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AUSTRIA'S NATIONAL INVENTORY REPORT 2002

Submission under the United Nations Framework Convention on Climate Change 2002

Umweltbundesamt

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EXECUTIVE SUMMARY

As a Party to the United Nations Framework Convention on Climate Change (UNFCCC), Austria is required to produce and regularly update National Greenhouse Gas Inventories. To date, National Greenhouse Gas Inventories have been produced for the years 1990 to 2000.

By taking decision 3/CP.5 (see document FCCC/CP/1999/6/Add.1) the Conference of the Parties (COP) has undertaken to implement the UNFCCC guidelines on reporting and reviewing (FCCC/CP/1999/7). According to this decision Parties shall submit a National Inventory Report (NIR) containing detailed and complete information on their inventories, in order to ensure the transparency of the inventory (See paragraph 32 of FCCC/CP/1999/7). This is the second version of the National Inventory Report (NIR) submitted by Austria. This version is an update of the NIR submitted in 2001 taking into account several comments made by two expert review teams (Austria's GHG inventory submission 2001 was reviewed during an in-country review and by a centralized review).

The structure of the NIR has also been changed and follows quite closely the proposal as included in Annex I of document FCCC/SBSTA/2002/Add.2. There are 5 chapters (Chapter 1: Introduction-General Issues, Chapter 2: Trend in GHG Emissions, Chapter 3: Key Sources; Chapter 4: Sector Analysis and Chapter 5: Improvement Program) as well as an executive summary.

Abbreviations and references used are also included as well as the emissions for the year 2000 as included in the tables of the common reporting format.

It is the intention of this report to better understand the calculation of the Austrian GHG emission data. Those who want to know more details will have to consult the background literature cited in this document.

The preparation and review of Austria's National Greenhouse Gas Inventory as well as the preparation of the NIR is the responsibility of the *Department of Emissions/Climate Protection/Noise Abatement* of the Federal Environment Agency.

The project leaders have been:

Klaus Radunsky and
Manfred Ritter

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The Austrian Federal Environment Agency expresses its thanks and appreciation to the project leaders for their contributions and cooperative effort in producing a national methodology and emission inventory of high quality. Contributors to the development of methodologies have been acknowledged in the respective sections of the Sector Analysis of the NIR.

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1 INTRODUCTION – GENERAL ISSUES

1.1 Institutional Arrangement for Inventory Preparation

The Austrian Federal Environment Agency has been aware of the importance of a national air emission inventory that identifies and quantifies the main sources of pollutants for many years. Such an inventory provides a common and consistent means for comparing the relative contribution of different emission sources and hence can be a basis for policies to reduce emissions.

Regulations under the UNFCCC and the Kyoto Protocol define new standards for national emission inventories. Therefore the present National Inventory System Austria will be adapted according to Article 5.1 of the Kyoto Protocol.

The Austrian Federal Environment Agency (UBAVIE) is responsible for the preparation of Austrian emission inventories by law (ENVIRONMENTAL CONTROL ACT, 1998)[1]. As Austria has to fulfil various national and international obligations, the Austrian Federal Environment Agency prepares a comprehensive Austrian Air Emission Inventory (Österreichische Luftschadstoff-Inventur, OLI) comprising all air pollutants stipulated in the various national and international obligations. The Austrian Air Emission Inventory and all reporting obligations are the responsibility of the *"Department of Emissions/Climate Protection/Noise Abatement*" which is a part of the Austrian Federal Environment Agency.

1.1.1 Austria's Obligations

Austria has to comply with the following obligations:

- Austria's annual obligation under the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) and its Protocols (1979) comprising the annual reporting of national emission data on SO_2, NO_x, NMVOCs, NH_3, CO, TSP, PM_{10}, and $PM_{2,5}$ as well as on the heavy metals Pb, Cd and Hg and the persistent organic pollutants PAH, dioxins and furans and HCB.
- Austria's annual obligations under the European Council Decision 1993/389/EEC of June 24th 1993 for a Monitoring Mechanism of Community CO_2 and other Greenhouse Gas Emissions as amended by Council Decision 1999/296/EC.
- Austria's obligation under the United Nations Framework Convention on Climate Change (UNFCCC, 1992) and the Kyoto Protocol (1997). Relevant COP Decisions and Guidelines are:

  - 3/CP.5 Guidelines for the Preparation of National Communications by Parties included in Annex I to the Convention, Part I: UNFCCC Reporting Guidelines on Annual Inventories (referring to Document FCCC/CP/1999/7).
  - 4/CP.5 Guidelines for the Preparation of National Communications by Parties included in Annex I to the Convention, Part II: UNFCCC Reporting Guidelines on National Communications (referring to Document FCCC/CP/1999/7).
  - Document FCCC/CP/1999/7 Review of the Implementation of Commitments and of other Provisions of the Convention – UNFCCC Guidelines on Reporting and Review.
  - 11/CP.4 National communications from Parties included in Annex I to the Convention.

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[1] ENVIRONMENTAL CONTROL ACT, (1998): Environmental Control Act (Umweltkontrollgesetz). Federal Law Gazette 152/1998.

- Document FCCC/CP/2001/13/Add.3 Report of the Conference of the Parties on its seventh session, held at Marrakesh from 29 October to 10 November 2001, Addendum, Part two: Action taken by the Conference of the Parties, Volume III (Decision 20/CP.7: Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol; Decision 21/CP.7: Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol; Decision 22/C.7: Guidance for the preparation of the information required under Article 7 of the Kyoto Protocol; Decision 23/CP.7: Guidelines for review under Article 8 of the Kyoto Protocol).

- Obligation under the Austrian Air Quality Protection Act (AUSTRIAN AIR QUALITY PROTECTION ACT, 1997)[2] comprising the reporting of national emission data on SO_2, NO_x, NMVOC, CO, heavy metals (Pb, Cd, Hg), benzene and particulate matter.
- Austria's obligation according to Article 15 of the European IPPC Directive 1996/61/EC is to implement a European Pollutant Emission Register (EPER). Article 15 of the IPPC Directive can be associated with Article 6 of the Aarhus Convention (United Nations: Aarhus, 1998) which refers to the right of the public to access environmental information and to participate in the decision-making process of environmental issues.

1.1.2 History of NISA

As there are so many different obligations which are subject to continuous development, Austria’s National Inventory System has to be adapted to these changes. A brief history of the development and the activities of NISA is shown here:

- Austria established estimates for SO_2 under EMEP in 1978 (Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe) and joined the UNECE in 1983. At that time Austria reported mainly SO_2 emissions.
- As an EFTA country Austria participated in CORINAIR 90, which was an air emission inventory for Europe. It was part of the CORINE (Coordination d’Information Environmentale) work plan set up by the European Council of Ministers in 1985. The aim of CORINAIR 90 was to produce a complete, consistent and transparent emission inventory for the pollutants: SO_x as SO_2, NO_x as NO_2, NMVOC, CH_4, CO, CO_2, N_2O and NH_3.
- As a Party to the Convention, Austria signed the UNFCCC on June 8, 1992 and subsequently submitted its instrument of ratification on February 28, 1994.
- In 1994 the first so-called Austrian Air Emission Inventory (Österreichische Luftschadstoff-Inventur, OLI) was prepared.
- In 1997 the emission data were reported for a time period (for each of the years from 1980 to 1995) for the first time.

1.1.3 Adaptation of NISA according to the Kyoto Protocol

Regulations under the UNFCCC and the Kyoto Protocol define 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. This national system shall include all institutional, legal and procedural arrangements made within a Party for estimating anthropogenic emissions by sources and

[2] AUSTRIAN AIR QUALITY PROTECTION ACT (1997): Austrian Air Quality Protection Act (Immissionsschutzgesetz-Luft). Federal Law Gazette I 115/1997.

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 year 2002 or 2003, Austria is making preparations to meet all requirements it entails. The National Inventory System Austria shall fulfil all the requirements of the Kyoto Protocol and it shall also fulfil all the other obligations Austria has to comply with.

The emission inventory system, which is currently being adapted, will have a structure as illustrated in Figure 1.

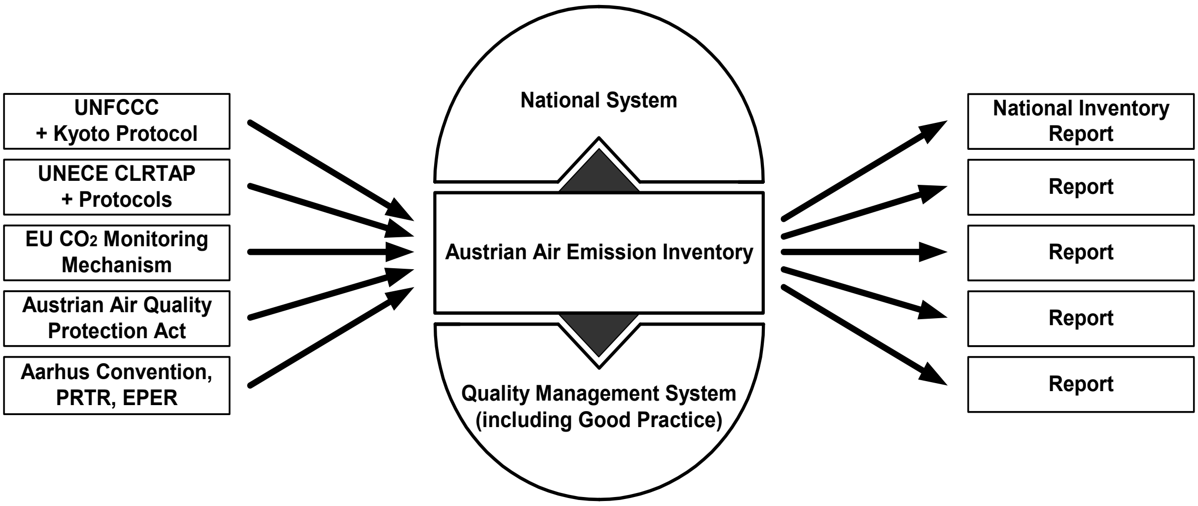

Figure 1: Structure of the future emission inventory system in Austria (NISA)

The Austrian Air Emission Inventory comprising all air pollutants stipulated in the various national and international obligations will be the centre of NISA. The national system and the quality management system will be incorporated into NISA as complementary sections.

Austria is taking significant steps to ensure a high-quality emission inventory in which uncertainties are reduced as far as feasible and in which data are developed in a transparent, consistent, complete, comparable and accurate manner. The Austrian National Inventory System should be able to take account of any type of flexible mechanism such as international emission trading as defined in the Kyoto Protocol. Details are provided with respect to:

- Adaptation of the national system according to Article 5.1 of the Kyoto Protocol: *"Each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. Guidelines for such national systems, which shall incorporate the methodologies specified in paragraph 2 below, shall be decided upon by the Conference of the Parties serving as the meeting of the Parties to this Protocol at its first session."*
- Quality management system
- Uncertainty analysis
- Identification of key source categories

The Guidelines for National Systems for the Estimation of Anthropogenic Greenhouse Gas Emissions by Sources and Removals by Sinks under Article 5.1 of the Kyoto Protocol (Decision 20/CP.7) describe the elements which shall be included in a national system. The main characteristics are that the national system shall ensure transparency, consistency, comparability, completeness and accuracy of inventories and the quality of inventory-activities (e.g. collecting activity data, selecting methods and emission factors). The general functions are to establish and maintain the institutional, legal, and procedural arrangements defined in the guidelines for national systems between the government agencies and other entities, to ensure sufficient capacity for timely performance, to designate a single national entity with overall responsibility for the national system, to prepare national annual inventories and supplementary information in timely manner and to provide information necessary to meet the reporting requirements. Specific functions in these guidelines are the inventory planning, preparation and management.

The following steps have already been made to prepare NISA to meet the requirements of the Kyoto Protocol:

- Conceptual design for an adaptation of the national system according to Article 5.1 of the Kyoto Protocol
- Development of a quality management system
- Implementation of the quality management system
- First comprehensive uncertainty analysis
- Identification of key source categories

The next steps are:

- Adaptation of the national system according to Article 5.1 of the Kyoto Protocol

To fulfil the new requirements the Kyoto Protocol entails, additional resources will be needed.

It is planned that the national system will be adapted according to Article 5.1 of the Kyoto Protocol by 2003. The system will include all institutions whose data have a significant impact on the emission data and identify their collaboration with the Federal Environment Agency. Among them are:

- Federal Provinces
- Austrian Federal Economic Chamber
- Statistics Austria
- Federal Ministry of the Environment
- Operators of installations covered by the European IPPC Directive

At the moment the Austrian Federal Environment Agency uses only published information of these institutions. The inventory of the Federal Provinces is prepared by the Austrian Federal Environment Agency with a top down method using the emissions of the Austrian Air Emission Inventory. One of the next steps will be to further improve the cooperation between these institutions and the Federal Environment Agency Austria.

Table 1: Timetable for the adaptation of the national system according to Art. 5.1 of the Kyoto Protocol:

Conceptual design for an adaptation of the national system	2001
Specification of quality of data provided by partners	2002
Adapted national system fully operational at the Austrian Federal Environment Agency	2003

1.2 Inventory Preparation Process

The present Austrian greenhouse gas inventory for the period 1990 to 2000 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)[3] (version 1.01) and the IPCC 1996 Guidelines for National Greenhouse Gas Inventories, which specify the reporting obligations according to Articles 4 and 12 of the UNFCCC [IPCC-Rev. Guidelines, 1997].

1.2.1 The CORINAIR System

The OLI is based on the CORINAIR (CORe INventory of AIR emissions) system which has been developed by the ETC/AE (European Topic Centre on Air Emissions) since 1995. Austria, as many other European Countries, uses this calculation method for quantifying national emissions. The CORINAIR system is designed to collect and report air emissions from the EC and PHARE countries to the EEA in a common format. This common European-wide database can easily be applied for the preparation of specific inventories in accordance with the guidelines under the UNECE/CLRTAP and UNFCCC. In the following a brief description from the EEA homepage is given:

The aim is to collect, maintain, manage and publish information on emissions into the air, by means of a European air emission inventory and database system. This concerns air emissions from all sources relevant to the environmental problems of climate change, acidification, eutrophication, tropospheric ozone, air quality and dispersion of hazardous substances.

As the CORINAIR inventory is source-oriented, there is a distinction between point and area sources. Point sources are large, stationary sources of emissions that release pollutants into the atmosphere. In Austria steam boilers with more than 50 MW are categorised as large point sources. These combustion plants have to collect their data on emissions and fuel consumption monthly and report them annually. The Austrian Federal Environment Agency calculates emissions for the pollutants addressed in the inventory on the basis of these reported emission data and on the basis of fuel consumption.

Facilities or activities whose individual small amounts of emissions do not qualify them as point sources are summarised as area sources. Collectively these facilities or activities can release significant amounts of a pollutant. To estimate emissions from area sources emission factors are used. Information about the source of the emission factors used is provided below.

SNAP and SPLIT Codes

Similar to the IPCC categories the CORINAIR system has its own nomenclature, called SNAP (Selected Nomenclature for sources of Air Pollution). It is designed to estimate not only emissions of greenhouse gases but all kind of air pollutants. The specifications of the SNAP categories have to be revised continuously due to new reporting requirements, old versions of SNAP codes are *SNAP 90* and *SNAP 94*.

[3] http://www.unfccc.de/resource/CRFV1_01o01.zip

The current SNAP code version used in the NISA is called *SNAP 97* which provides three levels of detail:

Level 1: 11 main categories numbered from 01 to 11.

Level 2: 76 subcategories of Level 1. Examples: 01 01, 11 25.

Level 3: 414 subcategories of Level 2. Examples: 01 01 01, 02 02 05.

Additionally the predefined SNAP categories may be expanded by so called SPLITs which are predefined by the ETC or user defined. A SPLIT code consists of three alphanumeric digits.

Fuel Codes

Fuel codes provide an additional possibility for SNAP code extension and are defined as a four digit alphanumeric code. The first three digits are based on the NAPFUE code. Further information about fuel codes can be found in Chapter 4.1, the source analysis of the sector Energy.

OLI-Activities

Activities are the basis of OLI. Each activity is unambiguously identified by a combination of SNAP, SPLIT and an optional Fuel Code. An activity (greenhouse gas source category) is defined for a closed time series and usually consists for each year of the time series of an activity rate, an emission factor and an emission value for each pollutant of the inventory.

Each activity has an IPCC code which is used for transforming the SNAP system to the CRF. A list of IPCC categories and the corresponding SNAP categories is provided in each sector description.

1.2.2 General Methods Used

(i) If emission data are reported (e.g. by the plant owner) they are the basis for the inventory and the emission rates derived. This method is mainly used for large point sources.

(ii) If no such information is available an emission factor will be multiplied with the activity data to obtain the emission data for a specific source. This method is mainly used for area sources.

For the preparation of the greenhouse gas inventory, the UBAVIE prefers emission data that are reported by the operator of the source because these data usually reflect the actual emissions better than data calculated using general emission factors, because the operator has the best information about the actual circumstances. If these data are not available, national emission factors are used or, if there are no national emission factors, international emission factors are used to estimate the emissions.

Table *Summary 3 of the CRF (Summary Report for Methods and Emission Factors Used)* shows the methods applied and the emission factors used for the greenhouse gas source and sink categories in the IPCC format for the present Austrian inventory.

For the key source categories the most accurate methods for the preparation of the greenhouse gas inventory should be used. Required methodological changes are described in the corresponding subchapter of Chapter 4 *Sector Analysis*. An Improvement Program is under preparation, first elements of the improvement process are described in Chapter 5.

1.2.3 Main Data Suppliers

The main data suppliers for the Austrian air emission inventory are the Austrian Institute for Economic Research (WIFO) for 1980-1995 and STATISTIK AUSTRIA for 1996–2000 who provide the underlying energy source data. The Austrian energy balances are based on several databases mainly prepared by the Ministry of Economic Affairs and Work, "Bundeslastverteiler" and STATISTIK AUSTRIA. Their methodology follows the IEA and Eurostat conventions. The aggregates of the balances, for example transformation input and output or final energy use, are harmonised with the IEA tables as well as their sectoral breakdown which follows the NACE classification. The lowest regional level of energy balances are the Federal Provinces. From the Association of the Austrian Industries the Federal Environment Agency receives information about activity data and emissions for the industry sector. Steam boilers with more than 50 MW report their emissions and their activity data directly to the UBAVIE. National and sometimes international studies are also used as data suppliers.

1.2.4 Data Management

OLI needs a reliable data management to fulfil the data collecting and reporting requirements. Data collection is performed by many co-workers and the reporting requirements grow rapidly and may change over time. Data management is carried out by using MSExcel™ spreadsheets in combination with Visual Basic™ macros. The whole data is stored on a central network server which is backuped daily for the needs of data recovery.

1.2.5 Reporting

The Austrian Air Emission Inventory currently uses the EMEP/CORINAIR calculation method for quantifying national emissions, 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 to comply Austria's reporting obligations under the UNECE/CLRTAP convention (see Chapter 1.1.1). The databases can be found using the following hyperlink: http://nfp-at.eionet.eu.int:8980/Public/irc/eionet-circle/Home/main[4]

As mentioned above the Austrian Federal Environment Agency internally uses an expert system, which is a combination of a MSAccess data bank and MSExcel spreadsheets. This system is more comprehensive and more flexible than the CollectER databases.

Austria's national emissions (as reported in the Austrian Air Emission Inventory) have to be transferred to the UNFCCC Common Reporting Format using CORINAIR standard procedures in order to comply with UNFCCC reporting obligations and to ensure comparability of the reported data. For every SNAP item in CORINAIR there is only one IPCC source category as defined in standard data tables. The Austrian Federal Environment Agency has extended these tables to improve the transformation of activity data from the EMEP/CORINAIR format to the CRF format. A table for transforming fuels is presented in the Chapter *4.1 Energy* (Table 24).

1.3 Quality Assurance and Quality Control (QA/QC)

A quality management system (QMS) has been designed to ensure compliance with requirements such as transparency, accuracy and completeness. After its full implementation

[4] You need a valid user-account to have access to the data at this link!

by 2002 the accreditation of the *Department for Emissions, Climate Change and Noise Abatement* as inspection body is scheduled for 2003. The QMS contains all relevant features of EN 45000 (a series of European standards), such as the strict independence, impartiality and integrity of accredited bodies and demonstrates the full compatibility with the QA/QC requirements of the IPCC-GPG.

1.3.1 Quality Management System (QMS)

Quality assurance and quality control during the compilation of an emission inventory is an advisable feature. As soon as the Kyoto Protocol has entered into force, however, a QMS will be essential to ensure the quality of emission data according to the requirements of the IPCC-GPG as a basis for any kind of international emission trading. The Austrian Federal Environment Agency has decided to implement a QMS based on the EN 45004. The EN 45000 series that has been drawn up as a quality management standard (similar to the ISO 9000 series) has the objective of increase confidence in bodies performing testing, inspection or certification. It consists of the following standards:

- ISO/IEC 17025 (General requirements for the competence of testing and calibration laboratories) replacing EN 45001 (General criteria for the operation of testing laboratories)
- EN 45002 (General criteria for the assessment of testing laboratories)
- EN 45003 (General criteria for the laboratory accreditation bodies)
- EN 45004 (General criteria for the operation of various types of bodies performing inspection)
- EN 45011 (General criteria for certification bodies operating product certification)
- EN 45012 (General criteria for certification bodies operating quality system certification)
- EN 45013 (General criteria for certification bodies operating certification of personnel)
- EN 45014 (General criteria for supplier's declaration of conformity)
- EN 45020 (General terms and their definitions concerning standardisation and related activities)

As already noted, the Federal Environment Agency Austria is currently implementing a QMS based on the European standard EN 45004. This system is process-based and illustrated in Figure 2.

