Energy Engineering (BOKU – University of Agriculture, Vienna). July 2002.

Activities:
New counting methods resulted in changes of the activity data in the livestock categories cattle, sheep, fattening pigs and poultry. The consistency of the time series still needs further improvement.

Agricultural Soils (4D)

Emissions from Agricultural Soils and Enteric Fermentation were calculated by ARCS (Austrian Research Center Seibersdorf).

N_2O:
For the first time direct emissions (from nitrogen inputs to soils: mineral and organic fertilizers, crop residues, sewage sludge application, biological fixation) and indirect emissions (from atmospheric nitrogen deposition and nitrogen leaching) as well as emissions from nitrogen input through grazing animal excreta have been estimated. This has resulted in additional N_2O emissions over the whole time series, e.g. 2.000.000 tons of CO_2 equivalents more in the base year 1990.

NOx:
For the first time emissions from fertilized and unfertilized cultures have been calculated.

VOC:
Emissions from agricultural vegetation have been estimated for the first time.

Manure Management (4B)

Emissions of the category "Manure Management" were calculated by the ILUET (Institute for Land-, Environment- and Energy Engineering), University of Agriculture (BOKU), Vienna.

N_2O:
For the first time N_2O emissions of this category have been estimated according to Tier 1 methodology. The IPCC Guidelines method for estimating N_2O emissions from manure management entails multiplying the total amount of N excretion (from all animal categories) in each type of manure management system by an emission factor for that type of manure management system. Emissions are then summed over all manure management systems.

CH_4:
CH_4 emissions generated by the manure of cattle and swine have been estimated with the Tier 2 methodology. All the other livestocks are of minor importance in Austria, therefore CH_4 emissions of these livestock categories have been estimated with the Tier 1 approach.

Enteric Fermentation (4A)

Emissions of this category have been calculated by ARCS (Austrian Research Center Seibersdorf).

CH_4:
The CH_4-emissions have been calculated in accordance with the IPCC guidelines. As cattle contributes the vast majority of emissions, the detailed IPCC Tier 2 methodology has been applied. This methodology relies on specific emission factors that are derived from the energy intake and from different cattle farming practices.

The less detailed "Tier 1" methodology has been applied for all other animal categories. Emissions from organic and conventional farming practices have been calculated separately.

5 METHOD OF REPORTING AND DATA BASIS

The Austrian greenhouse gas inventory for the period 1990 to 2001 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) and the IPCC 1996 Guidelines for National Greenhouse Gas Inventories, 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.

As the Kyoto Protocol is expected to enter into force in the near future, Austria is making preparations to meet all requirements it entails. According to Article 5.1 of the Kyoto Protocol (which specifies requirements for a national system as part of a COP decision) the National Inventory System Austria (NISA) was further developed in 2002.

In October 2001 there were two in-depth reviews of the Austrian greenhouse gas inventory. A long-term program shall ensure necessary improvements till 2005.

Austria, as many other European Countries, uses the CORINAIR calculation method (CORe INventory AIR) for quantifying national emissions. The CORINAIR system is designed to report air emissions from the EC and Phare countries to the European Environment Agency in a common format. This common European-wide database is applied for the preparation of specific inventories in accordance with the guidelines under the UNECE/CLRTAP and UNFCCC.

Similar to the IPCC categories, the CORINAIR system has its own nomenclature, called SNAP (Selected Nomenclature for sources of Air Pollution). This nomenclature is designed to estimate not only emissions of greenhouse gases but all kind of air pollutants. The specification of the SNAP categories has to be revised continuously due to new reporting requirements. The current SNAP code version used is SNAP 97. The results are presented in CollectER databases on the EIONET. Each database stores one year of the time series and can be read by using the CollectER V1.3 Software. The databases also include information about non-GHG air pollutants which are needed for reporting to other conventions. The Austrian Federal Environment Agency uses internally an expert system, which is a combination of an Access database and Excel sheets. This system is more comprehensive and more flexible than the CollectER databases.

The national project covering the entire present estimation of Air Emissions in Austria during the reported period is the Austrian Air Emission Inventory (*Österreichische Luftschadstoff-Inventur - OLI*). The OLI figures for Austria's national emissions resulting from this project have been transferred to the UNFCCC Common Reporting Format using CORINAIR stan-

dard procedures, in order to comply with UNFCCC reporting obligations to ensure comparability of the reported data.