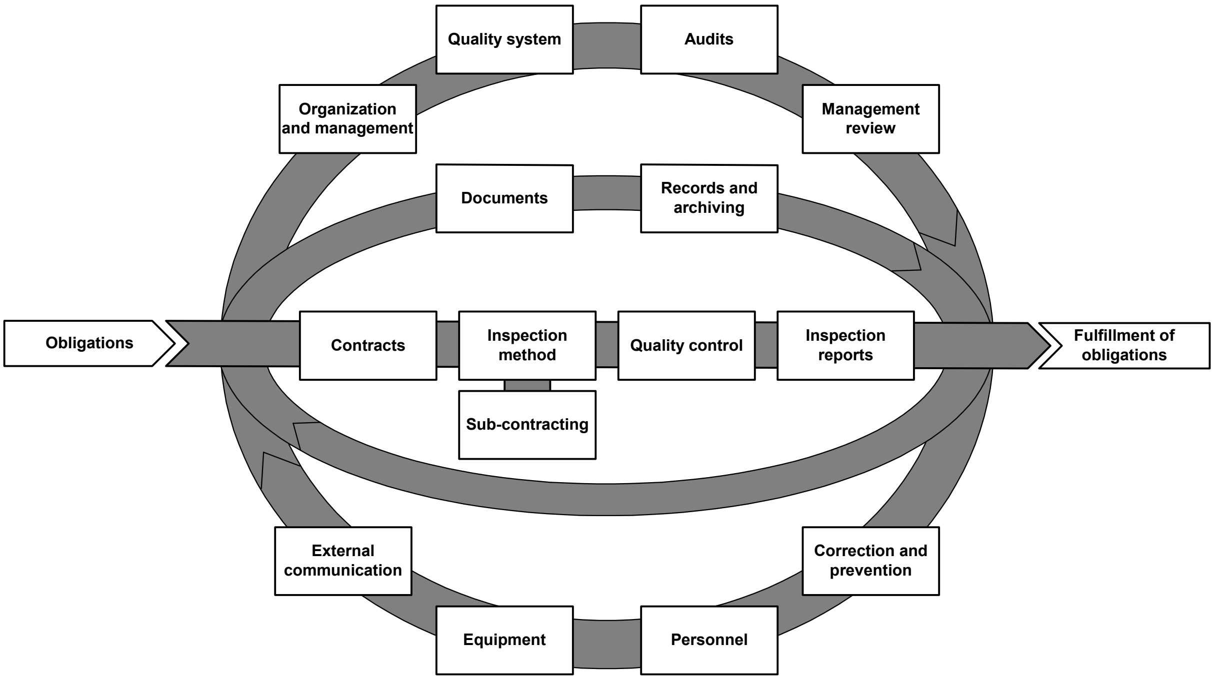

Figure 2: Process-based QMS (the outer circle corresponds to management processes, the straight line to realisation processes and the inner circle to supporting processes)

The process-based QMS consists of three process groups:

1) **Management processes** (outer circle)

They comprise all activities that are necessary for the management and control of an organisation, e.g. organisation and management, quality system, audits, management review, correction and prevention, personnel, equipment, external communication. The most important aspect with respect to organisation and management is that the manager has to ensure that the personnel is free from any commercial, financial or other pressure which might affect their judgement. The personnel has to meet other requirements too. It has to have appropriate qualification, training, experience and knowledge of the requirements for the inspections to be carried out. They shall have the ability to make professional judgements as to conformity with general requirements using examination results and to report thereon.

As regards equipment, mainly computers are used during the compilation of emission inventories. Any software applied has to be tested and confirmed in advance. Furthermore access authorisation must be strictly limited to protect the integrity of data and to guarantee data confidentiality if necessary.

2) **Realisation processes** (straight line)

These processes are the most important ones as they concern the compilation of emission inventories. They start with a contract control system which ensures that the methods to be used are selected in advance, while taking into account that for key source categories the most detailed method, i.e. the method with the lowest uncertainty, should be applied. The inspection process consists of two steps, the data collection and the application of methods for the estimation of emissions. The Federal Environment Agency currently uses IPCC methods, CORINAIR methods and specific methods. The latter are country-specific and have to be fully documented and validated. All emission data are subject to appropriate quality control checks and data verification before they are released in an inspection report.

Usually an inspection body has to perform inspections itself. When it sub-contracts any part of the inspection, however, it must ensure that the sub-contractor complies with the standard EN 45004.

3) **Supporting processes** (inner circle)

These processes support both management and realisation processes and include a control system for all documents and data as well as for records and their archiving.

All relevant requirements addressed in the IPCC-GPG are included in the quality management system.

1.3.2 Inspection bodies

The European Standard EN 45004 specifies general criteria for the competence of impartial bodies performing inspection, irrespective of the sector involved. It covers the functions of bodies whose work may include the examination of materials, products, installations, plants, processes, work procedures or services, and the determination of their conformity with requirements, as well as the subsequent reporting of results of these activities to clients and – if required – to supervisory authorities. In the case of emissions inventories, inspection concerns the examination of air emissions and covers the collection of emission data or of data which are used to estimate them, their compilation and the check of their conformity with emission reduction limits.

For this purpose a quality management system based on EN 45004 is being implemented by the Department *Emissions/Climate Protection/Noise Abatement* of the Austrian Federal Environment Agency. The quality management system takes into account recommendations of European and international documents such as the ISO 9000 series of standards and Guide EAL-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.

1.3.3 Accreditation Act

The EN 45000 series is implemented in the Austrian legislative system, whereas the ISO 9000 series is not. The Austrian Accreditation Act ("Akkreditierungsgesetz", Federal Law Gazette 468/1992 as amended by 430/1996) regulates the accreditation of testing, inspection and certification bodies. It designates the Federal Ministry for Economic Affairs and Labour as accreditation body and defines the conditions for granting, maintaining and extending accreditation and the conditions under which accreditation may be suspended or withdrawn, partially or in total for all or part of the testing, inspection or certification body's scope of accreditation. It requires re-assessment in the event of changes affecting the activity and operation of the testing, inspection or certification body, such as changes in personnel or equipment, or if analysis of a complaint or any other information indicates that the testing, inspection or certification body no longer complies with the requirements of the accreditation body.

In Figure 3 the inter-relationship between the Austrian Accreditation Act, the EN 45000 series and the ISO 9000 series is shown.

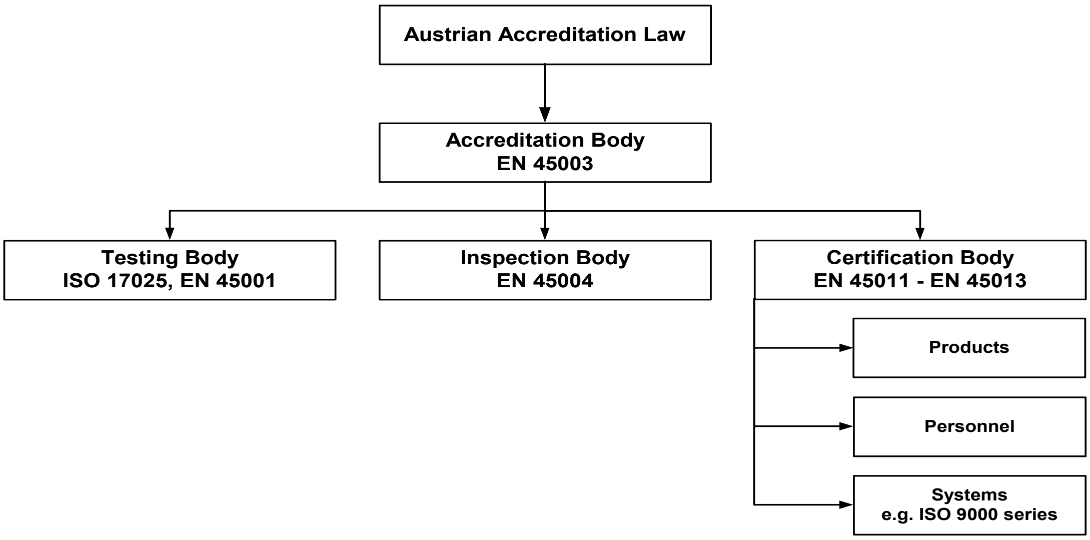

Figure 3: Inter-relationship between the Austrian Accreditation Act, the EN 45000 series and the ISO 9000 series.

The most important difference between the EN 45000 series and the ISO 9000 series is that accredited bodies under the EN 45004 have to ensure strict independence, impartiality and integrity in their activities. The personnel of the inspection body has to be free from any commercial, financial and other pressures which might affect their judgement. It has to be ensured that persons or organisations external to the inspection body cannot influence the results of inspections carried out. We feel that such a regulation is fundamental in order to guarantee that the emission data reflect the real emissions as truly as possible.

Accredited bodies are entitled to be labelled with the federation emblem and an accreditation mark and their reports are official documents. Any corrections of or additions to an inspection report after it has been issued have to be recorded and justified.

1.3.4 Implementation of QA/QC

The implementation of the QMS has been started by February 2002.

The procedures to perform this record-keeping, checking and improving are described in the quality manual as "Standard Operation Procedures", covering all relevant aspects of the activities of our inspection body.

The full implementation (including accreditation) of the QMS has been delayed in comparison to the timetable included in the NIR 2001 because key staff responsible for QA/QC left the UBAVIE in 2001.

Table 2 shows the timetable for the implementation of the quality management system:

Table 2: Timetable for steps

Step	Date
1. Development of a quality management system including quality manual	1999 – 2002
2. Full implementation of the quality management system	2002 – 2003
3. Accreditation of the inspection body	2003

1.3.5 Treatment of confidentiality issues

Only one source, the activity of SF_6 (cast aluminium) from aluminium foundries, has to be treated confidential ("C"). One of the aluminium foundries wanted to keep its production volume (its activity) secret, and as there are less than four of such companies in Austria the overall activity for this source category has to be treated confidential[5].

1.4 Uncertainty Assessment

In comparison to last year's submission, there was no change in the survey of uncertainty assessment for the Austrian greenhouse gas emission inventory.

This chapter summarises work on a first comprehensive uncertainty analysis comprising the whole emission inventory, which was funded by the Austrian Federal Environment Agency and completed in 2000. It presents the results for three greenhouse gases (CO_2, CH_4 and N_2O) for the years 1990 to 1997. Compilation, prioritisation, uncertainty assessment and Monte Carlo analysis are addressed in greater detail.

After introduction of higher TIER methods (e.g. agriculture) the uncertainty will be recalculated. It can be assumed that the uncertainty estimated for the emissions in the year 1997 is still valid for the emissions of the year 2000, because there was no major change in methodologies.

1.4.1 First comprehensive uncertainty analysis

One of the main future requirements arising from the IPCC-GPG is the estimation of uncertainties along with the determination of key source categories. The starting point for any prioritisation of efforts aimed at improving the accuracy of inventories is the identification of key source categories. Based on these categories, the uncertainty is estimated (being itself an input for a possible second step in the identification of key source categories) and as a next step, if required, the methods for emission estimation are adapted.

A first comprehensive uncertainty analysis was performed as a pilot study [WINIWARTER & RYPDAL, 2001] on greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997. The work was not carried out internally by the UBAVIE but by the *Austrian Research Centres Seibersdorf* to assure independent assessment.

In Table 3 the most important emission sources with respect to uncertainty are listed.

Table 3: Most important emission sources with respect to uncertainty

Emission Source	CO_2	CH_4	N_2O
Energy Conversion	×		×
Industry	×		
Transport	×		×
Energy – Other Sources	×		
Fugitive Emissions – Gas and Liquid Fuels	×		

[5] No emission figure is included in the CRF but the emission data is known to the UBAVIE. Upon request it can be made available to the ERT.

Emission Source	CO_2	CH_4	N_2O
Industrial Processes – Cement	×		
Metal Industry Processes – Iron and Steel	×		
Enteric Fermentation – Cattle		×	
Agricultural Soils		×	×
Abandonment of Managed Lands	×		
Solid Waste Disposal		×	

Table 4 shows the estimates for total uncertainty including systematic uncertainty and random uncertainty and Table 5 refers to random uncertainty.

Table 4: Total uncertainty of emission data (emissions given in Tg CO_2 equivalents per year, uncertainties given as a percentage of the mean value)

Total uncertainty		CO_2	CH_4	N_2O	Total GHG emissions
1990	Mean value	63,20	9,48	6,59	79,27
	Standard deviation	0,73	2,29	2,95	3,89
	2σ	**2,3%**	**48,3%**	**89,6%**	**9,8%**
1997	Mean value	67,76	8,34	6,81	82,91
	Standard deviation	0,71	1,98	2,93	3,67
	2σ	**2,1%**	**47,4%**	**85,9%**	**8,9%**

Annotation: 63,20 for example means sixty-three point twenty, whereas 63.200 would mean sixtythreethousandtwohundred.

Table 5: Random uncertainty of emission data (emissions given in Tg CO_2 equivalents per year, uncertainties given as a percentage of the mean)

Random uncertainty		CO_2	CH_4	N_2O	Total GHG emissions
1990	Mean value	63,54	11,41	1,99	76,94
	Standard deviation	0,30	1,64	0,26	1,73
	2σ	**1,0%**	**28,7%**	**25,6%**	**4,5%**
1997	Mean value	68,05	10,02	2,27	80,34
	Standard deviation	0,34	1,43	0,27	1,53
	2σ	**1,0%**	**28,5%**	**23,9%**	**3,8%**

As regards uncertainty, two aspects were considered: systematic uncertainty and random uncertainty. Random uncertainty covers the fluctuation of a large set of measurements, which may include both the random uncertainty of the measurements and the natural variability of a parameter. A systematic error is the deviation of a result from “reality”, a deviation that may be caused by a systematically flawed estimate as well as by the omission or false interpretation of certain data or statistics. The main difficulty in dealing with the systematic error is that it is normally by definition not apparent. Once a systematic error becomes apparent, it can be accounted for and eliminated.

The total uncertainty comprises both systematic and random uncertainty and reflects the current situation, whereas the random uncertainty can be established under ideal conditions with the inventory techniques currently available.

Regarding the individual greenhouse gases, the emissions of CO_2 have a low uncertainty whereas the uncertainty for N_2O is high. The overall relative uncertainty calculated for the year 1990 was 9,8%, for the year 1997 it was 8.9%. The reduction is due to the increase in CO_2 emissions caused by the use of fossil fuels. These CO_2 emissions have a very low uncertainty in comparison to other greenhouse gas emissions and as they dominate the total greenhouse gas emissions their uncertainty dominates the overall uncertainty. The random uncertainty calculated for the year 1990 was 4,5%, for the year 1997 it was 3,8%.

1.4.2 Procedure

The uncertainty was determined in four steps:

- Step 1: Compilation of emission sources
- Step 2: Prioritisation and first estimate of uncertainty
- Step 3: Uncertainty assessment for input parameters
- Step 4: Monte Carlo analysis

1.4.2.1 Step 1: Compilation of emission sources

The emission sources had to be compiled so that it was possible to describe emissions in terms of statistically independent parameters. As the Austrian Air Emission Inventory is based on the CORINAIR SNAP Code, these source categories had to be transformed into IPCC source categories first. Emission source categories that are based on common assumptions and use the same emission factors have been aggregated.

1.4.2.2 Step 2: Prioritisation and first estimate of uncertainty

A prioritisation of input parameters (emission factors and activities or emission data) was performed using three different approaches in order to determine the emission sources with the highest uncertainty and to provide a focus for further assessment. One approach was based on the results for the UK as described by CHARLES et al. (1998), another approach was based on the results for Norway as described by RYPDAL (1999). In case of qualitative estimates of uncertainty (such as low, medium and high) as in the Norwegian study, these categories were transformed into quantitative values (low = 5%, medium = 30%, high = 80%). Based on the method for the UK and Norway a first estimate of uncertainty was made. The third approach was made according to the IPCC-GPG 2000, Chapter 7 (Methodological Choice and Recalculation).

1.4.2.3 Step 3: Uncertainty assessment for input parameters

Any emission source category that was relevant in at least one of the approaches described in step 2 was analysed more thoroughly with regard to its uncertainty. A detailed uncertainty analysis was performed by quantitative estimation, by literature research or by expert judgement. In the latter case the experts were asked to provide references from the literature so that their uncertainty estimates could be taken into account.

As already mentioned, two aspects were considered regarding uncertainty: systematic uncertainty and random uncertainty.

1.4.2.4 Step 4: Monte Carlo analysis

The uncertainty data determined in Step 3 were fed into a Monte Carlo analysis. All input parameters were varied to obtain overall uncertainties for each of the greenhouse gases CO_2, CH_4 and N_2O and for their combination as CO_2 equivalents (using values for greenhouse gas warming potentials). The uncertainties for the underlying data (activities and emission factors) were calculated as well.

1.5 Completeness

CRF–Table 9 (Completeness) has been used in order to describe this issue. This chapter includes some additional useful information.

1.5.1 Sources and sinks

All sources and sinks included in the IPCC Guidelines are covered. Others, specific to Austria, have not been identified.

1.5.2 Gases

The direct GHGs as well as the precursor gases postulated are covered by the Austrian inventory.

1.5.3 Geographic coverage

The geographic coverage is complete. Austria has no territory not covered by the inventory.

1.5.4 Notation keys

The reasons for different allocation to categories used by the party differ, e.g. allocation in national statistics, no information in the national statistics, national methods, impossible disaggregation of emission declarations,…

- IE (included elsewhere):

For detailed explanations see table 9. It is planned to further improve the level of disaggregation in the future in order to avoid "IE".

- NE (not estimated):

For detailed explanations see CRF- table 9. For those emissions by sources and removals by sinks of greenhouse gases marked by "NE" there are checkups in progress if they actually are "NO" (not occurring). As a part of the improvement program of the inventory it is planned that those sources or sinks are either estimated or allocated to "NO". No key sources are expected to arise from that group.

- NA (not applicable):

The increase of this number is due to improved completeness of the CRF- tables

- C (confidential):

The only activity treated confidentially is SF_6 from Aluminium Foundries (cast aluminium – sector *2 C*)

Table 6 shows the changes in numbers of the notation keys in CRF–tables 1 to 6 with respect to the last NIR.

Table 6: Numbers of notation keys for the UNFCC-NIR 2001 and 2002

Sector	Submission 2001		Submission 2002	
	IE	NE	IE	NE
1	44	11	60	4
2	23	50	23	61
3	3	9	3	9
4	9	11	11	8
5	5	16	6	30
6	-	-5	-	-
Total	**84**	**102**	**103**	**112**

Total figures are composed of sectors and subsectors. The increases in notation key “NE” can be regarded as a fact of higher transparency since many appeared as “0,00” in the submission 2001 and are not to be considered as a decrease in the quality of the inventory.

1.6 Recalculations

This chapter quantifies the changes in emissions for all six greenhouse gases compared to the previous submission – UNFCCC 2001 (in the format of the IPCC Summary Table 1A).

1.6.1 Preamble

Compiling an emission inventory includes data collecting, data transfer and data processing. Data must be collected from different sources, for instance statistic divisions, plant operators, studies, personal information or other publications. The provided data must be transferred from different data formats and units into a unique electronic format to be processed further. The calculation of emissions by applying methodologies on the collected data and the final computing of time series into a predefined format (CRF) are further steps in the preparation of the final submission. Finally the submission must be delivered in due time. Even though a QA/QC system gives assistance so that potential error sources are minimized it is sometimes necessary to make some revisions (called recalculations) under the following circumstances:

- An emission source was not considered in the previous inventory.
- A source/data supplier has delivered new data. The causes might be: Previous data were preliminary data only (by estimation, extrapolation), improvements in methodology.
- Occurrence of errors in data transfer or processing: wrong data, unit-conversion, software errors, ...

- Methodological changes: a new methodology must be applied to fulfil the reporting requirements because one of the following reasons:
  - Uncertainty must be decreased.
  - An emission source becomes a key source.
  - Consistent input data needed for applying the methodology is no longer accessible.
  - Input data for more detailed methodology is now available.
  - National methodology is no longer appropriate.

1.6.2 Recalculation of National Total

Table 7 compares the National Total GHG Equivalent Emissions of UNFCCC 2002 with UNFCCC 2001.
Table 8 and Table 9 show the recalculations for each GHG separately.

Table 7: Recalculation Difference of National Total CO_2 Equivalent Emissions

Year	National Total GWP with LUCF		
	UNFCCC 2001 [Gg CO_2 equiv]	UNFCCC 2002 [Gg CO_2 equiv]	Recalculation Difference [%]
Base year	77.191	77.639	0,58%
1990	76.939	77.388	0,58%
1991	80.875	81.314	0,54%
1992	74.404	74.893	0,66%
1993	73.656	74.770	1,51%
1994	75.621	76.159	0,71%
1995	78.044	78.606	0,72%
1996	79.150	79.951	1,01%
1997	80.828	81.319	0,61%
1998	79.203	79.458	0,32%
1999	79.224	79.731	0,64%

Table 8: Recalculation Difference of National Total CO_2 and CH_4 Emissions.

Year	CO_2 [Gg]			CH_4 [Gg]		
	UNFCCC 2001	UNFCCC 2002	Difference	UNFCCC 2001	UNFCCC 2002	Difference
1990	62.132	62.297	0,27%	537,60	538,01	0,08%
1991	66.024	66.174	0,23%	527,11	527,54	0,08%
1992	60.154	60.349	0,32%	514,47	514,93	0,09%
1993	59.901	60.717	1,36%	508,34	508,82	0,10%

Year	CO_2 [Gg]			CH_4 [Gg]		
	UNFCCC 2001	UNFCCC 2002	Difference	UNFCCC 2001	UNFCCC 2002	Difference
1994	61.756	61.995	0,39%	500,07	500,52	0,09%
1995	63.754	64.015	0,41%	489,47	489,93	0,09%
1996	64.889	65.386	0,76%	481,34	481,82	0,10%
1997	66.829	67.012	0,27%	469,60	470,07	0,10%
1998	65.489	65.464	-0,04%	459,04	459,15	0,02%
1999	65.778	66.025	0,37%	454,35	454,16	-0,04%

Table 9: Recalculation Difference of National Total N_2O and HFC,PFC,SF_6 Emissions

Year	N_2O [Gg]			HFC, PFC, SF_6 Actual Emissions [Gg CO_2-equivalents]		
	UNFCCC 2001	UNFCCC 2002	Difference	UNFCCC 2001	UNFCCC 2002	Difference
1990	6,56	7,44	13,51%	1.484,60	1.484,60	0,00%
1991	6,84	7,74	13,21%	1.663,08	1.663,08	0,00%
1992	6,89	7,81	13,29%	1.310,13	1.310,13	0,00%
1993	7,09	8,02	13,14%	883,12	882,88	-0,03%
1994	7,29	8,23	12,83%	1.103,32	1.103,32	0,00%
1995	7,34	8,28	12,81%	1.736,44	1.736,44	0,00%
1996	7,31	8,26	13,00%	1.885,75	1.885,75	0,00%
1997	7,27	8,23	13,26%	1.884,35	1.884,35	0,00%
1998	7,36	8,26	12,21%	1.791,37	1.791,37	0,00%
1999	7,35	8,21	11,61%	1.625,69	1.625,69	0,00%

1.6.3 Recalculation of CO_2 Emissions by Categories

The National Totals of CO_2 emissions were recalculated for the whole time series. Explanations are provided in the relating subchapters.

Table 10: Recalculation Difference of CO_2 Emissions.

IPCC Categories		CO_2 [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	Total without sinks	165,0	150,4	195,5	815,9	238,9	261,5	496,2	182,8	-25,8	246,7
1	ENERGY	-6,6	-9,2	41,9	658,9	82,6	96,0	330,5	-49,5	-83,1	120,4
1 A	FUEL COMBUSTION ACTIVITIES	2.012,2	2.128,3	2.278,7	2.845,9	2.344,6	2.299,0	2.920,5	2.437,5	2.556,9	2.584,4

IPCC Categories		CO_2 [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1 A 1	Energy Industries	2.018,9	2.137,5	2.236,8	2.187,0	2.262,0	2.203,0	2.590,0	2.487,0	2.640,0	1.545,0
1 A 2	Manufacturing Industries and Construction	1.016,0	1.056,8	1.068,1	1.034,0	1.061,3	1.036,2	1.008,0	1.024,9	1.034,8	1.367,2
1 A 3	Transport	-1.625,7	-1.662,4	-1.676,7	-1.403,9	-1.561,6	-1.641,0	-1.594,9	-1.644,8	-1.654,7	-1.647,7
1 A 4	Other Sectors	603,1	596,4	650,5	1.028,7	582,9	700,8	917,4	570,3	536,9	1.319,9
1 B	FUGITIVE EMISSIONS FROM FUELS	-2.018,9	-2.137,5	-2.236,8	-2.187,0	-2.262,0	-2.203,0	-2.590,0	-2.487,0	-2.640,0	-2.464,0
1 B 2	Oil and natural gas	-2.018,9	-2.137,5	-2.236,8	-2.187,0	-2.262,0	-2.203,0	-2.590,0	-2.487,0	-2.640,0	-2.464,0
2	INDUSTRIAL PROCESSES	171,4	161,6	154,7	157,2	155,2	164,0	164,0	230,3	55,0	160,7
2 A	MINERAL PRODUCTS	171,4	161,6	154,7	157,2	155,2	164,0	164,0	230,3	55,0	160,7
2 A 1	Cement Production								66,3	-109,1	4,9
2 A 2	Lime Production	171,4	161,6	154,7	157,2	155,2	164,0	164,0	164,0	164,0	155,8
3	SOLVENT AND OTHER PRODUCT USE										
4	AGRICULTURE										
5	LAND USE CHANGE AND FORESTRY										
6	WASTE	0,2	-2,1	-1,1	-0,2	1,1	1,4	1,7	2,0	2,3	-34,4
6 C	WASTE INCINERATION	0,2	-2,1	-1,1	-0,2	1,1	1,4	1,7	2,0	2,3	-34,4
6 C 2	plastics and other non-biogenic waste	0,2	-2,1	-1,1	-0,2	1,1	1,4	1,7	2,0	2,3	-34,4
7	OTHER										
I B	International Bunkers									-207,1	-71,9
Bio	CO2 Emissions from Bio-mass										-4,9

Blank fields indicate that no recalculation of emissions has been carried out.

1.6.4 Recalculation of CH_4 Emissions by Categories

The National Totals of CH_4 emissions were recalculated for the whole time series. Explanations are provided in the relating subchapters.

Table 11: Recalculation Difference of CH_4 Emissions.

IPCC Categories		CH_4 [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	Total without sinks	0,41	0,43	0,46	0,49	0,45	0,46	0,48	0,48	0,11	-0,20
1	ENERGY	0,41	0,43	0,46	0,49	0,45	0,46	0,48	0,48	0,47	0,55
1 A	FUEL COMBUSTION ACTIVITIES	0,16	0,16	0,17	0,21	0,17	0,19	0,19	0,17	0,16	0,26
1 A 2	Manufacturing Industries and Construction	0,07	0,08	0,08	0,08	0,08	0,07	0,07	0,07	0,07	0,12
1 A 3	Transport	-0,13	-0,12	-0,12	-0,10	-0,12	-0,10	-0,10	-0,10	-0,10	-0,10
1 A 4	Other Sectors	0,21	0,21	0,22	0,24	0,21	0,21	0,23	0,20	0,19	0,23

IPCC Categories		CH_4 [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1 B	FUGITIVE EMISSIONS FROM FUELS	0,25	0,27	0,28	0,27	0,28	0,28	0,29	0,31	0,31	0,29
2	INDUSTRIAL PROCESSES										
3	SOLVENT AND OTHER PRODUCT USE										
4	AGRICULTURE	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	-0,21	-0,57
4 D	AGRICULTURAL SOILS									-0,36	-0,73
4 F	FIELD BURNING OF AGRICULTURAL WASTES	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16
5	LAND USE CHANGE AND FORESTRY										
6	WASTE	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,17
6 C	WASTE INCINERATION	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,17
6 C 2	Plastics and other non-biogenic waste	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,16	-0,17
7	OTHER										
I B	International Bunkers										

Blank fields indicate that no recalculation of emissions has been carried out.

1.6.5 Recalculation of N_2O Emissions by Categories

The National Totals of N_2O emissions were recalculated for the whole time series. Explanations are provided in the relating subchapters.

Table 12: Recalculation Difference of N_2O Emissions

IPCC Categories		N_2O [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	Total without sinks	0,89	0,90	0,92	0,93	0,94	0,94	0,95	0,96	0,90	0,85
1	ENERGY	0,82	0,83	0,84	0,86	0,86	0,86	0,87	0,89	0,85	0,85
1 A	FUEL COMBUSTION ACTIVITIES	0,82	0,83	0,84	0,86	0,86	0,86	0,87	0,89	0,85	0,85
1 A 1	Energy Industries	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
1 A 2	Manufacturing Industries and Construction	0,35	0,37	0,37	0,36	0,38	0,37	0,37	0,38	0,36	0,35
1 A 3	Transport	-0,06	-0,06	-0,06	-0,05	-0,06	-0,06	-0,07	-0,07	-0,07	-0,07
1 A 4	Other Sectors	0,51	0,51	0,52	0,54	0,53	0,54	0,56	0,56	0,55	0,55
2	INDUSTRIAL PROCESSES										
3	SOLVENT AND OTHER PRODUCT USE										
4	AGRICULTURE									-0,03	-0,06
4 D	AGRICULTURAL SOILS									-0,03	-0,07

IPCC Categories		N_2O [Gg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
4 F	FIELD BURNING OF AGRICULTURAL WASTES										
5	LAND USE CHANGE AND FORESTRY										
6	WASTE	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
6 B	WASTEWATER HANDLING	0,07	0,07	0,07	0,07	0,07	0,08	0,08	0,08	0,08	0,08
6 C	WASTE INCINERATION										-0,01
6 C 2	plastics and other non-biogenic waste										-0,01
7	OTHER										
I B	International Bunkers										

Blank fields indicate that no recalculation of emissions has been carried out.

1.6.6 Recalculation of HFC Emissions by Categories

No recalculations where done for HFC-gases.

1.6.7 Recalculation of PFC Emissions by Categories

No recalculations where done for PFC-gases.

1.6.8 Recalculation of SF_6 Emissions by Categories

The National Totals of SF_6 emissions were recalculated for year 1993 because there was a transfer mistake, for next years submissions the figures will be changed back to the old figures which were the correct ones.

Table 13: Recalculation Difference of SF_6 Emissions

IPCC Categories		SF_6 [Mg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	Total without sinks				-0,01						
1	ENERGY										
2	INDUSTRIAL PROCESSES				-0,01						
2 F	CONSUMPTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE				-0,01						
2 F 6	Semiconductor Manufacture				-0,01						
3	SOLVENT AND OTHER PRODUCT USE										
4	AGRICULTURE										

IPCC Categories		SF_6 [Mg]; Differences with respect to UNFCCC 2001									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
5	LAND USE CHANGE AND FORESTRY										
6	WASTE										
7	OTHER										
I B	International Bunkers										

Blank fields indicate that no recalculation of emissions has been carried out.

2 TREND IN TOTAL EMISSIONS

According to the Kyoto Protocol, the greenhouse gas emissions of Austria have to be 8% below 1990 levels during the five-year commitment period from 2008 to 2012. The European Community and its Member States also have a common reduction target of 8%, which they decided to achieve jointly. In April 2002 the Council of the EC has adopted a decision[6] which includes emission limitations and/or reduction targets for each EC Member State. Austria agreed to reduce its greenhouse gas emissions for 2008–2012 by 13% compared to 1990 levels.

For Austria, there is also a CO_2 stabilisation target 2000 according to the UNFCCC, which means that by 2000 CO_2 emissions should have been reduced to 1990 levels. However, the member states of the EC agreed to jointly implement this stabilization target and the EC was successful in fulfilling this goal.

2.1 Emission Trends for aggregated GHG emissions in CO_2 equivalents

Table 14 presents a summary of Austria’s anthropogenic greenhouse gas emissions for the period from 1990 to 2000.

For CO_2, CH_4 and N_2O the base year is 1990. For the F-gases the year 1995 has been selected as base year, since the data are considered to be more reliable than those from 1990.

The greenhouse gas emissions in Austria have been fluctuating somewhat during the period, but the overall trend since 1993 has been increasing emissions. In 2000 the total amount of greenhouse gas emissions in Austria was 79.754 Gg CO_2 equivalents. This was 2,7% above the level of the base year.

Table 14: Summary of Austria's anthropogenic greenhouse gas emissions 1990 – 2000

GHG	Base year*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend Base year-2000
	CO_2 equivalents [Gg]												[%]
Total	**77.639**	**77.388**	**81.314**	**74.893**	**74.770**	**76.159**	**78.606**	**79.951**	**81.319**	**79.458**	**79.731**	**79.754**	**+2,72**
CO_2	62.297	62.297	66.174	60.349	60.717	61.995	64.015	65.386	67.012	65.464	66.025	66.102	+6,11
CH_4	11.298	11.298	11.078	10.814	10.685	10.511	10.289	10.118	9.872	9.642	9.537	9.402	-16,79
N_2O	2.308	2.308	2.399	2.420	2.485	2.550	2.566	2.561	2.552	2.561	2.544	2.515	+8,99
HFCs	546	4	6	9	12	17	546	625	718	816	870	1.033	+89,22
PFCs	16	963	974	576	48	54	16	15	18	21	25	25	+61,08
SF_6	1.175	518	683	725	823	1.033	1.175	1.246	1.148	955	730	677	-42,37

Total emissions and CO_2 are without LUCF
*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6
Note: Global warming potentials (GWPs) used (100 years time horizon): carbon dioxide (CO_2) = 1; methane (CH_4) = 21; nitrous oxide (N_2O) = 310; sulphur hexafluoride (SF_6) = 23 900; hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) consist of different substances, therefore GWPs have to be calculated individually depending on the substances.

[6] Council Decision of 25 April 2002 (2002/358/CE) concerning the approval, on behalf of the EC, of the KP to the UNFCCC and the joint fulfilment of commitments thereunder

2.2 Emission Trends by gas for GHG emissions

Table 15 presents the greenhouse gas emissions of the base year and 2000 and their share of the total amount of greenhouse gas emissions.

Table 15: Greenhouse gas emissions in the base year and in 2000.

GHG	Base year*	2000	Base year*	2000
	CO_2 equivalents [Gg]		[%]	
Total	**77.639**	**79.754**	100	100
CO_2	62.297	66.102	80,24	82,88
CH_4	11.298	9.402	14,55	11,79
N_2O	2.308	2.515	2,97	3,15
F-gases	1.736	1.735	2,24	2,18

Total emissions and CO_2 are without LUCF
*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

The major greenhouse gas in Austria is CO_2, which represented 83% of total greenhouse gas emissions in 2000 compared with 80% in the base year, followed by CH_4 (12% in 2000 respectively 15% in the base year), N_2O (3% in 2000 and in the base year) and F-gases (2% in 2000 and in the base year).

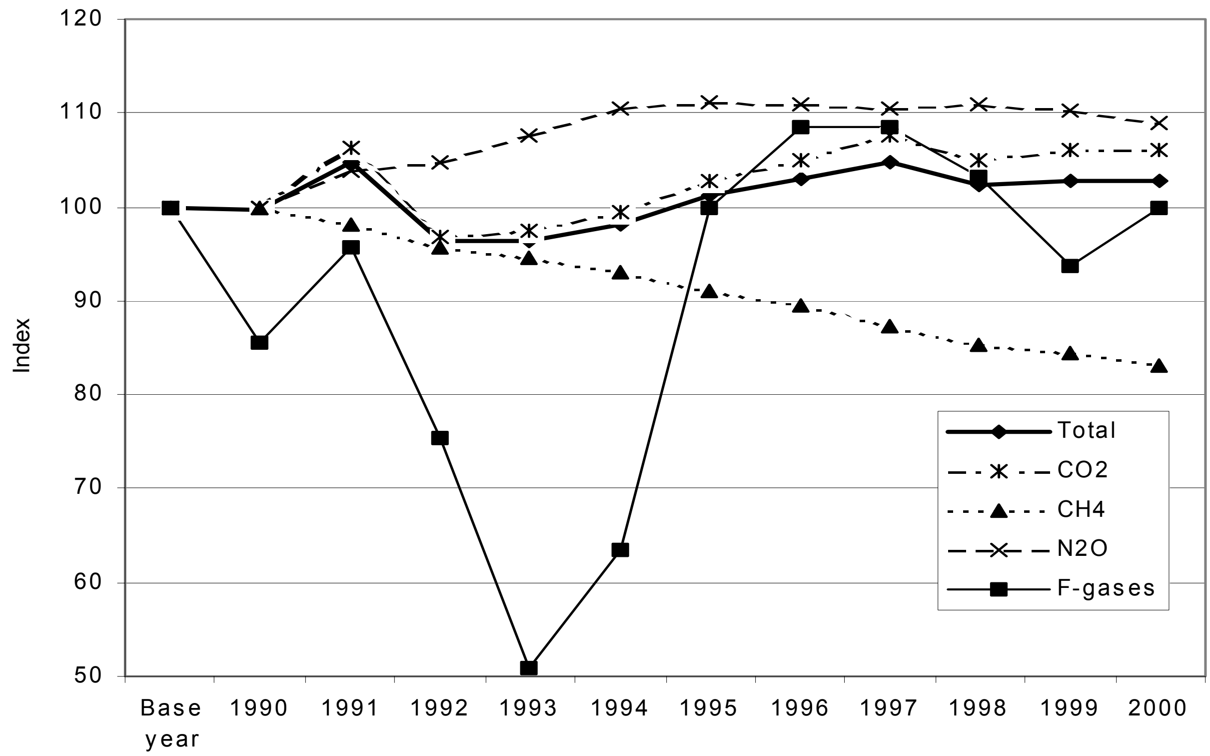

Figure 4: Austria’s greenhouse gas emissions from 1990 to 2000 in index form

The trend in Austrian greenhouse gas emissions is presented in Figure 4 relative to the emissions in the base year (index form: 1990 = 100 for CO_2, CH_4 and N_2O and 1995 = 100 for HFCs, PFCs and SF_6).

CO_2

The CO_2 emissions have been fluctuating somewhat, but the overall trend since 1992 have been increasing emissions. The CO_2 emissions increased from 62.297 to 66.102 Gg during the period from 1990 to 2000, see Table 14. In 2000 the CO_2 emissions were 6,1% above the level of the base year.

The main source of CO_2 emissions in Austria is fossil fuel combustion.

According to the Climate Convention Austria's CO_2 emissions should have been reduced to the levels of 1990 by 2000, but the CO_2 stabilisation target for 2000 could not be met. However, the Member States agreed to jointly fulfil this goal and the EU was successful doing so.

CH_4

The CH_4 emissions decreased steadily during the period from 1990 to 2000, from 11.298 to 9.402 Gg CO_2 equivalents, see Table 14. In 2000 the CH_4 emissions were 16,8% below the level of the base year.

The main sources of CH_4 emissions in Austria are solid waste disposal on land (landfills) and enteric fermentation and manure management.

N_2O

The N_2O emissions increased until 1994 by 11%, then the amount of emitted N_2O in Austria was stable for the next five years. Since 1998 the emissions slightly decrease (see Figure 4). In 2000 N_2O emissions were 9% above the level of the base year (2.308 Gg CO_2 equivalents – see Table 14).

The main sources of N_2O emissions are agricultural soils and fossil fuel combustion.

HFCs

The HFC emissions increased remarkably during the period from 1990 to 2000, from 4 to 1.033 Gg CO_2 equivalents. In 2000 the HFC emissions were 89,2% above the level of the base year (1995).

The main sources of HFC emissions are refrigeration and air conditioning equipment, foam blowing and XPS/ PU plates.

PFCs

PFC emissions show the inverse trend as HFC emissions. The PFC emissions decreased remarkably during the period from 1990 to 2000, from 963 to 25 Gg CO_2 equivalents.

In 2000 the PFC emissions were 61% above the level of the base year (1995).

The main source of PFC emissions is semiconductor manufacture.

SF_6

SF_6 emissions in 1990 amounted to 518 Gg CO_2 equivalents. They increased steadily until 1996 where they reached a maximum of 1.246 Gg CO_2 equivalents. Since then they are deceasing, in 2000 SF_6 emissions amounted to 677 Gg CO_2 equivalents.

In 2000 the SF_6 emissions were 42% below the level of the base year (1995).

The main sources of SF_6 emissions are semiconductor manufacture, magnesium production and filling of noise insulate glasses.

2.3 Emission Trends by sources for GHG emissions

Table 16 presents a summary of Austria's anthropogenic greenhouse gas emissions by sector for the period from 1990 to 2000:

- Sector 1 – Energy
- Sector 2 – Industrial Processes
- Sector 3 – Solvent and Other Product Use
- Sector 4 – Agriculture
- Sector 5 – Land-Use Change and Forestry
- Sector 6 - Waste

Table 16: Summary of Austria's greenhouse gas emissions by sector 1990–2000.

Sector	Base year*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend Base year-2000
	CO_2 equivalents [Gg]												[%]
Total	**77.639**	**77.388**	**81.314**	**74.893**	**74.770**	**76.159**	**78.606**	**79.951**	**81.319**	**79.458**	**79.731**	**79.754**	**+2,72**
1	50.184	50.184	54.741	49.982	50.292	50.972	52.763	54.635	55.015	54.430	54.950	54.877	+9,35
2	14.844	14.592	14.224	12.779	12.523	13.375	14.266	13.910	15.058	14.035	13.913	14.105	-4,98
3	755	755	669	614	593	594	613	612	638	628	628	628	-16,82
4	5.596	5.596	5.525	5.372	5.338	5.287	5.144	5.082	5.052	5.031	4.927	4.812	-14,00
5	-9.215	-9.215	-13.504	-8.656	-8.982	-7.862	-7.254	-5.385	-7.633	-7.633	-7.633	-7.633	17,16
6	6.261	6.261	6.155	6.146	6.023	5.931	5.820	5.712	5.556	5.335	5.313	5.332	-14,84

Total emissions are without LUCF
*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

The dominant sectors are the energy sector, which caused 69% of the total greenhouse gas emissions in Austria in 2000 (65% in 1990), followed by the Sector *Industrial Processes*, which caused 18% of the greenhouse gas emissions in 2000 (19% in 1990).

The Austrian greenhouse gas emissions by sector are also presented in Figure 5 in index-form with the different base years (1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6) as basis.

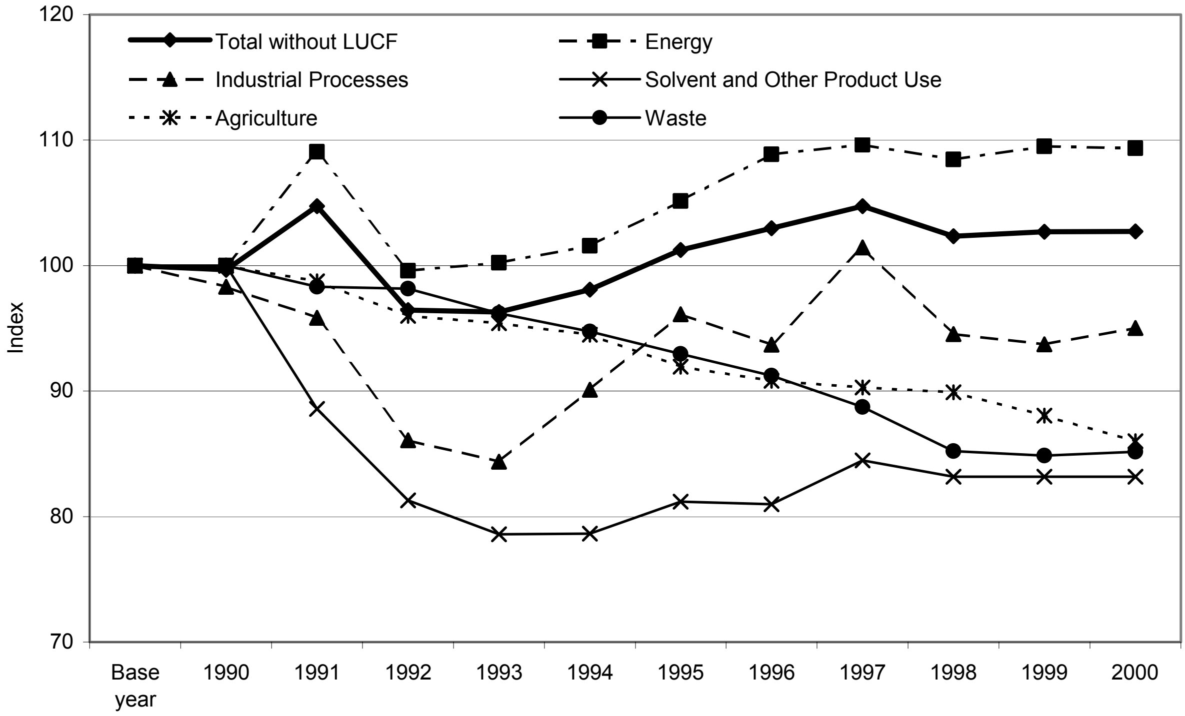

Figure 5: Austrian greenhouse gas emissions by sector 1990–2000

Energy (IPCC Category 1)

The overall trend for the greenhouse gas emissions from Category *1 Energy* was increasing emissions, but they seem to have stabilized now at the level of 1996. In 2000 the greenhouse gas emissions from the energy sector amounted to 54.877 Gg CO_2 equivalents. This was 9,4% above the level of the base year.