As the National Inventory System Austria (NISA) shall fulfil the requirements of the Kyoto Protocol following Article 5.1, the Austrian Federal Environment Agency is now implementing a quality management system based on the EN 45004. This system takes into account recommendations of European and international documents such as the ISO 9000 series of standards and Guide-G24 (Accreditation of Inspection Bodies – Guidelines on the application of EN 45004. European Co-operation for Accreditation: 1996) as far as they are relevant for inspection bodies. The accreditation as inspection body is planned.

A further improvement of the emission inventory is expected due to methodological changes with respect to IPCC key-source categories. The Kyoto Protocol prescribes the most accurate methods as defined in the *Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories* for the IPCC key-source categories. The aim of this improvement is that the most accurate methods are used for the IPCC key-source categories.

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.

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 2: Status of the present report

Reporting Obligation	*Format*	*Inventory*	*Version*
Monitoring Mechanism	Common Reporting Format (IPCC)	OLI 2002	December 2002

[5] WINIWARTER, W.; RYPDAL, K. (2001): Assessing the Uncertainty Associated with National Greenhouse Gas Emission Inventories: A Case Study for Austria, Accepted for publication in Atmospheric Environment.

6 ANNEX 1

NOTATION KEYS

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

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.
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.
0:	for emissions by sources and removals by sinks of greenhouse gases which are estimated to be less than one half the unit being used to record the inventory table and which therefore appear as zero after rounding.

Table 3: Emission Trends CO_2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	(Gg)												
1. Energy	48.649	48.649	50.763	46.768	47.479	47.378	49.870	54.991	52.792	53.855	52.099	52.333	55.879
A. Fuel Combustion (Sectoral Approach)	48.529	48.529	50.633	46.629	47.347	47.131	49.729	54.296	52.649	53.698	52.305	52.146	55.672
1. Energy Industries	13.225	13.225	14.097	10.966	10.910	11.262	12.427	13.700	13.681	12.851	12.899	12.230	14.375
2. Manufacturing Industries and Construction	6.927	6.927	7.466	7.381	8.098	8.566	8.730	8.959	9.815	9.601	8.772	9.061	7.753
3. Transport	12.739	12.739	14.161	14.110	14.264	14.369	14.451	16.103	15.051	17.136	16.493	17.481	18.883
4. Other Sectors	13.638	13.638	14.907	14.172	14.075	12.933	14.121	15.534	14.101	14.102	14.137	13.368	14.658
5. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Fugitive Emissions from Fuels	120	120	130	139	132	148	149	95	143	165	194	187	207
1. Solid Fuels	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Oil and Natural Gas	120	120	130	139	132	148	149	95	143	165	194	187	207
2. Industrial Processes	12.921	12.921	12.377	11.298	11.459	12.094	12.358	11.840	13.000	12.871	12.114	12.188	12.834
A. Mineral Products	3.975	3.975	3.838	3.900	3.729	3.864	3.212	3.229	3.370	3.110	3.108	3.060	3.074
B. Chemical Industry	424	424	434	395	428	406	489	484	475	521	492	484	462
C. Metal Production	8.461	8.461	8.041	6.949	7.254	7.771	8.385	8.084	9.107	8.385	8.456	8.591	9.243
D. Other Production	61	61	65	55	48	53	52	51	48	57	58	53	51
E. Production of Halocarbons and SF_6													
F. Consumption of Halocarbons and SF_6													NO
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	523	523	436	381	361	361	381	379	405	396	396	396	396
4. Agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0
A. Enteric Fermentation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Manure Management	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [3]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0	0	0	0	0	0	0	0	0	0	0	0	0
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
5. Land-Use Change and Forestry [3]	-9.215	-9.215	-13.504	-8.656	-8.982	-7.862	-7.254	-5.385	-7.633	-7.633	-7.633	-7.633	-7.633
A. Changes in Forest and Other Woody Biomass Stocks	-9.215	-9.215	-13.504	-8.656	-8.982	-7.862	-7.254	-5.385	-7.633	-7.633	-7.633	-7.633	-7.633
B. Forest and Grassland Conversion	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
C. Abandonment of Managed Lands	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. CO2 Emissions and Removals from Soil	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	21	21	18	8	9	10	10	10	11	11	11	11	11
A. Solid Waste Disposal on Land	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Waste-water Handling	0	0	0	0	0	0	0	0	0	0	0	0	0
C. Waste Incineration	21	21	18	8	9	10	10	10	11	11	11	11	11
D. Other	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Other *(please specify)*	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Emissions/Removals with LUCF [3]	50.898	50.898	50.091	49.798	50.325	51.882	55.373	61.243	58.575	58.700	57.387	57.294	61.487
Total Emissions without LUCF [4]	60.113	60.113	63.595	58.455	59.307	59.744	62.627	66.629	66.208	66.333	65.020	64.928	69.120
Memo Items:													
International Bunkers	886	886	994	1.077	1.140	1.186	1.327	1.466	1.526	1.578	1.542	1.675	1.615
Aviation	886	886	994	1.077	1.140	1.186	1.327	1.466	1.526	1.578	1.542	1.675	1.615
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass	10.301	10.301	11.218	11.059	11.405	11.894	11.759	12.585	12.589	11.880	12.600	12.179	13.139

(1) Fill in the base year adopted by the Party under the Convention, if different from 1990.
(2) See footnote 4 to Summary 1.A of this common reporting format.
(3) Take the net emissions as reported in Summary 1.A of this common reporting format. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).
(4) 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.

General notes on the consistency with last year's submission:

Category 1A1a:
Emissions of waste incineration for energy purposes reported in the previous submission under categories 6C1 and 1A5 are now reported under this category.

Category 1A1c:
Emissions from coal consumption of the mining industry which former were included in category 1A2f are now included in this category.

Category 1A2:
Emissions of the different industry branches so far included in category 1A2f are now reported under the corresponding categories 1A2b to 1A2e.

Category 1A2a:
Natural gas and residual fuel oil consumption which in previous submissions were considered under category 1A2f are now reported under this category.

Category 1A2f:
This category now includes only emissions from industry which are not considered under categories 1A2a to 1A2b.

Category 1A5:
In the previous submission energy consumption and CO_2-emission from biomass of waste incineration plants were reported under this category. Now they are reported under category 1A1a.

Table 4: Emission Trends CH_4

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	(Gg)												
Total Emissions	**508,17**	**508,17**	**502,46**	**489,50**	**491,31**	**484,31**	**479,73**	**474,07**	**457,57**	**449,60**	**442,84**	**434,97**	**432,11**
1. Energy	**26,47**	**26,47**	**28,38**	**26,10**	**26,18**	**24,48**	**25,41**	**26,66**	**19,12**	**18,83**	**18,73**	**17,85**	**18,84**
A. Fuel Combustion (Sectoral Approach)	21,95	21,95	23,60	21,39	21,25	19,40	19,90	20,80	13,45	13,01	12,81	12,13	12,85
1. Energy Industries	0,15	0,15	0,17	0,15	0,16	0,15	0,16	0,18	0,20	0,18	0,19	0,22	0,31
2. Manufacturing Industries and Construction	0,55	0,55	0,57	0,58	0,56	0,59	0,60	0,61	0,64	0,63	0,64	0,65	0,60
3. Transport	2,83	2,81	2,97	2,78	2,63	2,51	2,51	2,10	1,92	1,92	1,73	1,63	1,58
4. Other Sectors	18,39	18,39	19,89	17,88	17,89	16,14	16,84	17,99	10,69	10,28	10,26	9,63	10,34
5. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Fugitive Emissions from Fuels	4,52	4,52	4,78	4,71	4,94	5,08	5,51	5,86	5,67	5,82	5,92	5,72	6,01
1. Solid Fuels	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
2. Oil and Natural Gas	4,50	4,50	4,76	4,69	4,93	5,07	5,50	5,85	5,67	5,81	5,91	5,71	6,00
2. Industrial Processes	**0,14**	**0,14**	**0,14**	**0,14**	**0,15**	**0,15**	**0,16**	**0,16**	**0,18**	**0,19**	**0,14**	**0,13**	**0,12**
A. Mineral Products	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,01	0,01	0,01
B. Chemical Industry	0,10	0,10	0,11	0,09	0,11	0,11	0,12	0,12	0,13	0,16	0,10	0,09	0,08
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	0,00	0,00
D. Other Production	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
E. Production of Halocarbons and SF_6													
F. Consumption of Halocarbons and SF_6													
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
4. Agriculture	**210,64**	**210,64**	**207,69**	**195,70**	**206,78**	**206,29**	**206,18**	**203,52**	**201,46**	**201,52**	**197,96**	**195,17**	**193,98**
A. Enteric Fermentation	169,28	169,28	166,98	159,69	159,71	159,19	159,44	157,59	155,49	154,95	153,78	152,21	149,99
B. Manure Management	41,29	41,29	40,63	39,94	47,00	47,03	46,67	45,85	45,90	46,50	44,10	42,88	43,31
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
5. Land-Use Change and Forestry	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
A. Changes in Forest and Other Woody Biomass Stocks	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Forest and Grassland Conversion	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Abandonment of Managed Lands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. CO2 Emissions and Removals from Soil	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**270,91**	**270,91**	**266,25**	**263,57**	**258,20**	**253,38**	**247,98**	**243,73**	**236,81**	**229,06**	**226,01**	**221,82**	**219,77**
A. Solid Waste Disposal on Land	234,70	234,70	229,89	227,03	221,53	216,54	211,21	206,94	200,00	192,23	189,16	184,93	182,97
B. Waste-water Handling	13,73	13,73	13,88	14,06	14,19	14,29	14,29	14,31	14,34	14,35	14,37	14,40	14,32
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	0,00	0,00
D. Other	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48	22,48
7. Other (please specify)	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Memo Items:													
International Bunkers	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**	**0,01**
Aviation	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass													