99,6% of the emissions from this sector in 2000 arise from fossil fuel combustion.

CO_2 emissions from fossil fuel combustion are also the main sources of greenhouse gas emissions in Austria. The most important source for greenhouse gas emissions in the year 2000 in Austria was the transport sector, which had a share of 21,5% to the national total greenhouse gas emissions.

Industrial Processes (IPCC Category 2)

The greenhouse gas emissions from the industrial processes sector fluctuated during the period. In 2000 the greenhouse gas emissions from Category *2 Industrial Processes* amounted to 14.105 Gg CO_2 equivalents. This was 5,0% below the level of the base year.

The main sources of greenhouse gas emissions in the industrial processes sector are *Metal Production* and *Mineral Products*, which caused 61 respectively 22% of the emissions from this sector in 2000.

Solvent and Other Product Use (IPCC Category 3)

The greenhouse gas emissions from Category *3 Solvent and Other product Use* fluctuated during the period, the overall trend was decreasing emissions. In 2000 the greenhouse gas emissions from the Solvent and Other product Use sector amounted to 628 Gg CO_2 equivalents. This was 16,8% below the level of the base year.

Agriculture (IPCC Category 4)

The greenhouse gas emissions from the agriculture sector decreased steadily during the period. In 2000 the greenhouse gas emissions from Category *4 Agriculture* amounted to 4.812 Gg CO_2 equivalents. This was 14,0% below the level of the base year.

The main sources of greenhouse gas emissions in the agriculture sector are *Enteric Fermentation* and *Agricultural Soils*, which caused 54 respectively 35% of the emissions from this sector in 2000.

Waste (IPCC Category 6)

The greenhouse gas emissions from Category *6 Waste* decreased steadily during the period. In 2000 the greenhouse gas emissions from the waste sector amounted to 5.332 Gg CO_2 equivalents. This was 14,8% below the level of the base year.

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 2000.

2.4 Emission Trends for indirect GHG and SO_2

As part of the inventory also emissions of NO_x, CO, NMVOC and SO_2 were estimated.

Table 17 presents a summary of the emissions of the indirect greenhouse gases and SO_2 for the period from 1990 to 2000.

Table 17: Summary of emissions of NO_x, CO, NMVOC and SO_2 1990-2000.

Gas	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend 1990-2000
	[Gg]											[%]
NO_x	201,80	205,44	196,71	190,84	193,83	182,71	180,92	184,66	181,52	181,87	183,57	- 9,03
CO	1.353,03	1.333,31	1.253,65	1.229,22	1.198,72	1.097,80	1.073,34	1.070,09	1.015,01	969,73	906,49	- 33,00
NMVOC	359,68	329,69	296,13	285,94	274,45	275,71	265,36	260,36	250,61	245,08	238,70	- 33,64
SO_2	90,74	81,83	63,00	60,40	56,32	53,82	52,80	50,67	45,77	41,43	40,75	- 55,09

The emissions of the indirect greenhouse gases and SO_2 decreased during the period. The emissions of these gases in index-form with 1990 as base are presented in Figure 6.

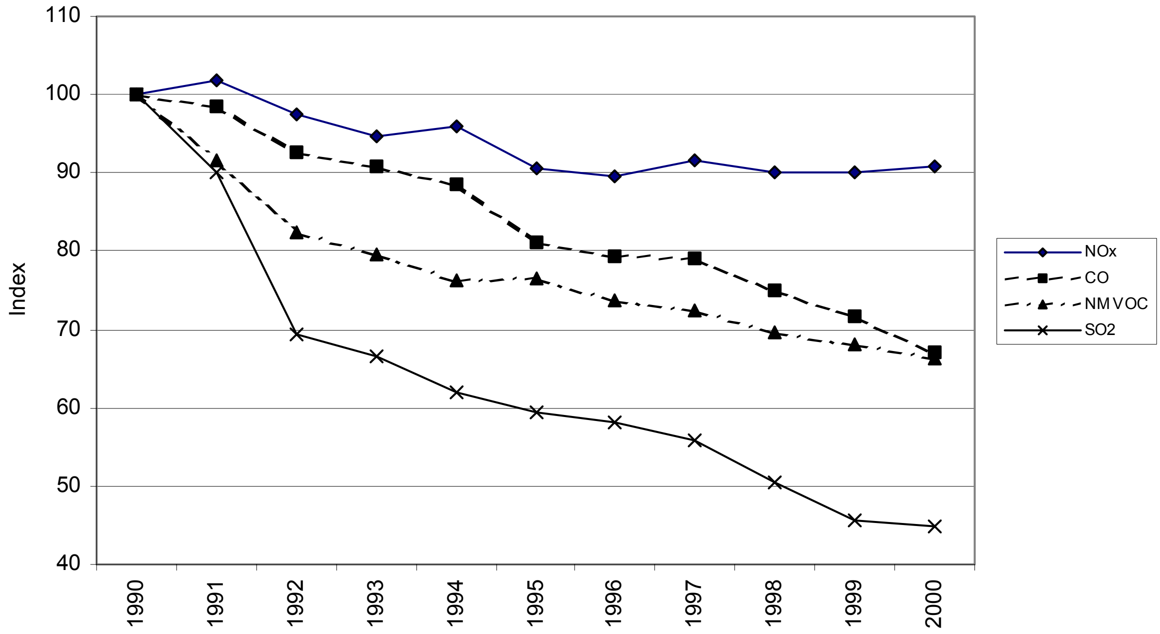

Figure 6: Emissions of indirect greenhouse gases and SO_2 1990-2000

NO_x

The NO_x emissions decreased from 202 to 184 Gg during the period from 1990 to 2000. In 2000 the NO_x emissions were 9% below the level of 1990.

The main source of NO_x emissions in Austria is fossil fuel combustion.

CO

The CO emissions decreased from 1.353 to 906 Gg during the period from 1990 to 2000. In 2000 the CO emissions were 33% below the level of 1990.

The main sources of CO emissions in Austria are fossil fuel combustion and metal production.

NMVOC

The NMVOC emissions decreased from 360 to 239 during the period from 1990 to 2000. In 2000 the NMVOC emissions were 33,6% below the level of 1990.

The main sources of NMVOC emissions are other solvent use and fossil fuel combustion.

SO_2

The SO_2 emissions decreased from 91 to 41 Gg during the period from 1990 to 2000. In 2000 the SO_2 emissions were 55% below the level of 1990.

The main source of SO_2 emissions is fossil fuel combustion.

3 KEY SOURCES

In order to prepare for a National System according to Article 5.1 of the Kyoto Protocol each Annex I Party shall identify the key source categories.

The identification of key source categories is described in the IPCC Good Practice Guidance [IPCC-GPG, 2000], Chapter 7. It stipulates that a key source category is one that is prioritised within the national system because its estimate has a significant influence on a country's total inventory of greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both.

All notations, descriptions of identification and results for source and key source categories included in this chapter are based on the IPCC Good Practice Guidance.

The identification includes all reported greenhouse gases CO_2, CH_4, N_2O, HFC, PFC and SF_6. All IPCC source categories are included except the category LUCF as guidelines for this category are not yet available in the IPCC Good Practice Guidance.

The presented key source analysis was performed by UBAVIE with data for greenhouse gas emissions of the submission 2002 to the UNFCCC and comprises a level assessment for the years 1990 and 2000 and a trend assessment.

3.1 Austria's key source categories

This chapter presents the results of Austria's key source analysis. The methodology is described in Chapter 3.2.

The identified key source categories are listed in Table 18. They comprise 78.735 Gg CO_2 equivalents in the year 2000, which is a share of 96,21% to the total greenhouse gas emissions (without sector LUCF).

Table 18: Austrian key source categories based on emission data for the year 2000

IPCC 96 / Code	Name (Emission source)	CO_2	CH_4	N_2O	HFC	PFC	SF_6
1 A 1 a gaseous fuel	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	x					
1 A 1 a liquid fuel	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	x					
1 A 1 a solid fuel	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	x					
1 A 1 b liquid fuel	Energy_Fuel Combustion_Energy Industries_Petroleum refining	x					
1 A 2 gaseous fuel	Energy_Fuel Combustion_Manufacturing Industries and Construction	x					
1 A 2 mobile – liquid fuel	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	x					
1 A 2 stationary-liquid fuel	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	x					
1 A 2 other fuel	Energy_Fuel Combustion_Manufacturing Industries and Construction	x					
1 A 2 solid fuel	Energy_Fuel Combustion_Manufacturing Industries and Construction	x					
1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	x					
1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	x					

IPCC 96 / Code	Name (Emission source)	CO_2	CH_4	N_2O	HFC	PFC	SF_6
				x			
1 A 4 mobile - diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	x					
1 A 4 stationary-biomass fuel	Energy_Fuel Combustion_Other Sectors-Stationary		x				
1 A 4 stationary-gaseous fuel	Energy_Fuel Combustion_Other Sectors-Stationary	x					
1 A 4 stationary-liquid fuel	Energy_Fuel Combustion_Other Sectors-Stationary	x					
1 A 4 stationary-solid fuel	Energy_Fuel Combustion_Other Sectors-Stationary	x					
2 A 1	Industrial Processes_Mineral Products_Cement Production	x					
2 A 2	Industrial Processes_Mineral Products_Lime Production	x					
2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	x					
2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	x					
2 C 1	Industrial Processes_Metal Production_Iron and Steel	x					
2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries					x	
							x
2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride				x		
							x
3	Solvent and other Product Use	x					
4 A 1	Agriculture_Enteric Fermentation_Cattle		x				
4 B 1	Agriculture_Manure Management_Cattle		x				
4 D	Agriculture_Agricultural Soils		x				
				x			
6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land		x				
6 D 1	Waste_Other Waste_Sludge spreading		x				

The most important key sources are:

- The category *1 A 3 b Road Transportation (diesel oil and gasoline)* accounts for the largest contribution in the sector Energy as well as to the total of greenhouse gas emissions. The CO_2 emissions of this IPCC category rose from 11,65 Mio. tons to 16,58 Mio. tons (+42,3%) between 1990 and 2000.
- The second largest contribution to the total of greenhouse gas emissions CO_2 emissions from category *2 C 1 Iron and Steel Production* (10,8%). The emissions of this category fell between 1990 and 1994, but since then have risen again so that now they are nearly at the level of 1990.

The two categories (i) *Energy Fuel Combustion Manufacturing Industries and Construction – other fuel use* (CO_2) and (ii) *Industrial Processes Metal Production SF6 Used in Aluminium and Magnesium Foundries* (SF_6) are considered as key sources due to their significant contribution to the trend of greenhouse gas emissions (see also Chapter 3.2).

Detailed information on the estimation of greenhouse gas emissions from key source categories is given in the sector analysis Chapter 4.

Comparison to last year's submission

UBAVIE presented its first key source analysis in the NIR 2001. This analysis was performed with data of the submission 2001 for the years 1990 and 1999. There is a difference in the identified key source categories to the results of this year's analysis. The explanations for the differences are as follows:

- Allocation of greenhouse gas emissions to different categories:

  As suggested by the in country review team in October 2001, CO_2 emissions from the category *1 B 2 a Fugitive Emissions from Fuels Other Oil* are reported now in category *1 A 1 b liquid – Fuel Combustion Energy Industries Petroleum Refining* and therefore the second mentioned source category is considered as a key source category instead of the first one in the NIR 2002.

- More detailed source category level:

  Source category *1 A 2 liquid – Energy Fuel Combustion Manufacturing Industries and Construction* in the NIR 2001 is disaggregated to liquid stationary and liquid mobile. CO_2 emissions from both source categories are considered as key source categories in the NIR 2002.

  SF_6 and PFC emissions are split to categories *2 F* and *2 C 4*, which gives a more precise information of the origin. Both categories have been identified as key source categories.

- Recalculation of emission data for the year 1990:

  In comparison to last years key source assessment three more source categories have been identified as key source categories by Level Assessment in the year 1990. These are:

  - CO_2 emissions from category *2 A 2 Industrial Processes Mineral Products Lime Production*
  - CH_4 emissions from category *4 B 1 Agriculture Manure Management Cattle*
  - CH_4 emissions from category *1 A 4 biomass – Energy Fuel Combustion Other Sectors – Stationary* in the use of IPCC-Fuel type biomass

All categories that have been identified as key source categories in the NIR 2001 have been confirmed in the NIR 2002.

3.2 Description of methodology used for identifying key source categories

The method used to identify key source categories is identical with the application of the Tier 1 method - quantitative approach described in the Good Practice Guidance [IPCC-GPG, 2000], Chapter 7 *Methodological Choice and Recalculation*.

The identification includes all greenhouse gases reported under UNFCCC: CO_2, CH_4, N_2O, HFC, PFC and SF_6. All IPCC source categories are included except for the category LUCF as guidelines for this category are not yet available through the IPCC Good Practice Guidance.

The identification of key source categories consists of three steps:

- Identifying of source categories – see Chapter 3.2.1

- Level Assessment 1990 and 2000 – see Chapter 3.2.2
- Trend Assessment 1990 to 2000 – see Chapter 3.2.3

Annex 1 encloses the spreadsheets used for the key source analysis.

3.2.1 Level of disaggregation and identification of key source categories

To identify key source categories the total emissions have been split into those source categories that have been estimated using the same methodology and the same emission factor. Although the resulting source split is not consistent with the source split recommended by the IPCC, it is considered to be the most appropriate one as it is based upon sources which are actually estimated independent from each other. This procedure allows to address directly the individual methodology which should be upgraded according to the result of the key source analysis.

Table A.1 of Annex 1 presents these 69 source categories with their greenhouse gas emissions expressed in CO_2 equivalents for the year 1990 and 2000.

Further details and a list of the source categories and key source categories for each category are given in the corresponding subchapter of Chapter 4: Sector Analysis.

3.2.2 Level Assessment 1990 and 2000

For the Level Assessment the contribution of the GHG emissions (expressed in CO_2-equivalents) of each source category to the total national emissions is calculated. The calculation is done for the years 1990 and 2000 according to Equation 7.1 of the GPG .

The results are ranked in descending order of magnitude and a cumulative total is provided. The calculation was carried out on two separate spreadsheets for each year and is presented in tables A.2 and A.3 of Annex 1. For the year 1990: 28 and for the year 2000: 27 source categories comprised > 95% of the cumulative total.

3.2.3 Trend Assessment 1990 to 2000

Trend Assessment is the ranking of the contributions of each source category's trend with respect to the national overall trend for GHG emissions. It identifies the source categories that have a trend different from the overall trend.

The calculation is done according to Equation 7.2 of the GPG.

The results are ranked in descending order of magnitude and a cumulative total is calculated. As presented in table A 4 of Annex 1 23 source categories comprise 95% of the cumulative total.

3.2.4 Identification of key source categories

Those source categories that make up the cumulative total of 95% in:

Level Assessment 1990 **+** Level Assessment 2000 **+** Trend Assessment 1990-2000

are identified as key source categories. They are listed in Table 18 in ascending IPCC category order, Table A.5 of Annex 1 presents them in order of their quantities (Level Assessment) of the year 2000.

3.3 Consequences of key source category selection

Whenever a method used for the estimation of emissions of a key source category is not consistent with a high Tier method according to the requirements of the IPCC Good Practice Report, the method will have to be improved in order to reduce uncertainty. To this end an emission inventory improvement programme is under development (see Chapter 5) to allow a stepwise improvement of the emission data.

4 SECTOR ANALYSIS

4.1 Energy (IPCC Category 1)

In IPCC Category *1 Energy* emissions arising from fuel combustion activities (Category *1 A*) as well as fugitive emissions from fuels (Category *1 B*) are considered.

CO_2 emissions from fossil fuel combustion are the main sources of GHGs in Austria. In the year 2000 about 68,8% of overall GHGs and 80,8% of overall anthropogenic CO_2 emissions from Austria were caused by the use of fossil fuels for road traffic, in the energy and manufacturing industry and in the commercial, agricultural and house holding sector.

In 2000 the most important source for GHGs in this category in Austria was the transport sector (IPCC Category *1 A 3*), which had a share of 21,5 % of the national total GHG emissions. 12,6 % of national GHG emissions are released by passenger cars, 2% by light duty vehicles, 6,7% by heavy duty vehicles, 0,2 % by mopeds and motorcycles. Austria's railway system is mainly driven by electricity, only 0,2% of overall GHGs arise from this sector. Fuels used by ships driven on inland waterways have a share of 0,1% of total GHG. Because Austria is a land locked country there is no occurrence of maritime activities. About 0,1% of national GHG arise from domestic air traffic.

In the commercial, agricultural and house holding sector (small combustion, Category *1 A 4 Other Sectors*), which is the second important source, fossil fuels are mainly used for heating purposes. It has to be mentioned that this category is very dependant on the climatic circumstances because of the temperate climate. A "cold winter" combined with an economic up trend may influence emissions from this sources in a strong way. The main share of biomass in Austria is used in the small combustion sector. This sector also includes emissions from off-road activities (IPCC Category *1 A 3 e*). GHG emissions from tractors and other mobile machines which are used in the agricultural and forestry sector have a share of 2,3% of the national total.

The third important source of GHG emissions in Austria is category *1 A 1 Energy Industries*, in which fossil fuels are combusted to produce electrical power or district heating. [7]It has to be noted that in the year 2000 78,1 % of the overall gross production of 53.166 GWh of public electricity were generated by hydro plants. 11.571 GWh (that are 21,8 %) were produced by thermal power plants, 70 GWh by solar and wind plants. Industrial auto producers generated 9.060 GWh of electricity in the year 2000. There are no operating nuclear plants in Austria. Thus the seasonal water situation in Austria has an important influence on the needs for electric power generation by fossil fuels. Biomass used in this sector is mainly used by smaller district heating plants. The refinery industry which consists of only one plant in Austria is now also included in this category (subcategory *1 A 1 b Petroleum refining-liquid fuels)*.

Table 19: Emissions of greenhouse gases and their trend from 1990-2000 from category 1 Energy

Gas	GHG emissions [Gg]											Trend 1990-2000
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
CO_2	48.818	53.326	48.580	48.805	49.426	51.152	53.043	53.487	52.896	53.436	53.414	+9,4%
CH_4	25,07	23,24	21,03	22,57	21,64	23,19	22,76	20,05	19,66	19,16	17,93	–28,5%
N_2O	2,71	2,99	3,10	3,27	3,52	3,63	3,60	3,57	3,62	3,59	3,51	+29,4%

[7] Source: IEA Questionnaire revised data march/2002, STATISTIC AUSTRIA.

Table 20: Total greenhouse gas emissions and trend from 1990–2000 by energy subcategories

	Category 1 Energy, GHG emissions [Gg CO_2 equivalent]										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	**50.184**	**54.741**	**49.982**	**50.292**	**50.972**	**52.763**	**54.635**	**55.015**	**54.430**	**54.950**	**54.877**
1 A	49.969	54.510	49.744	50.057	50.718	52.498	54.418	54.753	54.142	54.632	54.662
1 A 1	14.444	15.593	12.087	11.361	11.700	13.173	14.041	14.400	13.539	12.969	12.185
1 A 2	8.603	8.026	8.176	8.036	7.897	8.725	9.973	10.245	10.871	10.175	10.781
1 A 3	12.318	13.849	13.875	14.240	15.196	14.392	14.374	14.766	15.761	16.595	17.529
1 A 4	14.605	17.042	15.606	16.419	15.925	16.209	16.030	15.342	13.972	14.893	14.168
1 A 5	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE*
1 B	214,90	230,29	237,46	235,40	254,41	264,83	217,54	262,31	287,27	318,62	215,13
1 B 1	0,37	0,31	0,26	0,25	0,20	0,19	0,17	0,17	0,17	0,17	0,17
1 B 2	214,53	229,98	237,20	235,15	254,20	264,63	217,38	262,14	287,10	318,45	214,96

* included in Category *6 C 1 Waste Incineration*

Key sources

Liquid fuel consumption of the subcategories *1 A 2 Manufacturing Industries and Construction* and *1 A 4 Other Sectors* was split into mobile and stationary sources. In general emission sources which are estimated by using the same set of emission factors and source of activity data (which implies a similar range of uncertainty) were aggregated together.

Differences of key source determination compared to those of the submission 2001 are caused by recalculations:

- A new introduced key source is *1 A 1 b Petroleum Refining - liquid fuels* which now represents the emissions from the petroleum refining industry which were allocated under category *1 A 2 a Fugitive Emissions from Fuels* in the previous submission.
- Key source *1 A 2 Manufacturing Industries and Construction - liquid fuels* has been split into mobile and stationary sources. Both subcategories are now key sources. This split is needed because the mobile emission sources of industry are now allocated in Category *1 A 2*.
- CH_4 Emissions from source *1 A 4 stat-biomass* becomes a new key source due to the Level Assessment for the year 1990.

Table 21 shows the source categories in the level of aggregation for the key source analysis (For the key source analysis see Chapter 3).

Table 21: Source categories – key sources of the sector Energy

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	CO_2	LA1990, LA2000, TA
1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	CO_2	LA1990, LA2000, TA
1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	CO_2	LA1990, LA2000, TA

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production		
1 A 1 a other	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production		
1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum Refining	CO_2	LA1990, LA2000, TA
1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industries		
1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	CO_2	LA1990, LA2000, TA
1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	CO_2	LA1990, LA2000
1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	CO_2	LA1990, LA2000, TA
1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	CO_2	LA1990, LA2000, TA
1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction		
1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	CO_2	TA
1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation		
1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation		
1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	CO_2	LA1990, LA2000, TA
		N_2O	LA2000, TA
1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	CO_2	LA1990, LA2000, TA
1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways		
1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways		
1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation		
1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation		
1 A 3 e liquid	Energy_Fuel Combustion_Transport_Other		
1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	CO_2	LA1990, LA2000, TA
1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	CO_2	LA1990, LA2000, TA
1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	CO_2	LA1990, LA2000, TA
1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	CH_4	LA1990
1 A 4 stat-other	Energy_Fuel Combustion_Other Sectors-Stationary		
1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and Gardening		
1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	CO_2	LA1990, LA2000

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry		
1 B 1	Energy_Fugitve Emissions from Fuels_Solid fuels		
1 B 2 a	Energy_Fugitve Emissions from Fuels_Other_Oil		
1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas		

* shaded cell: source category is not a key source
LA1990 = Level Assessment 1990
LA2000 = Level Assessment 2000
TA = Trend Assessment 1990-2000

Quality Assurance and Quality Control (QA/QC)

No specific QA/QC procedure for this category has been implemented at this time, for general QA/QC see Chapter 1.3.