General notes on the consistency with last year's submission:

Category 1A1a:
Emissions of waste incineration for energy purposes reported in the previous submission under categories 6C1 and 1A5 are now reported under this category.

Category 1A1c:
Emissions from coal consumption of the mining industry which former were included in category 1A2f are now included in this category.

Category 1A2:
Emissions of the different industry branches so far included in category 1A2f are now reported under the corresponding categories 1A2b to 1A2e.

Category 1A2a:
Natural gas and residual fuel oil consumption which in previous submissions were considered under category 1A2f are now reported under this category.

Category 1A2f:
This category now includes only emissions from industry which are not considered under categories 1A2a to 1A2b.

Category 1A5:
In the previous submission energy consumption and CO_2-emission from biomass of waste incineration plants were reported under this category. Now they are reported under category 1A1a.

Table 5: Emission Trends N_2O

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	(Gg)												
Total Emissions	**18,72**	**18,72**	**20,75**	**16,92**	**19,59**	**21,78**	**20,51**	**19,85**	**20,79**	**20,17**	**19,93**	**19,85**	**19,20**
1. Energy	**2,98**	**2,98**	**3,61**	**3,88**	**4,16**	**4,47**	**4,61**	**4,62**	**4,51**	**4,70**	**4,49**	**4,40**	**4,41**
A. Fuel Combustion (Sectoral Approach)	2,98	2,98	3,61	3,88	4,16	4,47	4,61	4,62	4,51	4,70	4,49	4,40	4,41
1. Energy Industries	0,14	0,14	0,16	0,13	0,14	0,16	0,16	0,15	0,15	0,16	0,16	0,15	0,17
2. Manufacturing Industries and Construction	0,39	0,39	0,41	0,42	0,43	0,45	0,45	0,45	0,49	0,47	0,47	0,43	0,42
3. Transport	1,57	1,57	2,10	2,40	2,66	2,96	3,03	2,97	2,85	3,04	2,83	2,73	2,76
4. Other Sectors	0,88	0,88	0,96	0,93	0,94	0,92	0,93	1,04	1,03	1,03	1,04	1,01	1,05
5. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
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	0,00	0,00
1. Solid Fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and Natural Gas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Industrial Processes	**2,93**	**2,93**	**2,98**	**1,84**	**2,58**	**2,66**	**2,76**	**2,81**	**2,78**	**2,89**	**2,97**	**3,07**	**2,54**
A. Mineral Products	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Chemical Industry	2,93	2,93	2,98	1,84	2,58	2,66	2,76	2,81	2,78	2,89	2,97	3,07	2,54
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	0,00	0,00
D. Other Production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Production of Halocarbons and SF6													
F. Consumption of Halocarbons and SF6													
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
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**	**0,75**	**0,75**
4. Agriculture	**12,00**	**12,00**	**13,33**	**10,38**	**12,03**	**13,83**	**12,32**	**11,58**	**12,67**	**11,75**	**11,63**	**11,55**	**11,42**
A. Enteric Fermentation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Manure Management	2,41	2,41	2,38	2,29	2,43	2,42	2,44	2,40	2,39	2,39	2,35	2,32	2,29
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	9,58	9,58	10,95	8,08	9,59	11,40	9,88	9,19	10,28	9,36	9,28	9,23	9,13
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
5. Land-Use Change and Forestry	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
A. Changes in Forest and Other Woody Biomass Stocks	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Forest and Grassland Conversion	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Abandonment of Managed Lands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. CO2 Emissions and Removals from Soil	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**0,07**	**0,07**	**0,07**	**0,07**	**0,07**	**0,07**	**0,08**	**0,08**	**0,08**	**0,08**	**0,08**	**0,08**	**0,08**
A. Solid Waste Disposal on Land	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Waste-water Handling	0,07	0,07	0,07	0,07	0,07	0,07	0,08	0,08	0,08	0,08	0,08	0,08	0,08
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	0,00	0,00
D. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
7. Other *(please specify)* [0]	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Memo Items:													
International Bunkers	**0,03**	**0,03**	**0,03**	**0,04**	**0,04**	**0,04**	**0,05**	**0,05**	**0,05**	**0,06**	**0,05**	**0,06**	**0,06**
Aviation	0,03	0,03	0,03	0,04	0,04	0,04	0,05	0,05	0,05	0,06	0,05	0,06	0,06
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**
CO_2 Emissions from Biomass													