Concerning measurement and documentation of emission data there are specific regulations in the Austrian legislation:

- BGBl II 1997/ 331 Feuerungsanlagen-Verordnung
- BGBl 1989/ 19 Luftreinhalteverordnung für Kesselanlagen
- BGBl 1988/ 380 Luftreinhaltegesetz für Kesselanlagen

Extracts of the relevant paragraphs are provided in Annex 2.

Uncertainty assessment

A first comprehensive uncertainty analysis was performed as a pilot study [WINIWARTER & RYPDAL, 2001] on the greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997.

No information is available concerning uncertainty assessment of subsector data. For further information concerning uncertainty assessment, see Chapter 1.4.

Category *1 A Fuel Combustion*: The revision of the national energy statistics for 1999 implies changes for all GHGs in this year. The national energy balance of STATISTIC AUSTRIA is no longer used in the NACE-based format but in the format of the IEA-questionnaire because this format better supports the IPCC reporting format.

Table 22: Energy consumption 1999 in comparison to previous submission.

IPCC Categories / Fuel groups	Energy Consumption 1999 [PJ]		
	UNFCCC 2002	UNFCCC 2001	Difference [%]
1 A 1 Energy Industries	**188,3**	**202,2**	**-6,87**
Liquid	59,5	56,3	+5,68
Solid	37,9	41,8	-9,33
Gaseous	84,0	96,4	-12,86
Biomass	7,0	7,8	-10,26
Other	0,0	0,0	0,00

IPCC Categories / Fuel groups	Energy Consumption 1999 [PJ]		
	UNFCCC 2002	UNFCCC 2001	Difference [%]
1 A 2 Manufacturing Industries and Construction	**270,0**	**256,1**	**+5,43**
Liquid	41,1	30,0	+37,00
Solid	71,2	72,0	-1,11
Gaseous	115,0	114,0	+0,88
Biomass	35,4	37,0	-4,32
Other	7,4	3,1	+138,71
1 A 3 Transport	**217,0**	**238,9**	**-9,17**
Gasoline	87,2	89,6	-2,68
Diesel	129,8	149,3	-13,06
Natural gas	0,0	0,0	0,00
Solid	0,0	0,0	0,00
Biomass	0,0	0,0	0,00
Other	0,0	0,0	0,00
1 A 4 Other Sectors	**290,6**	**270,0**	**+7,63**
Liquid	119,5	108,1	+10,55
Solid	12,9	13,1	-1,53
Gaseous	76,5	67,5	+13,33
Biomass	81,7	80,8	+1,11
Other	0,0	0,6	-100,00
1 A 5 Other	**0,0**	**0,0**	**0,00**
TOTAL: 1 A FUEL COMBUSTION ACTIVITIES	**965,9**	**967,3**	**-0,14**
Liquid	**436,9**	**433,3**	**+0,83**
Solid	**122,0**	**126,8**	**-3,79**
Gaseous	**275,4**	**277,9**	**-0,90**
Biomass	**124,1**	**125,5**	**-1,12**
Other	**7,4**	**3,7**	**+100,00**

A new study [PISCHINGER, 2000], which estimates emissions from off-road traffic with a more detailed bottom-up approach, results in shifts of mainly liquid fuel energy consumption and emissions between the different subcategories (see Table 23). The new study shows that fuel consumption of off-road traffic was underestimated in the past. This implies that fuel consumption of road traffic was over-estimated, because there the total national gasoline and diesel sales are known with little uncertainty. When running the "road traffic model" with the adjusted fuel consumptions as new input parameters the model was not able to match the output of the fuel consumption exactly with the input value. A side effect of recalculations is a small decrease of the overall-consumption of liquid fuels for the base year 1990 of about 580 TJ and 1.370 TJ for the year 1999.

Table 23: Shifts of energy consumption mainly caused by the new transport study as absolute values and in percent. Only categories which have been affected by recalculations are shown.

IPCC Categories / Fuel groups	Recalculation of Energy Consumption [PJ]									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1 A FUEL COMBUSTION ACTIVITIES - Liquid	-0,58	-0,70	-0,22	7,96	-0,09	0,06	4,54	-0,55	-0,95	-1,37
1 A 1 a Public Electricity and Heat Production - Solid	-6,15	-5,74	-5,14	-4,80	-4,80	-4,72	-3,69	-3,50	-3,97	-3,89
1 A 1 b Petroleum refining - Liquid	1,64	1,43	2,02	1,53	1,73	1,64	1,99	2,25	2,13	5,85
1 A 2 a Iron and Steel - Solid	6,11	6,33	5,42	5,66	5,03	2,69	4,95	5,64	5,82	6,31
1 A 2 f Other - Liquid	12,06	12,82	12,38	12,41	12,58	12,33	11,66	11,63	11,89	11,11
1 A 2 f Other - Solid	0,04	-0,58	-0,28	-0,86	-0,22	2,03	-1,25	-2,14	-1,84	-7,15
1 A 3 b Road Transportation - gasoline	-1,85	-1,85	-1,87	-1,52	-1,81	-1,65	-2,29	-2,28	-2,26	-2,25
1 A 3 b Road Transportation - diesel oil	-20,61	-21,20	-21,57	-18,38	-14,49	-21,77	-19,30	-19,41	-19,05	-18,33
1 A 3 c Railways - Liquid	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-0,02	0,45
1 A 3 d Navigation - Gas/Diesel oil	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
1 A 3 d Navigation - Gasoline	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
1 A 3 e Other - Liquid	0,00	0,00	0,00	0,00	-6,01	0,00	0,00	-0,52	-0,76	-1,62
1 A 4 b Residential - Liquid	1,85	1,86	1,88	1,89	1,87	1,89	1,87	1,86	1,84	8,30*
1 A 4 c Agriculture / Forestry / Fishing - Liquid	6,27	6,18	6,89	11,98	5,98	7,56	10,54	5,86	5,42	4,96
International Bunkers - Aviation - Jet Kerosene	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-2,85	-4,34
IPCC Categories / Fuel groups	**Recalculation of Energy Consumption [%]**									
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
1 A FUEL COMBUSTION ACTIVITIES - Liquid	-0,07%	-0,08%	-0,03%	0,93%	-0,01%	0,01%	0,47%	-0,06%	-0,10%	-0,14%
1 A 1 a Public Electricity and Heat Production - Solid	-8,93%	-7,74%	-11,2%	-13,3%	-12,9%	-9,44%	-7,28%	-6,43%	-9,97%	-9,31%
1 A 1 b Petroleum refining - Liquid	8,18%	8,03%	11,30%	7,97%	8,22%	8,60%	6,49%	7,40%	6,83%	21,02%
1 A 2 a Iron and Steel - Solid	38,40%	38,08%	49,30%	50,63%	40,27%	18,73%	35,48%	36,73%	43,79%	43,28%
1 A 2 f Other - Liquid	30,55%	44,02%	38,60%	43,00%	45,74%	39,08%	33,60%	34,07%	29,89%	37,09%
1 A 2 f Other - Solid	0,07%	-1,12%	-0,55%	-1,80%	-0,46%	4,13%	-2,18%	-3,46%	-2,99%	-12,5%
1 A 3 b Road Transportation - gasoline	-1,68%	-1,53%	-1,62%	-1,38%	-1,69%	-1,60%	-2,41%	-2,52%	-2,46%	-2,56%
1 A 3 b Road Transportation - diesel oil	-29,0%	-26,3%	-25,1%	-20,1%	-14,0%	-21,1%	-17,6%	-16,2%	-14,6%	-12,7%
1 A 3 c Railways - Liquid	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	-1,08%	22,76%
1 A 3 d Navigation - Gas/Diesel oil	3,72%	4,21%	4,33%	4,28%	3,43%	3,55%	3,54%	2,99%	2,95%	2,91%
1 A 3 d Navigation - Gasoline	47,76%	47,75%	47,75%	47,75%	47,57%	47,16%	46,75%	46,32%	45,77%	45,24%
1 A 3 e Other - Liquid	0,00%	0,00%	0,00%	0,00%	-100%	0,00%	0,00%	-100%	-100%	-100%

1 A 4 b Residential - Liquid	3,77%	2,84%	3,17%	2,91%	2,93%	2,82%	2,37%	2,40%	2,42%	11,1%*
1 A 4 c Agriculture / Forestry / Fishing - Liquid	41,27%	40,11%	45,80%	118,7%	36,85%	51,31%	87,06%	34,31%	31,35%	28,30%
International Bunkers - Aviation - Jet Kerosene	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	-11,3%	-17,0%

* There is a larger shift for 1999 than for the other years because for calculation of emissions for the last submission preliminary data was used.

To improve comparability and in order to follow more closely the IPCC guidelines, emissions from fuel combustion in the petroleum refinery are now allocated under category *1 A 1 b* instead of category *1 B 2*. The share of refinery fuels, which were reported in the previous submission under category *1 A 2*, are now reported under category *1 A 1 b*. This leads to more accurate implied emission factors (IEF) for liquid fuels in category *1 A 1 Energy Industries.*

Fugitive CH_4 emissions from refinery, which were not estimated in the previous submission, are reported under category *1 B 2 Fugitive Emissions From Fuels-Oil and natural gas.* Invalid activity data for the year 1998 for memo item *International Bunkers-Aviation* were corrected according to the kerosene sale statistics of the BMWA.

Methodology

In general emissions from a source are calculated by multiplying the fuel amount burned in this source with a technology-dependent emission factor. Thus the process of estimating emissions is to find out the burning characteristics of a fuel when it is burned with a certain equipment.

The National Energy Balance

The actual time series of the energy balance is not yet consistent in some manner. From 1996 onwards data from STATISTIK AUSTIRA was used. For the years 1990 to 1995 the energy balance from WIFO was used (it is also based on data from STATISTIK AUSTRIA), because the energy balance from STATISTIK AUSTRIA was not available in time to be taken into account for the NIR.

In 1999 STATISTIK AUSTRIA implemented a new system to report the energy balance on time, there were some changes in the methodology in comparison to the WIFO energy balance, i.e. fuel categories, sectoral data split, international bunker fuels, reporting units and other items. In March 2002 STATISTIK AUSTRIA and WIFO have completed a consistent time series from 1990 onwards which will be taken into account for recalculations of the submission 2003. The new time series is consistent to the IEA-questionnaire format and has been submitted to the IEA in March 2002.

Fuels and Fuel Categories

The units used in the national fuel statistics are: *ton* for solid or liquid fuels and *cubic meter* for gaseous fuels. To convert these units into the caloric unit *Joule* the calorific value of each fuel category has to be quantified. These calorific values are specified in the unit *Joule per Mass or Volume Unit,* e.g. MJ/kg, MJ/m³ gas.

Each fuel has chemical and physical characteristics which influence its burning performance e.g. calorific value or carbon and sulphur content. Fuel categories are formed to pool fuels of the same characteristics in fuel groups, limitations are given by the fuel categories of the energy balance. A list of the fuel categories and their correspondence to IPCC-fuel categories is shown in Table 24.

Table 24: Fuel categories used for the inventory and correspondence to IPCC fuel categories

Inventory Fuel Category		STATISTIK AUSTRIA Fuel Category		IPCC Fuel Category (2)
Code (1)	Category	Category	Net Calorific Value*	
101 A	Hard Coal	Steinkohle	28,54	Solid (coal)
105 A	Brown Coal	Braunkohle	9,82	Solid (coal)
106 A	Brown Coal Briquettes	Braunkohlebriketts	19,30	Solid (coal)
107 A	Coke	Koks	28,20	Solid (coal)
111 A	Fuel Wood	Brennholz	14,35	Biomass
111 B	Biomass: Wood Wastes, Biogas, Sewage Sludge Gas, Gas from Waste Disposal Sites, Agricultural Wastes (Straw, Corncobs,..), Bio Alcohol, Sludge from Paper Production.	Biogene Brenn- und Treibstoffe	9,01	Biomass
113 A	Peat	Torf	8,80	Solid
114 A	Fuel Waste	Brennbare Abfälle	8,70	Other
114 B	Municipal Waste	Brennbare Abfälle	8,70	Other
114 C	Hazardous Waste	Brennbare Abfälle	8,70	Other
118 A	Sewage Sludge	Brennbare Abfälle	8,70	Other
203 B	Light Fuel Oil Sulphur Content < 0,2 %	Heizöl	40,80	Liquid (residual oil)
203 C	Medium Fuel Oil Sulphur Content < 0,4%	Heizöl	40,80	Liquid (residual oil)
203 D	Heavy Fuel Oil Sulphur Content < 1%	Heizöl	40,80	Liquid (residual oil)
204 A	Gas oil	Gasöl	42,80	Liquid (gas/diesel oil)
205 0	Diesel	Dieselöl, Gasöl	42,80	Liquid (gas/diesel oil)
206 B	Kerosene	Leucht- und Fugpetroleum	43,30	Liquid (gas/diesel oil)
208 0	Motor Gasoline, Aviation Gasoline	Benzin, Flugbenzin	42,60	Liquid (gasoline, aviation gasoline)
224 A	Other Petroleum Products	Sonstige Produkte der Erdölverarbeitung	41,30	Liquid
225 B	Turbine distillate	Heizöl	8,70	Liquid
301 A	Natural Gas	Naturgas / Erdgas	35,85	Gaseous (natural gas)
303 A	Liquified Petroleum Gas (LPG)	Flüssiggas	46,00	Liquid
304 A	Coke Oven Gas	Kokereigas	17,90	Solid
305 A	Blast Furnace Gas	Gichtgas	3,10	Solid
308 A	Refinery Gas	Raffinerierestgas	49,00	Liquid
310 A	Gas from Waste Disposal Site	Biogene Brenn- und Treibstoffe	36,00	Biomass
311 A	Gas Works Gas	Stadtgas	No more used	Solid

*Units: [MJ / kg] or [MJ / m^3 Gas] respectively, for the Year 2000
(1) First three digits are based on CORINAIR / NAPFUE 94–Code
(2) Fuel subcategories are shown in parenthesis

Structure of the national energy balance

The sectoral disaggregation from the national energy balance systems of WIFO, STATISTIC AUSTRIA and the IEA system are not consistent. The following tables show the structure of the different energy balance systems and its correspondence to the IPCC categories.

Table 25: WIFO energy balance and correspondence to IPCC categories (1990-1995).

Sector of WIFO Energy Balance	Comments on WIFO-Sector	IPCC-Category
Production	Primary fuels: Production Secondary fuels: Transformation output	Reference Approach: Production
Import		Reference Approach: Import
Stock Change	Includes statistical differences.	Reference Approach: Stock Change
Export	Jet Kerosene: 50% of Gross Inland Consumption.	Reference Approach: Export
Gross Inland Consumption		
Transformation Sector		
Public Power		1 A 1 a Public Electricity and Heat Production
Electricity-Auto Producers		1 A 2 f Manufacturing Industry and Construction – Other
Heat Production		1 A 1 a Public Electricity and Heat Production
Gas-generation	Transformation Input for gas generation: coke oven coke->blast furnace gas, LPG->gas works gas).	
Coke oven coke prod.	Coking coal input into coke oven including transf. Input for coke oven gas.	
Refinery	Transformation inputs for internal refining processes.	
Energy Sector	**Includes energy consumption for heating purposes.**	**1 A 1 a Public Electricity and Heat Production** **Refinery gas, residual oil: 1 A 1 b Petroleum Refining.**
Pipeline / Distribution losses		
Non Energy Use		Reference Approach: Carbon Stored
Final Consumption		
Industry		**1 A 2 Manuf. Ind. and Constr.- Other** **1 A 1 c Manufacture of Solid fuels and Other Energy Industries**
Mining		
Cement, Tiles, Ceramic, Lime		
Food and Beverages		
Textiles		
Clothing		
Leather		

Sector of WIFO Energy Balance	Comments on WIFO-Sector	IPCC-Category
Wood		
Paper		
Chemical		
Glas		
Iron Production		
Iron and metal -ware		
Machinery		
Electronic		
Small consumers	Disaggregation to the subcategories of *1 A 4* is performed by means of statistics from STATISTIC AUSTRIA.	1 A 4 a Commercial / Institutional 1 A 4 b Residential 1 A 4 c Agriculture / Forestry / Fishing
Transport		**1 A 3 d Navigation**
Railways	Includes energy consumption for heating purposes.	1 A 4 a Commercial / Institutional 1 A 3 c Railways
Aviation	Jet Kerosene: 50% of Gross Inland Consumption.	1 A 3 a Civil Aviation
Road	Gasoline, diesel oil: 100 % of final consumption.	1 A 3 b Road Transportation 1 A 2 f Manuf. Ind. and Constr.- Other - Mobile 1 A 4 b Residential – Mobile 1 A 4 c Agriculture / Forestry / Fisheries - Mobile

Table 26: STATISTIC AUSTRIA energy balance and correspondence to IPCC categories (1996-1998).

Sector of STATISTIC-AUSTRA Energy Balance	Comments	IPCC-Category
Production		Reference Approach: Production
Import		Reference Approach: Import
Stock Change		Reference Approach: Stock Change
Export		Reference Approach: Export
Gross Inland Consumption		
Transformation Input		
ÖNACE 01, 02, 04 - 11, 13 - 44	Excluding sector 11 coking coal which is the input for coke oven. Excluding sector 16 coke oven coke which is the transformation input for blast furnace gas.	1 A 2 f Manuf. Ind. and Constr.- Other
ÖNACE 03		1 A 1 c Manufacture of Solid fuels and Other Energy Industries
ÖNACE 12	Only refinery gas. Other fuels are used for transformation into other products.	1 A 1 b Petroleum refining.

Sector of STATISTIC-AUSTRA Energy Balance	Comments	IPCC-Category
Transformation Output		
Energy Sector		Refinery gas, residual oil: 1 A 1 b Petroleum refining. Other fuel: 1 A 1 a Public Electricity and Heat Production.
Non Energy Use		Reference Approach: Carbon Stored
Final Consumption		
ÖNACE 02 - 28		1 A 2 f Manuf. Ind. and Constr.- Other
ÖNACE 01, 29-44	Disaggregation to subcategories of 1 A 4 equal with years 1990-1995.	1 A 4 a Commercial / Institutional 1 A 4 b Residential 1 A 4 c Agriculture / Forestry / Fishing
Gasoline, diesel oil, coking coal for railways.	Study about mobile sources divides total fuel consumption into categories. Category *1 A 2 f* includes commercial/ institutional off-road mobile sources.	1 A 2 f Manuf. Ind. and Constr.- Other - Mobile 1 A 3 Transport 1 A 4 b Residential - Mobile 1 A 4 c Agriculture / Forestry / Fishing - Mobile
Kerosene, flight gasoline	Some petrol which is used for lightening purpose and included in fueltype "Kerosene" is reported under 1 A 4 a.	1 A 4 a Commercial / Institutional 1 A 3 a Civil Aviation (Domestic) Memo items: International bunkers

Table 27: ÖNACE sectors of STATISTIC Austria's energy balance.

STATISTIC AUSTRIA ÖNACE-sectors for: transformation input, transformation output, final consumption.
01 Land- und Forstwirtschaft, Fischerei und Fischzucht
02 Kohlenbergbau, Torfgewinnung; Bergbau auf Uran- und Thoriumerze
03 Erdöl- und Erdgasbergbau
04 Erzbergbau, Gewinnung von Steinen und Erden, sonstiger Bergbau
05 Herstellung von Nahrungs- und Genußmitteln und Getränken; Tabakverarbeitung
06 Herstellung von Textilien, Textilwaren und Bekleidung
07 Ledererzeugung und -verarbeitung, Herstellung von Schuhen
08 Be- und Verarbeitung von Holz (ohne Herstellung von Möbeln)
09 Herstellung und Verarbeitung von Papier und Pappe
10 Verlagswesen, Druckerei, Vervielfältigung von bespielten Ton-, Bild- und Datenträgern
11 Kokerei; Herstellung und Verarbeitung von Spalt- und Brutstoffen
12 Mineralölverarbeitung
13 Herstellung von Chemikalien und chemischen Erzeugnissen
14 Herstellung von Gummi und Kunststoffwaren
15 Herstellung und Bearbeitung von Glas, Herstellung von Waren aus Steinen und Erden

STATISTIC AUSTRIA ÖNACE-sectors for: transformation input, transformation output, final consumption.
16 Erzeugung von Roheisen, Stahl, Ferrolegierungen und Rohren, sonstige erste Bearbeitung von Eisen und Stahl
17 Erzeugung und erste Bearbeitung von NE-Metallen
18 Gießereiindustrie
19 Herstellung von Metallerzeugnissen
20 Maschinenbau
21 Herstellung von Büromaschinen, Datenverarbeitungsgeräten und -einrichtungen; Elektrotechnik, Feinmechanik und Optik
22 Fahrzeugbau
23 Herstellung von Möbeln, Schmuck, Musikinstrumenten, Sportgeräten, Spielwaren und sonstigen Erzeugnissen, Rückgewinnung
24 Elektrizitätsversorgung
25 Gasversorgung
26 Fernwärmeversorgung
27 Wasserversorgung
28 Bauwesen
29 Handel; Instandhaltung und Reparatur von Kraftfahrzeugen und Gebrauchsgütern
30 Beherbergungs- und Gaststättenwesen
31 Eisenbahnen
32 Sonstiger Landverkehr
33 Transport in Rohrfernleitungen
34 Schiffahrt
35 Flugverkehr
36 Hilfs- und Nebentätigkeiten für den Verkehr; Reisebüros; Nachrichtenübermittlung
37 Kredit- und Versicherungswesen
38 Realitätenwesen, Vermietung beweglicher Sachen, Erbringung von unternehmensbezogenen Dienstleistungen
39 Öffentliche Verwaltung. Landesverteidigung, Sozialversicherung
40 Unterrichtswesen
41 Gesundheits-, Veterinär- und Sozialwesen
42 Erbringung von sonstigen öffentlichen und persönlichen Dienstleistungen
43 Private Haushalte
44 Exterritoriale Organisationen und Körperschaften

Table 28: IEA-Questionnaires and their correspondence to IPCC categories (1999-2000).