General notes on the consistency with last year's submission:

Category 1A1a:
Emissions of waste incineration for energy purposes reported in the previous submission under categories 6C1 and 1A5 are now reported under this category.

Category 1A1c:
Emissions from coal consumption of the mining industry which former were included in category 1A2f are now included in this category.

Category 1A2:
Emissions of the different industry branches so far included in category 1A2f are now reported under the corresponding categories 1A2b to 1A2e.

Category 1A2a:
Natural gas and residual fuel oil consumption which in previous submissions were considered under category 1A2f are now reported under this category.

Category 1A2f:
This category now includes only emissions from industry which are not considered under categories 1A2a to 1A2b.

Category 1A5:
In the previous submission energy consumption and CO_2-emission from biomass of waste incineration plants were reported under this category. Now they are reported under category 1A1a.

Table 6: Emission Trends HFCs, PFCs and SF_6

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	(Gg)												
Emissions of HFCs[5] - CO_2 equivalent (Gg)	**546,07**	**3,69**	**5,85**	**8,54**	**12,35**	**16,89**	**546,07**	**624,83**	**718,82**	**815,61**	**870,46**	**1.033,25**	**1.033,25**
HFC-23	0,0002	0,0002	0,0003	0,0004	0,0005	0,0007	0,0002	0,0003	0,0003	0,0004	0,0005	0,0006	0,0006
HFC-32	0,0001	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0002	0,0004	0,0006	0,0009	0,0017	0,0017
HFC-41	0,0000	0,0000	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	0,0000	0,0000
HFC-125	0,0014	0,0000	0,0000	0,0000	0,0000	0,0000	0,0014	0,0057	0,0110	0,0148	0,0162	0,0219	0,0219
HFC-134	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
HFC-134a	0,4143	0,0014	0,0021	0,0032	0,0046	0,0067	0,4143	0,4578	0,5089	0,5677	0,6020	0,6531	0,6531
HFC-152a	0,0001	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0003	0,0006	0,0008	0,0007	0,4522	0,4522
HFC-143	0,0000	0,0000	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	0,0000	0,0000	0,0000	0,0000	0,0004	0,0025	0,0056	0,0083	0,0095	0,0136	0,0136
HFC-227ea	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0001	0,0002	0,0002
HFC-236fa	0,0000	0,0000	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	0,0000	0,0000
Emissions of PFCs[5] - CO_2 equivalent (Gg)	**15,62**	**963,17**	**974,33**	**576,19**	**48,13**	**53,63**	**15,62**	**14,79**	**18,26**	**20,85**	**25,32**	**25,16**	**25,16**
CF_4	0,0008	0,1328	0,1338	0,0793	0,0048	0,0050	0,0008	0,0007	0,0009	0,0009	0,0015	0,0015	0,0015
C_2F_6	0,0011	0,0109	0,0114	0,0066	0,0018	0,0023	0,0011	0,0011	0,0014	0,0016	0,0017	0,0017	0,0017
C_3F_8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
C_4F_{10}	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
$c\text{-}C_4F_8$	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	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	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	0,0000	0,0000
Emissions of SF_6[5] - CO_2 equivalent (Gg)	**1.174,74**	**517,74**	**682,90**	**725,40**	**822,84**	**1.032,81**	**1.174,74**	**1.246,13**	**1.148,86**	**954,90**	**729,90**	**676,95**	**676,95**
SF_6	0,05	0,02	0,03	0,03	0,03	0,04	0,05	0,05	0,05	0,04	0,03	0,03	0,03