IEA-Questionnaires	Comments	IPCC-Category
Production		Reference Approach: Production
Imports		Reference Approach: Import
Exports		Reference Approach: Export
Bunkers	No data	

IEA-Questionnaires	Comments	IPCC-Category
Stock Changes		Reference Approach: Stock Change
Refinery Fuel		1 A 1 b Petroleum Refining
Transformation Sector, of which:		
Coke Ovens		
Blast furnaces		
Public Electricity plants		1 A 1 a Public Electricity and Heat Production
Public CHP plants		1 A 1 a Public Electricity and Heat Production
Public Heat plants		1 A 1 a Public Electricity and Heat Production
Auto Producer Electricity plants		1 A 2 f Manuf. Ind. and Constr.-Other
Auto Producer CHP plants		1 A 2 f Manuf. Ind. and Constr.-Other
Auto Producer Heat plants		1 A 2 f Manuf. Ind. and Constr.-Other
Total Energy Sector		1 A 1 a Public Electricity and Heat Production
Distribution Losses	Includes statistical differences and therefore it may be smaller than zero.	
Final Energy Consumption		
Other sectors Transport Sector	Subsectoral division into stationary sources of category *1A4* is not according to the energy balance but consistent with the time series of previous years. Estimation of mobile sources is performed by means of a study.	1 A 3 Transport 1 A 4 a Commercial / Institutional 1 A 4 b Residential 1 A 4 c Agriculture / Forestry / Fishing
Industry Sector		1 A 2 f Manuf. Ind. and Constr.-Other

Activity data of the national energy balance

The energy balance is compiled by collecting statistical data from different sources, e.g. reports of industrial plants, consumer surveys, import/export-statistics or fuel sale. If actual data is not available in time the sectoral disaggregation of the gross inland consumption is performed by applying calculation models.

Table 29: Energy balance[8] by fuels for the years 1990–2000.

SOLID FUELS											
101A Hard Coal [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	10	11	21	18	20	19	0	0	0	0	0
Import	101.030	106.068	106.735	89.270	84.408	83.814	105.923	106.120	104.862	99.264	100.095
Stock Change	18.416	10.875	-6.245	-4.772	4.313	15.749	1.663	8.146	-393	1.535	4.594
Export	3	2	250	4	3	23	66	117	5	0	0
Gross Inland Consumption	119.453	116.952	100.260	84.512	88.738	99.559	107.520	114.149	104.464	100.703	104.489
Transformation Sector	108.216	104.446	88.483	76.529	79.770	87.209	93.088	99.335	90.480	90.736	91.455
Public Power	37.419	40.802	27.475	19.461	20.974	28.443	33.300	39.193	28.422	24.008	37.070
Electricity-Auto Producers	149	400	405	439	454	493	1.184	1.046	1.248	1.060	1.202
Heat Production	2.211	2.502	1.488	997	1.574	1.374	0	0	0	0	0
Energy Sector	0	0	0	0	0	0	0	0	0	193	893
Non Energy Use	48	49	57	57	32	40	31	37	33	28	29
Final Consumption	11.189	12.457	11.719	7.926	8.937	12.310	14.402	14.778	13.952	9.724	11.032
Industry & Transport	7.177	7.511	8.275	7.702	6.365	6.878	7.633	9.162	8.528	6.910	8.523
Small Consumers	4.012	4.945	3.445	225	2.572	5.432	6.769	5.616	5.424	2.814	2.509
105A Brown Coal [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	26.680	22.680	19.302	18.434	14.919	14.142	10.974	11.195	11.292	11.143	12.240
Import	257	249	93	14	206	313	3.659	2.784	2.078	129	347
Stock Change	251	6.940	-3.601	18.448	-1.915	4.656	4.653	1.616	-2.842	4.107	69
Export	38	28	33	7	0	1	11	1	2	10	10
Gross Inland Consumption	27.150	29.841	15.762	14.765	13.209	19.111	19.275	15.594	10.525	15.368	12.646
Transformation Sector	23.117	25.127	12.575	11.635	10.722	16.614	14.542	11.928	7.547	13.740	11.928
Public Power	21.916	24.025	11.251	10.210	9.447	15.385	13.727	11.715	7.325	13.527	11.734
Electricity-Auto Producers	752	690	1.065	1.207	1.165	1.138	815	213	222	213	194
Heat Production	449	411	259	219	110	91	0	0	0	0	0
Energy Sector	46	35	14	5	9	3	2	6	4	147	20
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	3.987	4.679	3.173	3.125	2.479	2.494	4.731	3.661	2.974	1.461	713
Industry & Transport	2.194	2.491	1.770	1.838	1.671	1.620	1.190	900	855	906	283
Small Consumers	1.793	2.188	1.403	1.287	808	874	3.541	2.761	2.120	555	429
106A Brown Coal Briquettes [TJ] 1996-1998: Included in 105A Brown Coal	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	0	0	0	0	0	0	-	-	-	0	0
Import	5.921	6.097	4.871	4.577	3.486	3.333	-	-	-	2.046	1.834

[8] Datasource: 1990–1995 WIFO, 1996–2000 STATISTIK AUSTRIA

Stock Change	-8	52	3	0	-5	12	-	-	-	0	0
Export	0	2	1	2	2	21	-	-	-	0	0
Gross Inland Consump-tion	5.912	6.146	4.872	4.575	3.479	3.324	-	-	-	2.046	1.834
Transformation Sector	227	626	255	229	191	0	-	-	-	0	0
Public Power	131	258	109	97	94	0	-	-	-	0	0
Electricity-Auto Produc-ers	0	0	0	0	0	0	-	-	-	0	0
Heat Production	95	368	146	132	97	0	-	-	-	0	0
Energy Sector	0	0	0	0	0	0	-	-	-	0	0
Non Energy Use	0	0	0	0	0	0	-	-	-	0	0
Final Consumption	5.685	5.520	4.617	4.346	3.288	3.324	-	-	-	2.046	1.834
Industry & Transport	1.235	591	490	392	449	252	-	-	-	0	0
Small Consumers	4.450	4.929	4.127	3.955	2.839	3.072	-	-	-	2.046	1.834
107A Coke [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	48.640	43.415	41.926	39.946	40.826	40.830	43.950	44.172	45.066	47.114	40.581
Import	22.977	25.196	19.324	16.520	17.289	20.237	19.647	24.567	19.178	17.258	26.341
Stock Change	-3.849	2.883	-1.374	1.698	3.763	-4.543	-216	-1.285	-1.237	-2.784	4.571
Export	27	62	64	11	12	18	7	1	10	0	29
Gross Inland Consump-tion	67.741	71.432	59.811	58.153	61.865	56.506	63.375	67.453	62.997	61.589	71.463
Transformation Sector	16.805	17.173	14.828	14.836	16.221	18.246	16.952	19.253	18.605	18.693	21.946
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Produc-ers	0	0	0	0	0	0	0	0	0	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	0	0	0	0	0	0	0	0	0	3.487	4.102
Non Energy Use	667	621	676	683	590	626	313	387	480	28.978	33.988
Final Consumption	50.269	53.638	44.308	42.634	45.054	37.635	46.109	47.813	43.912	10.431	11.427
Industry & Transport	34.174	34.066	29.511	27.538	29.686	29.583	36.735	39.456	38.120	2.901	4.366
Small Consumers	16.095	19.572	14.796	15.096	15.368	8.052	9.374	8.357	5.792	7.530	7.061
113A Peat [TJ] 1996-2000: included in 105A Brown Coal	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	8	8	8	8	8	8	-	-	-	-	-
Import	0	0	0	0	0	0	-	-	-	-	-
Stock Change	0	0	0	0	0	0	-	-	-	-	-
Export	0	0	0	0	0	0	-	-	-	-	-
Gross Inland Consump-tion	8	8	8	8	8	8	-	-	-	-	-
Transformation Sector	0	0	0	0	0	0	-	-	-	-	-
Public Power	0	0	0	0	0	0	-	-	-	-	-
Electricity-Auto Produc-ers	0	0	0	0	0	0	-	-	-	-	-
Heat Production	0	0	0	0	0	0	-	-	-	-	-

Energy Sector	0	0	0	0	0	0	-	-	-	-	-
Non Energy Use	0	0	0	0	0	0	-	-	-	-	-
Final Consumption	8	8	8	8	8	8	-	-	-	-	-
Industry & Transport	0	0	0	0	0	0	-	-	-	-	-
Small Consumers	8	8	8	8	8	8	-	-	-	-	-
304A Coke Oven Gas [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	13.117	12.276	11.164	10.636	10.790	10.906	11.419	11.605	12.166	12.220	10.466
Import	0	0	0	0	0	0	0	0	0	0	0
Stock Change	0	0	0	0	0	0	0	0	0	0	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	13.117	12.276	11.164	10.636	10.790	10.906	11.419	11.605	12.166	12.220	10.466
Transformation Sector	3.385	2.763	2.885	3.335	3.490	6.228	3.416	3.180	3.069	3.885	3.627
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	3.006	2.389	2.524	2.946	3.490	6.228	3.416	3.180	3.069	3.885	3.627
Heat Production	379	374	361	389	0	0	0	0	0	0	0
Energy Sector	3.556	3.116	2.808	2.423	2.274	1.987	3.058	2.781	3.279	2.951	2.951
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	6.111	6.325	5.416	4.826	5.026	2.691	4.946	5.644	5.818	5.384	3.888
Industry & Transport	6.111	6.325	5.416	4.826	5.026	2.691	4.946	5.644	5.818	5.384	3.888
Small Consumers	0	0	0	0	0	0	0	0	0	0	0
305A Blast Furnace Gas [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	16.175	16.530	14.273	14.281	15.614	17.564	16.311	18.528	17.909	17.988	21.128
Import	0	0	0	0	0	0	0	0	0	0	0
Stock Change	0	0	0	0	0	0	0	0	0	0	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	16.175	16.530	14.273	14.281	15.614	17.564	16.311	18.528	17.909	17.988	21.128
Transformation Sector	4.822	4.352	5.404	5.462	5.477	5.766	6.109	7.186	8.347	6.744	5.904
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	4.582	4.115	5.176	5.215	4.862	5.205	6.109	7.186	8.347	6.744	5.904
Heat Production	240	237	229	247	616	561	0	0	0	0	0
Energy Sector	1.972	2.015	1.740	1.741	1.914	2.175	633	720	696	699	821
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	9.370	10.152	7.119	7.069	8.223	9.622	9.568	10.622	8.867	10.545	14.403
Industry & Transport	9.370	10.152	7.119	7.069	8.223	9.622	9.568	10.622	8.867	10.545	14.403
Small Consumers	0	0	0	0	0	0	0	0	0	0	0
311A Gas Works Gas [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	912	564	2	34	24	9	0	0	0	0	0
Import	0	0	0	0	0	0	0	0	0	0	0

Stock Change	0	0	0	0	0	0	0	0	0	0	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	912	564	2	34	24	9	0	0	0	0	0
Transformation Sector	0	0	0	0	0	0	0	0	0	0	0
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	0	0	0	0	0	0	0	0	0	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	0	0	0	0	0	0	0	0	0	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	896	552	2	34	24	9	0	0	0	0	0
Industry & Transport	23	19	0	0	0	0	0	0	0	0	0
Small Consumers	873	533	2	34	24	9	0	0	0	0	0
LIQUID FUELS											
203X Fuel Oil [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	78.437	81.430	74.854	69.320	60.785	61.260	58.117	62.022	54.248	53.272	40.810
Import	26.649	22.719	21.453	22.384	18.827	21.796	15.569	20.343	27.034	19.061	10.671
Stock Change	-11.205	-7.305	-7.735	3.044	4.492	-4.736	2.161	4.500	-1.525	-5.254	9.082
Export	214	2.417	2.670	4.546	3.167	1.550	2.524	2.154	741	1.507	6.191
Gross Inland Consumption	93.667	94.427	85.902	90.202	80.937	76.771	73.324	84.712	79.016	60.563	49.933
Transformation Sector	26.899	33.413	31.067	34.800	31.461	26.907	29.241	39.055	37.865	26.677	14.825
Public Power	11.412	14.019	10.358	11.893	12.059	7.327	10.589	14.903	14.587	22.889	10.711
Electricity-Auto Producers	3.888	5.150	5.538	5.754	5.840	6.710	2.175	1.669	1.587	1.222	1.833
Heat Production	11.598	14.245	13.889	14.610	12.470	12.871	8.555	11.264	13.233	2.566	2.281
Energy Sector	3.304	3.184	3.270	5.033	5.920	5.613	2.245	1.962	2.533	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	63.465	57.829	51.565	50.369	43.556	44.250	41.837	43.695	38.618	33.886	35.108
Industry & Transport	32.306	29.768	27.634	29.339	31.468	29.782	26.364	25.705	32.073	22.563	23.785
Small Consumers	31.160	28.061	23.931	21.030	12.088	14.468	15.472	17.990	6.545	11.322	11.322
204A Gas Oil [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	117.975	136.690	138.230	153.557	68.761	61.921	68.376	68.663	54.785	53.286	45.454
Import	48.027	60.196	50.199	54.328	747	7.034	16.077	15.213	24.688	26.365	22.855
Stock Change	4	695	4.779	-2.727	-2.452	1.676	-712	-2.271	1.748	0	128
Export	154	1.744	3.244	5.662	2.055	0	0	2	10	0	43
Gross Inland Consumption	165.853	195.837	189.964	199.497	65.002	70.631	83.741	81.603	81.210	79.351	68.394
Transformation Sector	23.535	31.032	25.180	28.013	76	82	46	89	115	0	0
Public Power	0	0	0	0	0	0	5	46	51	0	0
Electricity-Auto Producers	0	0	0	0	0	0	0	0	2	0	0
Heat Production	0	0	0	0	76	82	41	43	62	0	0

Energy Sector	0	0	0	0	0	0	19	22	92	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	142.319	164.805	164.784	171.484	64.927	70.549	83.676	81.491	81.004	79.351	68.394
Industry & Transport	89.184	99.154	103.956	104.439	0	0	3.482	4.976	3.612	471	171
Small Consumers	53.134	65.651	60.828	67.045	64.927	70.549	80.194	76.515	77.391	78.880	68.223
2050 Diesel Oil [TJ] 1990-1993: included in 204A Gas Oil	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	-	-	-	-	86.480	81.607	85.746	98.690	111.663	104.004	113.934
Import	-	-	-	-	76.904	58.587	75.862	68.799	81.061	80.336	88.810
Stock Change	-	-	-	-	-749	2.280	-4.123	8.330	-4.623	1.883	-2.525
Export	-	-	-	-	3.748	3.527	4.132	11.560	19.954	19.645	17.762
Gross Inland Consumption	-	-	-	-	158.887	138.947	153.353	164.258	168.147	166.578	182.456
Transformation Sector	-	-	-	-	30.415	18.105	29.336	24.507	16.905	128	1.584
Public Power	-	-	-	-	114	242	78	15	1	86	1.541
Electricity-Auto Producers	-	-	-	-	78	80	80	273	41	43	43
Heat Production	-	-	-	-	0	3	0	2	1	0	0
Energy Sector	-	-	-	-	0	0	42	27	54	0	0
Non Energy Use	-	-	-	-	0	0	0	0	0	0	0
Final Consumption	-	-	-	-	128.472	120.842	123.975	139.725	151.189	166.449	180.873
Industry & Transport	-	-	-	-	128.472	120.842	48.258	54.483	57.028	166.449	180.873
Small Consumers	-	-	-	-	0	0	75.717	85.242	94.161	0	0
206B Kerosene [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	14.077	16.456	18.334	16.434	16.954	18.667	21.024	22.046	23.541	21.785	23.326
Import	3.233	4.249	1.940	2.354	3.987	1.934	3.361	1.560	1.425	1.712	1.840
Stock Change	-624	-436	-1.889	1.518	-366	2.362	-315	489	154	43	-214
Export	7.394	8.298	8.968	8.615	9.328	12.401	20.447	21.495	22.587	257	214
Gross Inland Consumption	9.292	11.972	9.417	11.691	11.247	10.562	3.622	2.600	2.534	23.283	24.738
Transformation Sector	1.714	2.941	0	2.455	1.318	280	1.731	292	7	0	0
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	0	0	0	0	0	0	0	0	0	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	0	0	0	1	0	0	0	0	0	0	0
Non Energy Use	333	767	758	827	920	159	424	482	534	0	0
Final Consumption	7.244	8.263	8.659	8.408	9.009	10.123	1.467	1.826	1.993	23.283	24.738
Industry & Transport	6.872	8.048	8.575	8.352	8.787	10.008	18	37	7	22.598	24.482
Small Consumers	372	216	84	56	222	115	1.449	1.789	1.986	685	257
2080 Gasoline [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	112.324	102.765	105.444	100.195	108.764	97.182	97.836	102.430	94.849	81.558	73.270
Import	23.844	25.767	26.402	27.124	30.830	32.842	29.540	26.337	33.237	32.385	28.475

Stock Change	-2.270	5.818	-3.300	6.119	-3.126	3.250	-523	-884	-1.842	-1.403	-1.955
Export	12.009	5.523	9.275	13.317	27.312	25.425	29.833	35.385	35.044	25.543	15.640
Gross Inland Consumption	121.890	128.828	119.271	120.121	109.156	107.848	97.020	92.497	91.200	86.998	84.150
Transformation Sector	12.280	8.749	4.336	9.783	2.643	5.009	2.494	2.939	163	0	0
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	0	0	0	0	0	0	0	0	0	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	0	0	0	0	0	0	6	1	4	0	0
Non Energy Use	766	711	438	438	428	424	374	353	371	0	0
Final Consumption	108.845	119.367	114.498	109.900	106.084	102.415	94.146	89.204	90.662	86.998	84.150
Industry & Transport	108.845	119.367	114.498	109.900	106.084	102.415	19.065	21.236	23.697	86.998	84.150
Small Consumers	0	0	0	0	0	0	75.081	67.968	66.965	0	0
224A Other Petroleum Products [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	15.143	19.986	29.430	30.234	32.476	27.256	29.299	32.594	31.018	59.398	56.890
Import	28.454	21.988	14.061	14.210	12.143	4.310	16.312	16.167	19.209	16.678	21.193
Stock Change	-2.737	-2.469	3.801	-2.305	-1.102	162	86	-62	276	0	-1.547
Export	1.525	2.139	2.779	2.649	2.502	1.697	4.771	2.409	4.680	7.649	10.116
Gross Inland Consumption	39.335	37.365	44.513	39.490	41.014	30.031	40.927	46.290	45.822	56.806	56.096
Transformation Sector	3.308	3.458	5.639	2.343	1.317	1.666	3.195	3.543	4.391	0	0
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	0	0	0	0	0	0	0	0	0	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	0	0	0	0	0	0	12.864	13.485	13.654	460	460
Non Energy Use	35.772	33.677	38.702	36.964	39.432	28.002	24.850	29.241	27.759	56.388	55.803
Final Consumption	255	230	172	182	265	363	18	21	18	56.305	55.552
Industry & Transport	255	230	172	182	265	363	18	21	18	56.305	55.552
Small Consumers	0	0	0	0	0	0	0	0	0	0	0
303A LPG [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	25.030	27.251	26.082	23.133	25.967	28.806	28.881	30.568	30.464	873	1.562
Import	7.958	9.871	9.185	9.892	9.721	6.880	8.515	8.349	7.449	6.984	7.305
Stock Change	94	820	56	-280	245	-500	-158	-222	82	-46	-276
Export	635	2.037	1.850	1.589	2.207	1.949	1.949	2.561	3.085	919	781
Gross Inland Consumption	32.447	35.905	33.473	31.156	33.726	33.237	35.289	36.135	34.910	6.800	6.892
Transformation Sector	1.210	857	85	142	562	161	116	81	58	0	0
Public Power	0	0	0	0	0	0	107	74	55	0	0
Electricity-Auto Producers	0	0	0	0	0	0	8	6	0	0	0
Heat Production	287	283	77	108	91	152	2	1	2	0	0
Energy Sector	360	379	38	81	12	901	262	11	68	0	0

Non Energy Use	25.149	27.583	26.031	23.315	24.781	26.045	27.973	28.505	28.214	0	0
Final Consumption	5.728	7.086	7.319	7.618	8.372	6.135	6.937	7.537	6.571	6.800	6.892
Industry & Transport	2.548	2.505	2.371	2.707	2.909	3.920	4.058	4.215	3.924	3.078	3.078
Small Consumers	3.180	4.581	4.948	4.911	5.463	2.215	2.879	3.322	2.646	3.722	3.813
308A Refinery Gas [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	18.276	16.000	16.596	15.645	16.708	14.938	17.570	17.181	17.045	16.709	15.288
Import	0	0	0	0	0	0	0	0	0	0	0
Stock Change	0	0	0	0	0	0	0	0	0	-49	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	18.276	16.000	16.596	15.645	16.708	14.938	17.570	17.181	17.045	16.660	15.288
Transformation Sector	1.637	1.431	2.024	1.531	1.727	1.643	1.993	2.249	2.126	0	0
Public Power	0	0	0	0	0	0	0	0	0	0	0
Electricity-Auto Producers	1.637	1.431	2.024	1.531	1.725	1.643	1.993	2.249	2.126	0	0
Heat Production	0	0	0	0	0	0	0	0	0	0	0
Energy Sector	16.639	14.569	14.572	14.114	14.981	13.295	15.578	14.932	14.919	16.562	15.190
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	0	0	0	0	0	0	0	0	0	98	98
Industry & Transport	0	0	0	0	0	0	0	0	0	98	98
Small Consumers	0	0	0	0	0	0	0	0	0	0	0
GASEOUS FUELS											
301A Natural Gas [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	46.376	47.729	51.722	53.559	48.776	53.336	53.701	51.404	56.440	62.525	64.826
Import	187.917	184.138	183.846	193.697	179.430	229.114	236.579	216.911	224.009	219.483	222.784
Stock Change	-15.054	-73	-7.946	-7.212	18.891	-12.290	-3.340	8.236	4.168	6.867	-8.309
Export	0	0	12	0	189	576	0	0	698	0	0
Gross Inland Consumption	219.239	231.794	227.610	240.044	246.908	269.583	286.941	276.551	283.920	288.876	279.301
Transformation Sector	74.710	76.754	74.009	79.220	91.219	95.667	104.177	97.615	100.500	102.249	77.269
Public Power	51.447	49.546	44.128	45.608	46.150	49.204	66.464	57.511	60.482	67.662	50.546
Electricity-Auto Producers	13.025	15.671	17.662	20.736	28.662	28.026	24.968	25.912	26.657	27.180	21.475
Heat Production	10.238	11.537	12.219	12.876	16.407	18.437	11.280	12.859	13.151	7.407	5.248
Energy Sector	13.411	13.990	13.415	12.967	14.952	18.645	17.069	16.726	19.340	8.299	9.957
Non Energy Use	14.913	15.965	10.735	11.238	10.036	10.518	10.781	10.669	10.554	10.644	10.504
Final Consumption	113.479	121.733	126.553	133.933	130.701	144.754	154.915	151.542	153.527	165.192	181.778
Industry & Transport	61.847	60.545	58.399	57.615	55.835	61.065	80.935	85.464	88.409	88.726	100.860
Small Consumers	51.632	61.188	68.154	76.318	74.866	83.689	73.980	66.077	65.118	76.465	80.918
OTHER FUELS											
114X Fuel Waste [TJ] 1990-1993: Includes paper/waste sludge	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000

Production	23.910	24.817	26.046	25.991	7.182	7.588	11.243	11.828	10.426	13.221	12.620
Import	0	0	0	0	0	0	0	0	0	0	0
Stock Change	0	0	0	0	0	0	0	0	0	0	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	23.910	24.817	26.046	25.991	7.182	7.588	11.243	11.828	10.426	13.221	12.620
Transformation Sector	8.767	9.127	11.035	11.565	4.647	4.945	7.521	8.064	7.044	8.377	7.803
Public Power	0	0	0	0	0	0	0	0	0	2.340	2.827
Electricity-Auto Producers	5.929	5.856	7.394	7.551	767	922	3.068	3.390	2.555	3.082	1.576
Heat Production	2.838	3.271	3.641	4.014	3.881	4.024	4.453	4.674	4.489	2.955	3.400
Energy Sector	0	0	0	0	0	0	0	0	0	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	15.143	15.690	15.011	14.426	2.536	2.643	3.722	3.764	3.381	4.330	4.016
Industry & Transport	14.763	14.826	14.901	14.403	2.249	2.020	3.148	3.177	2.813	4.330	4.016
Small Consumers	380	864	110	23	286	622	574	586	568	0	0
BIOMASS											
111A Fuel Wood [TJ] 1999-2000: Includes wood waste	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	89.497	78.948	77.390	80.780	77.707	87.442	84.840	79.629	77.469	125.443	117.928
Import	2.472	3.059	2.615	2.657	2.219	1.753	2.423	2.141	1.733	4.127	4.622
Stock Change	-589	763	413	150	-238	250	243	-54	0	0	0
Export	30	86	61	20	50	239	107	119	142	6.171	6.689
Gross Inland Consumption	91.350	82.684	80.357	83.567	79.639	89.206	87.399	81.598	79.060	123.399	115.861
Transformation Sector	0	0	0	0	0	0	0	0	210	20.911	17.726
Public Power	0	0	0	0	0	0	0	0	210	98	96
Electricity-Auto Producers	0	0	0	0	0	0	0	0	0	13.927	10.047
Heat Production	0	0	0	0	0	0	0	0	0	6.886	7.583
Energy Sector	0	0	0	0	0	0	0	0	0	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	91.350	82.684	80.357	83.567	79.639	89.206	87.399	81.598	78.850	102.489	98.135
Industry & Transport	247	232	226	190	177	1.322	697	848	307	24.449	26.585
Small Consumers	91.103	82.452	80.131	83.377	79.462	87.884	86.702	80.750	78.543	78.040	71.550
111B Biomass [TJ]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Production	19.191	20.844	21.653	20.717	43.605	46.213	45.573	46.870	45.062	718	794
Import	0	0	0	0	0	0	0	0	0	0	0
Stock Change	0	0	0	0	0	0	0	0	0	0	0
Export	0	0	0	0	0	0	0	0	0	0	0
Gross Inland Consumption	19.191	20.844	21.653	20.717	43.605	46.213	45.573	46.870	45.062	718	794
Transformation Sector	2.734	3.365	4.041	4.843	18.172	23.599	20.556	22.315	21.792	669	740
Public Power	5	19	29	22	27	33	417	330	229	0	0

Electricity-Auto Producers	1.200	1.662	1.705	1.822	15.333	20.403	14.492	16.277	14.822	669	740
Heat Production	989	1.141	1.428	1.642	2.313	2.696	5.646	5.708	6.741	0	0
Energy Sector	2	7	32	32	23	10	0	0	0	0	0
Non Energy Use	0	0	0	0	0	0	0	0	0	0	0
Final Consumption	16.990	18.010	18.450	17.189	25.903	23.067	26.045	25.582	24.185	49	53
Industry & Transport	5.856	6.774	7.666	6.622	15.380	12.544	22.887	22.038	20.234	49	53
Small Consumers	11.134	11.235	10.783	10.567	10.523	10.523	3.159	3.545	3.951	0	0

Datasource: 1990–1995 WIFO, 1996–2000 STATISTIK AUSTRIA

4.1.1 Source Categories

In accordance with the IPCC Guidelines two different approaches for determination of CO_2 emissions from IPCC Category *1 A Fuel Combustion* are made for verification purposes (see FCCC/CP/1999/7 §23). National estimates of carbon dioxide emissions from *Fuel Combustion* (from the sectoral approach) are compared with those estimates obtained using the IPCC reference approach.

4.1.1.1 1 A Fuel Combustion - Reference Approach

Methodology

The default methodology according to IPCC Worksheet 1-1 was used.

Emission factors

Carbon emission factors

For estimation of emissions that arise from combustion of fossil fuels the default carbon emission factors described in chapter 1.4.1.1 of the IPCC Reference Manual have been used (see also IPCC Workbook 1.6 table 1-2).

For estimation of emissions that arise from combustion of solid biomass the carbon emission factor is a complex factor depending on the share of the yearly consumption of biogenic fuel types.

Table 30: CO_2 and Carbon emission factors of biomass

Biomass Fuel Type	CO_2 emission factor [kg/GJ]	Carbon emission factor [t/TJ]
Fuel Wood	100	27,27
Fuel Waste	90	24,55
Biomass	110	30,00

Fraction of carbon oxidised

The default values of table 1-6 of the IPCC Reference Manual have been used.

Activity data

Production, Imports, Exports, Stock Change

Activity data are taken from the national energy balance. The reference approach requires very detailed fuel categories, but the fuel categories of the national energy balance, which are used as input data, are not that detailed. Some of these categories are aggregations of the detailed fuel categories the reference approach asks for.

Ethane, *Naphtha*, *Bitumen*, *Lubricants*, *Petroleum Coke* and *Refinery Feedstocks* are included in *Other Oil*. *Other Kerosene* is included in *Jet Kerosene. Peat* is included in *Lignite. Liquid Biomass* and *Gas Biomass* are included in *Solid Biomass*.

International Bunkers

There is no occurrence of international navigation. Only air traffic is considered.

For the years 1990-1998 in the national energy balance jet kerosene for international air traffic is considered as export.

Fuel consumption of international bunkers is consistent with memo item international bunkers as described in the relevant chapter for Category *1 A 3*.

Carbon Stored (Feedstocks)

Emissions from carbon stored in products is calculated for each fuel by multiplying its non–energy use with the corresponding default IPCC carbon emission factor.

Annotation: For 1999 and 2000 the difference of CO_2 emissions from solid fuels for the two approaches is significantly smaller than for 1990–1998. This is caused by the fact that in the national energy balance 1999–2000 the coke oven coke used for blast furnaces is considered as non–energy usage, whereas for the years before no differentiation between coke oven coke that was combusted and coke used in blast furnaces was made.

It is assumed that 100% of the carbon of non–energy use of all types of fuels is stored in products, which implies that the fraction of carbon stored is 1,00. The release of stored carbon as emissions is considered in Category *6 Waste*.

4.1.1.2 Differences between Sectoral and Reference Approach: CRF Table 1.A(c)

Energy consumption in the sectoral approach is lower for the following reasons:

- *Non–energy use* of fuels is not considered in the sectoral approach (most important: coke used in steel production) except the share that is considered in fuel waste.
- *Transformation losses* are not considered in the sectoral approach.

Table 31: Comparison of Energy Consumption of the two approaches

Year	Reference Approach				Sectoral Approach				
	Liquid [PJ]	Solid [PJ]	Gaseous [PJ]	Total [PJ]	Liquid [PJ]	Solid [PJ]	Gaseous [PJ]	Other [PJ]	Total [PJ]
1990	443	172	219	834	372	164	202	21	759
1991	477	181	232	890	406	175	212	21	814
1992	466	139	228	833	390	131	214	21	756

Year	Reference Approach				Sectoral Approach				
	Liquid [PJ]	Solid [PJ]	Gaseous [PJ]	Total [PJ]	Liquid [PJ]	Solid [PJ]	Gaseous [PJ]	Other [PJ]	Total [PJ]
1993	467	122	240	829	402	116	226	21	765
1994	479	126	247	852	406	120	237	2	765
1995	457	138	270	864	396	131	259	2	789
1996	468	146	287	902	412	142	274	6	835
1997	490	153	277	920	424	149	264	7	844
1998	500	133	284	917	433	128	273	5	839
1999	505	133	289	926	437	122	275	7	842
2000	491	150	279	920	428	142	269	6	845

Additional reasons for deviation of CO_2 emissions:

- In the sectoral approach some CO_2 emissions from combustion of fossil fuels are reported under categories *2 A 1, 2 C 1* and *6 C.*
- CO_2 emission factors for a specific fuel category may differ for some categories in the sectoral approach.
- *Liquid Fuels:* Energy balance is mass balanced but not carbon balanced. Fuel category *Other Oil* is an aggregation of many fuel types and therefore it is difficult to quantify a reliable carbon emission factor. For the years 1990 to 1998 *International Bunkers of Aviation* in the national energy balance are assumed to be 90% of the jet kerosene sales, whereas in the sectoral approach they are estimated by means of LTO statistics.

Table 32: 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	27.874	16.284	11.463	55.621	27.899	9.554	11.041	204	48.698
1991	30.272	17.301	12.108	59.681	30.636	10.703	11.656	201	53.196
1992	29.283	13.147	12.167	54.597	29.515	6.987	11.736	203	48.441
1993	29.658	11.595	12.836	54.088	30.248	5.821	12.403	201	48.673
1994	30.327	12.046	13.289	55.661	30.363	5.907	12.997	11	49.278
1995	29.496	13.041	14.534	57.071	29.966	6.802	14.219	15	51.003
1996	30.483	13.923	15.493	59.899	30.678	7.139	15.077	55	52.949
1997	31.785	14.577	14.916	61.278	31.525	7.245	14.515	58	53.343
1998	32.615	12.594	15.336	60.545	32.236	5.460	14.989	45	52.731
1999	32.560	9.313	15.609	57.483	32.380	5.677	15.125	61	53.242
2000	31.585	10.624	15.080	57.289	31.699	6.815	14.754	51	53.319

4.1.1.3 1 A Fuel Combustion – Sectoral Approach

4.1.1.3.1 1 A Fuel Combustion – Stationary Sources

Methodology

CORINAIR methodology is applied: the fuel quantity of each subcategory is multiplied with a fuel and technology dependent emission factor for CO_2, CH_4 and N_2O.

Contrary to the standard methodology described in general for category *1 Energy*, emissions due to combustion activities of Category *2 C 1 Iron and Steel Production* are not included in category *1 A Fuel Combustion Activities* where they should be included according to IPCC-guidelines. They are reported together with process-specific emissions under category *2 Industrial Processes.* As energy consumption from this category *is* considered under category *1 A,* the implied emission factors of category *1 A* reported in the CRF are in general lower than IPCC default values.

One reason for reporting combustion-related emissions as mentioned above in Category *2 Industrial Processes* is that this better corresponds to the interests of industry which sees principal difficulties in splitting its emissions into several categories as there are no clear rules how to split emissions resulting from complex processes.

Because two waste incineration plants are with energy recovery and therefore reported the incinerated waste as a fuel in the energy balance, the energy consumption of these plants is considered in IPCC Category *Energy* (in *1 A 5 a Other*). Emissions other than CO_2 emissions from biomass incineration (see explanation provided below) are reported under *6 C Waste Incineration*.

CO_2 emissions from waste incineration were split into emissions due to incineration of biogenic waste (biomass incineration) and incineration of non-biogenic waste. It is assumed that 10% of the carbon content of municipal waste is non-biogenic. CO_2 emissions of this non-biogenic part of the waste are reported in *6 C Waste Incineration*, the rest of CO_2 emissions from waste incineration (90%) are reported in *1 A 5 a Other* as biogenic CO_2 emissions.

Emission factors

Emission factors for combustion plants are expressed as kg/GJ for CO_2 and g/GJ for CH_4 and N_2O. Please note that emission factors are sometimes dependent on the fuel category, e.g. “hard coal” is a group of different hard coal types with different characteristics, biomass includes many different solid, gaseous and liquid fuels (see Table 24).

Emission factors may vary over time for the following reasons:

- The chemical characteristics of a fuel category varies, e.g. sulphur content in residual oil, carbon content of coal.
- The mix of fuels in the fuel category changes over time. If the different fuels of a fuel category have different calorific values and their share in the fuel category changes, the calorific value of the fuel category might change over time. If emission factors are measured in the unit kg/t the transformation to kg/GJ induces a different emission factor.
- The technology of a combustion plant, which burns a specific fuel, changes over time.

References for CO_2 and CH_4 emission factors are national studies [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE IB-614, 2001]. N_2O emission factors are also taken from national studies [STANZEL et al., 1995] and [BMUJF, 1994]. Detailed figures are included in the relevant chapters.

Activity data

If the energy balance is based on mass or volume units the fuel quantities must be converted into energy units [TJ] by multiplying with the corresponding net calorific value (NCV), which is also provided by STATISTIK AUSTRIA, respectively WIFO together with the energy balance.

Only the quantities that are combusted are relevant for CO_2 emissions and therefore considered in the sectoral approach:

Total Combusted Fuel Quantity = Public Power + Electricity Auto Producers +

Heat Production + Energy Sector + Final Consumption

This means that the following share of the gross inland fuel consumption is not considered in the sectoral approach: non–energy use, transformation and distribution losses and transformations of fuels to other fuels like hard coal to coke oven coke or internal refinery processes which have been added to the transformation sector of the energy balance.

The fuel quantities of each subcategory are taken from the energy balance according to Table 25, Table 26 and Table 27.

Planned Improvements

Future steps for improving the quality of the Sectoral Approach are:

- Develop a consistent energy balance time series (This has already been delivered by STATISTIK AUSTRIA in march 2002).
- Split fuels further into different fuel types for better estimation of carbon contents and emission factors.
- Improve sectoral division for categories *1 A 2* and *1 A 4*.
- Determine activities of memo item Multilateral Operations that are currently included in category *1 A 4*.

1 A 1 a Public Electricity and Heat Production

Methodology

CORINAIR simple methodology was applied.

Emission factors

National emission factors for CO_2 and CH_4 are taken from [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE IB-614, 2001]. N_2O-emission factors are taken from a national study [STANZEL et al., 1995].

Table 33: Activity data and emission factors of category 1A1a for the year 2000.

SNAP	Fuel	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
010101	Hard Coal	95,00	0,10	0,50	21.987.005
010102	Hard Coal	95,00	0,10	0,50	5.310.933
010201	Hard Coal	93,00	0,30	5,00	10.664.989
010202	Hard Coal	93,00	0,30	5,00	0
010101	Brown Coal	110,00	0,10	0,50	11.753.600
010102	Brown Coal	110,00	0,10	0,50	0

SNAP	Fuel	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
010202	Brown Coal	108,00	0,20	2,00	38
010103	Brown Coal Briquettes	97,00	7,00	1,40	0
010202	Brown Coal Briquettes	108,00	0,20	2,00	0
010203	Brown Coal Briquettes	97,00	7,00	1,40	0
010203	Fuel Waste	10,00	12,00	1,40	0
010101	Light Fuel Oil	77,00	1,00	1,00	0
010103	Light Fuel Oil	78,00	0,20	0,60	535.574
010201	Light Fuel Oil	77,00	1,00	1,00	195
010202	Light Fuel Oil	77,00	1,00	1,00	16.576
010203	Light Fuel Oil	78,00	0,20	0,60	1.465.731
010101	Medium Fuel Oil	78,00	1,00	1,00	0
010202	Medium Fuel Oil	78,00	1,00	1,00	0
010203	Medium Fuel Oil	78,00	2,00	1,00	0
010101	Heavy Fuel Oil	80,00	0,60	1,80	5.704.649
010102	Heavy Fuel Oil	80,00	0,60	1,80	40.443
010103	Heavy Fuel Oil	78,00	2,00	1,00	685.876
010201	Heavy Fuel Oil	80,00	1,00	1,00	21.869
010202	Heavy Fuel Oil	80,00	1,00	1,00	4.219.918
010203	Heavy Fuel Oil	78,00	2,00	1,00	0
010103	Gas oil	75,00	1,20	1,00	0
010201	Gas oil	75,00	1,20	1,00	0
010203	Gas oil	75,00	1,20	1,00	0
010103	Diesel	78,00	0,20	0,60	1.540.800
010203	Diesel	78,00	0,20	0,60	0
010103	Kerosene	78,00	0,20	0,60	0
010103	Other Petroleum Products	78,00	2,00	1,00	0
010102	Turbine distillate	80,00	0,60	1,80	8.944
010101	Natural Gas	55,00	0,18	0,50	2.635.216
010102	Natural Gas	55,00	0,18	0,50	1.628.353
010103	Natural Gas	55,00	1,50	0,10	56.240.067
010201	Natural Gas	55,00	1,50	1,00	855.098
010202	Natural Gas	55,00	1,50	1,00	4.932.298
010203	Natural Gas	55,00	1,50	0,10	0
010103	Liquefied Petroleum Gas	64,00	1,50	0,10	918.895
010203	Liquefied Petroleum Gas	64,00	1,50	0,10	0
010202	Gas from Waste Disposal Site (1)	112,00	1,50	1,00	0

SNAP	Fuel	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
010101	Fuel Wood (1)	100,00	21,00	3,00	73.443
010102	Fuel Wood (1)	100,00	21,00	3,00	22.557
010103	Biomass (1)	110,00	2,00	4,00	0
010202	Biomass (1)	110,00	5,00	5,00	0
010203	Biomass (1)	110,00	2,00	4,00	7.583.000

(1) CO_2 emissions from biomass are not considered in the national total.

Activity data

Fuel consumption is taken from the energy balance as described in Table 25, Table 26, Table 27 and Table 29.

In a first step large point sources are considered. UBAVIE is operating a database to store plant specific data, called “*Dampfkesseldatenbank”* (DKDB) which includes fuel consumption, CO, NO_X, SO_X and dust emissions from boilers with a thermal capacity greater than 3 MW for the years 1990 onwards. These data are used to generate a sectoral split of the categories *Public Power* and *District Heating*, each for the two ranges ≥ *300 MW* and ≥ *50 MW to 300 MW* of thermal capacity. Currently 42 plants are considered in this approach.

The remaining fuel consumption (= total consumption minus consumption of large point sources) is the activity data for plants smaller than 50 MW.

Fuel consumption in the public electricity sector varies strongly over time. The most important reason for this variation is the fact that in Austria up to 70% of the power needed is produced by hydroelectric power plants. If production of electricity by hydropower is low, more from thermal power plants must be produced.

1 A 1 b Petroleum Refining

This category enfolds the emissions from fuel combustion of one petroleum refining plant.

Methodology

CO_2 emissions are reported by the *Association of the Austrian Petroleum Industry.*

N_2O emissions for the year 1996 are calculated by multiplying each reported fuel consumption with emission factors that are taken from a national study [BMUJF, 1994]. For all other years the emissions were calculated using the emission factor that was calculated by dividing the N_2O emissions of the year 1996 by the crude oil input of the refinery for this year (N_2O emissions in 1996 were 11,46 Mg and crude oil input was 9,1 Mt, this results in an emission factor of 1,26 g N_2O / Mg crude oil). CH_4 emissions are reported under Category *1 B 2 a Fugitive Emissions from Fuels – Oil*.

Crude oil input data is reported under category *1 B 2 a Oil.*

Emission factors

The emission factors are presented in Table 34.

Table 34: N_2O-emission factors of Category 1 A 1 b for the year 1996.

Fuel	EF [kg N_2O / TJ]
Residual Fuel Oil	0,60
Other Petrol. Products	0,60
Refinery Gas	0,10
Natural Gas	0,10

Activity data

Fuel consumption is taken from the energy balance as described in Table 25, Table 26, Table 28 and Table 29.

Table 35: Activity data of category 1 A 1 b for the year 2000.

Fuel	Consumption [TJ]
Residual Fuel Oil	12.864
Other Petrol. Products	2.245
Refinery Gas	17.570

1 A 1 c Manufacturing of Solid Fuels and Other Energy Industries

This category includes emissions from fuel combustion by pipeline compressors.

Methodology

CORINAIR methodology was used.

Emission factors

CO_2 and CH_4 emission factors are taken from various studies [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE IB-614, 2001].

The N_2O emission factor is taken from a national study [BMUJF, 1994].

Table 36: Activity data and emission factors of category 1A1b for the year 2000.

SNAP	Fuel	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
010503	Natural Gas	55,00	1,50	0,10	715.455

Activity data

For the years 1990 to 1993 the natural gas consumption is taken from STATISTIK AUSTRIA. The consumption for 1994 and 1995 was assumed to be equal to 1993 because no data from the energy statistic is available for this years. Since 1996 natural gas consumption is taken from the energy balance as described in Table 26, Table 28 and Table 29.

1 A 2 Manufacturing Industries and Construction – Stationary Sources

Methodology

The CORINAIR methodology was used.

Emission factors

National emission factors for CO_2 and CH_4 are taken from [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE IB-614, 2001]. N_2O emission factors are taken from national studies [STANZEL et al., 1995] and [BMUJF, 1994].

Table 37: Activity data and emission factors of category 1A2 for the year 2000.

SNAP / IPCC category	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
1 A 2 a :					
030301 Sinter and Pelletizing Plants(1)	Coke	IE	IE	IE	5.561.462
030203 Sinter and Pelletizing Plants(1)	Coke Oven Gas	IE	IE	IE	3.888.000
030203 Sinter and Pelletizing Plants(1)	Blast Furnace Gas	IE	IE	IE	14.403.000
1 A 2 f stationary:					
030103 Electr. Autopr.	Hard Coal	94,00	5,00	1,40	1.202.079
030103 Electr. Autopr.	Brown Coal	97,00	7,00	1,40	110.977
030103 Electr. Autopr.	Brown Coal Briquettes	97,00	7,00	1,40	0
030103 Electr. Autopr.	Coke	104,00	2,00	1,40	0
030103 Electr. Autopr.	Biomass	0,00	2,00	4,00	10.787.000
030103 Electr. Autopr.	Fuel Waste	10,00	12,00	1,40	2.435.516
030103 Electr. Autopr.	Light Fuel Oil	78,00	0,20	0,60	1.832.764
030103 Electr. Autopr.	Heavy Fuel Oil	78,00	2,00	1,00	1.832.764
030103 Electr. Autopr.	Gas oil	75,00	1,20	1,00	0
030103 Electr. Autopr.	Diesel	78,00	0,20	0,60	0
030103 Electr. Autopr.	Other Petroleum Products	78,00	2,00	1,00	0
030103 Electr. Autopr.	Natural Gas	55,00	1,50	0,10	20.626.804
030103 Electr. Autopr.	Liquefied Petroleum Gas	64,00	1,50	0,10	0
030103 Electr. Autopr. (1)	Coke Oven Gas	IE	IE	IE	6.578.000
030103 Electr. Autopr. (1)	Blast Furnace Gas	IE	IE	IE	6.725.000
030103 Paper and Pulp	Hard Coal	94,00	5,00	1,40	2.309.678
030103 Paper and Pulp	Brown Coal	97,00	7,00	1,40	261.900
030103 Paper and Pulp	Brown Coal Briquettes	97,00	7,00	1,40	0
030103 Paper and Pulp	Coke	104,00	2,00	1,40	0
030103 Paper and Pulp	Fuel Wood	0,00	2,00	4,00	0
030103 Paper and Pulp	Biomass	0,00	2,00	4,00	22.404.000
030103 Paper and Pulp	Fuel Waste	10,00	12,00	1,40	0

SNAP / IPCC category	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
030103 Paper and Pulp	Light Fuel Oil	78,00	0,20	0,60	0
030103 Paper and Pulp	Heavy Fuel Oil	78,00	2,00	1,00	2.778.401
030103 Paper and Pulp	Kerosene	78,00	0,20	0,60	0
030103 Paper and Pulp	Other Petroleum Products	78,00	2,00	1,00	0
030103 Paper and Pulp	Natural Gas	55,00	1,50	0,10	18.547.273
030103 Paper and Pulp	Liquefied Petroleum Gas	64,00	1,50	0,10	0
030105 Stationary Engines	Diesel	78,00	0,20	0,60	42.800
030205 Other Furnaces	Hard Coal	94,00	5,00	1,40	0
030205 Other Furnaces	Brown Coal	97,00	7,00	1,40	0
030205 Other Furnaces	Brown Coal Briquettes	97,00	7,00	1,40	0
030205 Other Furnaces	Coke	104,00	2,00	1,40	0
030205 Other Furnaces	Fuel Wood	0,00	2,00	4,00	0
030205 Other Furnaces	Biomass	0,00	2,00	4,00	0
030205 Other Furnaces	Fuel Waste	10,00	12,00	1,40	2.373.337
030205 Other Furnaces	Light Fuel Oil	78,00	0,20	0,60	3.677.682
030205 Other Furnaces	Medium Fuel Oil	78,00	2,00	1,00	55.663
030205 Other Furnaces	Heavy Fuel Oil	78,00	2,00	1,00	4.605.316
030205 Other Furnaces	Other Petroleum Products	78,00	2,00	1,00	0
030205 Other Furnaces	Natural Gas	55,00	1,50	0,10	37.485.381
030205 Other Furnaces	Gas Works Gas	64,00	1,50	0,00	0
030311 Cement (2)	Hard Coal	IE	IE	IE	4.464.866
030311 Cement (2)	Brown Coal	IE	IE	IE	104.171
030311 Cement (2)	Coke	IE	IE	IE	703.815
030311 Cement (2)	Fuel Waste	IE	IE	IE	1.378.959
030311 Cement (2)	Light Fuel Oil	IE	IE	IE	17.635
030311 Cement (2)	Medium Fuel Oil	IE	IE	IE	0
030311 Cement (2)	Heavy Fuel Oil	IE	IE	IE	1.740.963
030311 Cement (2)	Natural Gas	IE	IE	IE	439.893
030317 Other Glass	Coke	104,00	2,00	1,40	0
030317 Other Glass	Heavy Fuel Oil	78,00	2,00	1,00	39.091
030317 Other Glass	Natural Gas	55,00	1,50	0,10	2.869.200
030317 Other Glass	Liquefied Petroleum Gas	64,00	1,50	0,10	0
030319 Other Glass	Light Fuel Oil	78,00	0,20	0,60	0
030319 Other Glass	Heavy Fuel Oil	78,00	2,00	1,00	587.700
030319 Other Glass	Natural Gas	55,00	1,50	0,10	3.317.418
030326 Iron Industry(1)	Coke	IE	IE	IE	29.217.638

SNAP / IPCC category	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
030326 Other	Hard Coal	94,00	5,00	1,40	1.731.894
030326 Other	Brown Coal	97,00	7,00	1,40	0
030326 Other	Brown Coal Briquettes	97,00	7,00	1,40	0
030326 Other	Coke	104,00	2,00	1,40	2.870.785
030326 Other	Fuel Wood	0,00	2,00	4,00	617.314
030326 Other	Biomass	0,00	2,00	4,00	0
030326 Other	Fuel Waste	10,00	12,00	1,40	263.704
030326 Other	Light Fuel Oil	78,00	0,20	0,60	3.677.682
030326 Other	Medium Fuel Oil	78,00	2,00	1,00	55.663
030326 Other	Heavy Fuel Oil	78,00	2,00	1,00	4.605.316
030326 Other	Kerosene	78,00	0,20	0,60	0
030326 Other	Other Petroleum Prod-ucts	78,00	2,00	1,00	0
030326 Other	Natural Gas	55,00	1,50	0,10	37.485.381
030326 Other	Liquefied Petroleum Gas	64,00	1,50	0,10	3.078.299
1 A 2 f mobile:					
0808 Industry	Diesel	73,67	4,00	24,07	14.267.421
0808 Industry	Motor Gasoline	74,19	86,38	1,80	88.793

(1) emissions are reported under category *2 C 1 Iron and Steel Production*
(2) emissions are reported under category *2 A 1Cement Production*

Activity data

Fuel consumption is taken from the energy balance as described in Table 25, Table 26, Table 28 and Table 29.

This category includes combustion in industry. All emissions are reported under Category *1 A 2 f Other* because the sectoral approach as done for the inventory is not consistent with the IPCC system due to the following reasons:

1. the sectoral breakdown of the energy balance is not consistent over time for the time being
2. the sectors of the energy balance include energy use for heating purposes and are based on ÖNACE[9] which does not fit into the IPCC categories.

The following subcategories are treated separately in OLI:

1) Auto Producers:	Electrical power generation for industrial end use which is not injected into the electricity network. Activity data is taken from energy balance.
2) Paper and Pulp Production:	Activity data is taken from energy balance.
3) Cement Production:	Activity data and emissions obtained from national studies. All emissions (combustion and process related) are quoted

9 ÖNACE : Austrian version of NACE (Nomenclature générale des activités économiques dans les communautés européennes)

	All emissions (combustion and process-related) are quoted under category *2 A 1 Cement Production.*
4) Iron and Steel Production:	Two sites which include coke ovens, blast furnaces, sinter and steel production plants. A part of coke oven gas and blast furnace gas is used for district heating. Activity data and emissions are reported from plants. All emissions (combustion and process-related) are quoted under category *2 C 1 Iron and Steel Production.*
5) Other Industrial Production:	Activity data are taken from energy balance: Final Energy Consumption in industry not covered in subcategories 1–4.

1 A 4 Other Sectors – Stationary Sources

This category includes combustion in residential, commercial/ institutional, agriculture and forestry plants. Note that category *1 A 4* also includes mobile combustion sources (see category *1 A 3 Transport*).

Methodology

CORINAIR methodology was applied.

Emission factors

National emission factors for CO_2 and CH_4 are taken from [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE, 2001]. N_2O emission factors are taken from national studies [STANZEL et al., 1995] and [BMUJF, 1994].

Table 38: Activity data and emission factors of category 1 A 4 for the year 2000

SNAP	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
1 A 4 a Commercial/ Institutional:					
020103 Combustion Plants < 50 MW	Hard Coal	93,00	230,00	2,00	102.347
020103 Combustion Plants < 50 MW	Brown Coal	108,00	230,00	4,00	17.735
020103 Combustion Plants < 50 MW	Brown Coal Briquettes	97,00	80,00	4,00	308.800
020103 Combustion Plants < 50 MW	Coke	92,00	16,00	2,00	1.318.500
020103 Combustion Plants < 50 MW	Fuel Wood	0,00	112,00	3,00	28.167.915
020103 Combustion Plants < 50 MW	Biomass	0,00	21,00	3,00	3.616.686
020103 Combustion Plants < 50 MW	Fuel Waste	10,00	12,00	1,40	0
020103 Combustion Plants < 50 MW	Light Fuel Oil	77,00	0,25	0,60	4.357.906
020103 Combustion Plants < 50 MW	Medium Fuel Oil	78,00	2,00	1,00	111.327
020103 Combustion Plants < 50 MW	Gas oil	75,00	0,20	1,00	7.297.474
020103 Combustion Plants < 50 MW	Kerosene	78,00	0,20	0,60	256.800
020103 Combustion Plants < 50 MW	Natural Gas	55,00	0,80	1,00	20.895.929
020103 Combustion Plants < 50 MW	Liquefied Petroleum Gas	64,00	1,50	0,10	813.033
020103 Combustion Plants < 50 MW	Gas Works Gas	64,00	1,50	0,00	0

SNAP	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
1 A 4 b Residential – Stationary:					
020202 Central Heating	Hard Coal	93,00	230,00	2,00	1.761.000
020202 Central Heating	Brown Coal	108,00	230,00	4,00	303.000
020202 Central Heating	Brown Coal Briquettes	97,00	80,00	4,00	1.120.000
020202 Central Heating	Coke	92,00	16,00	2,00	4.220.000
020202 Central Heating	Fuel Wood	0,00	112,00	3,00	32.087.000
020202 Central Heating	Light Fuel Oil	77,00	0,25	0,60	6.964.503
020202 Central Heating	Gas oil	75,00	0,20	1,00	44.578.000
020202 Central Heating	Natural Gas	55,00	0,80	1,00	22.360.000
020202 Central Heating	Liquefied Petroleum Gas	64,00	1,50	0,10	3.000.382
020202 Apartment Heat.	Hard Coal	93,00	230,00	2,00	170.000
020202 Apartment Heat.	Brown Coal	108,00	280,00	4,00	29.000
020202 Apartment Heat.	Brown Coal Briquettes	97,00	100,00	4,00	108.000
020202 Apartment Heat.	Coke	92,00	16,00	2,00	408.000
020202 Apartment Heat.	Fuel Wood	0,00	112,00	5,00	434.000
020202 Apartment Heat.	Gas oil	75,00	0,20	1,00	2.827.000
020202 Apartment Heat.	Natural Gas	55,00	0,80	1,00	21.011.000
020205 Stove	Hard Coal	93,00	90,00	1,00	465.512
020205 Stove	Brown Coal	108,00	90,00	1,00	79.717
020205 Stove	Brown Coal Briquettes	97,00	90,00	4,00	296.700
020205 Stove	Coke	92,00	90,00	2,00	1.114.800
020205 Stove	Fuel Wood	0,00	170,00	7,00	10.861.085
020205 Stove	Gas oil	75,00	0,50	1,00	13.691.926
020205 Stove	Natural Gas	55,00	0,80	1,00	16.651.253
1 A 4 b Residential – Mobile:					
080900 Household and gardening	Diesel	73,67	3,30	24,22	848.139
080900 Household and gardening	Motor Gasoline	74,19	89,86	1,19	1.044.843
1 A 4 c Agricultural/ Forestry/ Fishing – Stationary:					
020302 Combustion Plants < 50 MW	Peat	106,00	300,00	1,00	8.800
1 A 4 c Agricultural/ Forestry/ Fishing – Mobile:					
080600 Agriculture	Diesel	73,67	6,56	25,15	15.158.848
080600 Agriculture	Motor Gasoline	74,19	90,56	1,55	400.079
080700 Forestry	Diesel	73,67	6,67	25,07	6.860.329
080700 Forestry	Motor Gasoline	74,19	94,17	0,53	189.968

Activity data

Fuel consumption is taken from the energy balance as described in Table 25, Table 26, Table 28 and Table 29.

In general the activity data published by STATISTIK AUSTRIA for this category are Total Final Consumption minus the Final Consumption of the categories *1 A 1* to *1 A 3* and *1 A 5*. This may cause a fluctuation over time series which is not always consistent with the real situation, e.g. heating degree days or fuel switches of the end users caused by fuel prices or economic situation.

There are three technology dependent subcategories for this category:

1. Central Heatings
2. Apartment Heatings
3. Stoves

The disaggregation of the total consumption to each of the technological sub types is performed by the means of building- and habitation-statistics published by STATISTIC AUSTRIA.

1 A 5 a Other – Stationary (Not elsewhere specified)

This category includes the energy consumption from two waste incineration plants because the waste incinerated in these plants is reported in the energy balance as a fuel. Since the CRF does not allow to report energy consumption in category *6 C* it is included in category *1 A 5 a Other.* It was assumed that 90% of total waste is biogenic. CO_2 emissions arising from incineration of this part of the waste (referred to as biomass incineration) is considered under Category *1 A 5 a Other*.

Emissions of all other gases from waste incineration and CO_2 emissions from incineration of the part of the waste which is considered non-biogenic (10% of total waste) are reported in Category *6 C Waste Incineration*.

CO_2 emissions from biomass incineration have been considered by applying an emission factor of 90 t CO_2 per TJ of waste.

Methodology

CORINAIR methodology was applied.

Emission factors

National emission factors for CO_2 from biomass incineration are taken from [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE, 2001].

Table 39: Activity data and emission factors of category 1 A 5 a for the year 2000

SNAP	FUEL	CO_2 biogen [kg/GJ]	Activity [GJ]
090201	Municipal Waste	90,00	4.873.732
090201	Hazardous Waste	90,00	938.398
090201	Sewage Sludge	90,00	744.588
090201	Heavy Fuel Oil	—	393.736
090201	Natural Gas	—	307.202

Activity data

Activity data are taken from the UBAVIE database *DKDB*.

4.1.1.3.2 1 A Fuel Combustion - Off Road

Methodology

In 2001 a study on off road emissions in Austria was finished [PISCHINGER, 2000]. The study was performed to improve the poor data quality in this sector. Following categories were taken into account:

- 1 A 2 f Industry
- 1 A 3 c Railways
- 1 A 3 d Navigation
- 1 A 3 e Other Transportation
- 1 A 4 b Household and Gardening
- 1 A 4 c Agriculture and Forestry

Depending on the fuel consumption of the engine the ratio power of the engine was calculated, emissions were calculated by multiplying ratio power and emission factors. To improve data quality the influence of the vehicle age on the operating time was taken into account.

With this method all relevant effects on engine emissions could be covered:

- Emissions according to the engine type
- Emissions according to the effective engine performance
- Emissions according to the engine age
- Emissions depending on the engine operating time in dependent on the engine age

Due to the high fuel consumption of the off road sector the ratio of fuel consumption between the on- and off road transport sector has been recalculated.

Emission factors

Emission factors were defined for four categories of engines depending on the year of construction. Emission factors are listed in Table 40 to Table 43.

Table 40: Emission Factors for diesel engines > 80 kW [g/kWh]

Year	Fuel	CO_2	CH_4	N_2O
	[g/kWh]			
1993	282	890	0,05	0,32
1997	273	861	0,04	0,35
2000	265	834	0,03	0,22

Table 41: Emission Factors for diesel engines < 80 kW [g/kWh]

Year	Fuel	CO_2	CH_4	N_2O
	[g/kWh]			
1993	296	935	0,10	0,32
1997	287	904	0,07	0,35
2000	278	876	0,06	0,22

Table 42: Emission Factors for 4-stroke-petrol engines [g/kWh]

Year	Fuel	CO_2	CH_4	N_2O
	[g/kWh]			
1993	550	1.734	2,16	0,04
1997	520	1.640	1,92	0,04
2000	500	1.577	1,78	0,04

Table 43: Emission Factors for 2-stroke-petrol engines [g/kWh]

Year	Fuel	CO_2	CH_4	N_2O
	[g/kWh]			
1993	700	2.207	3,00	0,01
1997	675	2.128	2,70	0,01
2000	655	2.065	2,40	0,01

Activity data

Activity data, vehicle stock and specific fuel consumption for vehicles and machinery were taken from:

- Statistic Austria
- Questionnaire to vehicle and machinery user
- Information from vehicle and machinery manufacturer
- Interviews with experts
- Expert judgment

1 A 2 f Manufacturing Industries and Construction – Other – Off Road

The applied methodology is described at the beginning of chapter 4.1.1.3.2. Activities used for estimating the emissions and the implied emission factors are presented in the following table.

Table 44: Emission factors and activities for industrial off-road traffic 1990–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	22,4	0,00007	4,7	2.045
1991	22,4	0,00007	4,7	1.850
1992	22,3	0,00007	4,7	1.810
1993	22,3	0,00007	4,7	1.828
1994	22,1	0,00007	5,0	2.209
1995	22,1	0,00007	5,0	2.143
1996	22,1	0,00007	5,2	2.150
1997	22,0	0,00007	5,4	2.487
1998	21,9	0,00007	5,3	2.518
1999	21,8	0,00006	5,3	2.544
2000	21,7	0,00006	5,3	2.569

1 A 3 a Civil Aviation

Methodology

The methodology for calculating emissions from aviation is based on the GLOBEMI model [HAUSBERGER, 1998]. The model calculates total emissions from all flights from and to Austria. Emissions are calculated as a function of person- and freight-kilometre. Therefore fuel consumption factors expressed in kg/seat-kilometre and kg/disposable tonne-kilometre are determined.

$$\text{Fuel consumption} = \frac{\text{pkm}}{\text{passenger load factor}} * \frac{\text{fuel consumption}}{\text{seat - km}} + \frac{\text{tkm}}{\text{freight load factor}} * \frac{\text{fuel consumption}}{\text{total load capacity}}$$

$$\text{Emission} = \text{total fuel consumption} * \frac{\text{g emission}}{\text{kg fuel}}$$

Based on the given transport performance the total fuel consumption is calculated. From the total fuel consumption emissions are calculated using emission factors in g/kg fuel. Total number of flights per year is reported by STATISTIK AUSTRIA.

Fuel Consumption per seat-kilometre and total load capacity as well as emission factors are taken from the following studies: [PISCHINGER, 1993], [BALASHOW, 1993], [WWF, 1994] and [IEA, 1992].

Data for passenger load factors and freight load factors for Austria are calculated on the basis of data from ICAO, Austro Control and Austrian Airlines

Emission Factors

The factors shown in Table 45 are used to calculate emissions for civil aviation in Austria. There is no differentiation according to the airplane type or the airplane/engine combination.

Table 45: Factors for Fuel consumption and emissions from civil aviation

Year	kg fuel /seat-km	kg fuel /disp. t-km	„seat-factor“	„freight-factor“	[g/kg fuel]					
					CO	HC	NO_X	PM	CO_2	SO_2
1971	0,05764	0,33549	49,2%	48,4%	16,50	5,95	12,14	0,09	3.154	5,0
1980	0,04806	0,27972	66,3%	60,8%	6,45	2,85	12,70	0,04	3.154	4,0
1990	0,03806	0,22155	78,7%	70,5%	2,73	1,10	11,17	0,02	3.154	3,1
1995	0,03385	0,19702	76,1%	71,4%	2,45	0,98	11,00	0,015	3.154	2,8
2000	0,03022	0,17592	78,8%	73,9%	2,39	0,96	11,00	0,014	3.154	2,5

Differentiation into modes of traffic

In the study [UBAVIE, 1994] the share of the four transport modes for air transport (national/international, </> 1000 meters) was identified on the basis of flight data provided by the national airports. Since 1994 the share of national/international emissions was assumed to remain unchanged.

Uncertainties

The differentiation in the modes of transport (national/international) for air traffic is based on a study in 1994. The share of national/international aviation is therefore not up to date.

Planned Improvements

In 2000 a complete new study on emissions from aviation was commissioned. It was finished in 2002 determining the emissions and fuel consumptions for the period from 1990 to 2000 using the detailed methodology according to the CORINAIR Inventory Guidelines. Emissions were calculated separately for all four modes of transport.

The results will be considered in the National Inventory and will be included in the next submission of the NIR.

<u>1 A 3 c Railways</u>

The applied methodology is described at the beginning of chapter 4.1.1.3.2. Activities used for estimating the emissions and the implied emission factors are presented in the following table.

Table 46: Emission factors and activity data for railway diesel engines 1990–2000

Year	CO_2 [g/kg diesel]	CH_4 [g/kg diesel]	N_2O [g/kg diesel]	mio. passenger-km	mio. tonne-km
1990	3.153	0,13	0,40	9.045	12.737
1991	3.153	0,13	0,40	9.428	13.181
1992	3.153	0,12	0,39	9.799	12.448
1993	3.153	0,12	0,39	9.599	12.030
1994	3.153	0,12	0,38	9.384	13.786
1995	3.153	0,12	0,38	9.755	14.158
1996	3.153	0,11	0,37	9.824	14.066
1997	3.153	0,11	0,37	8.477	14.993

Year	CO_2 [g/kg diesel]	CH_4 [g/kg diesel]	N_2O [g/kg diesel]	mio. passenger-km	mio. tonne-km
1998	3.153	0,11	0,36	8.313	15.552
1999	3.153	0,10	0,35	8.166	15.762
2000	3.153	0,10	0,35	8.374	17.339

1 A 3 d Navigation

The applied methodology is described at the beginning of chapter 4.1.1.3.2. Activities used for estimating the emissions and the implied emission factors are presented in the following table.

Table 47: Emission factors and activity data for the sector Navigation 1990–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	25,5	0,00025	1,0	2.045
1991	25,6	0,00027	0,9	1.850
1992	25,6	0,00027	0,8	1.810
1993	25,5	0,00027	0,8	1.828
1994	25,2	0,00023	1,0	2.209
1995	25,2	0,00024	1,0	2.143
1996	25,1	0,00023	1,0	2.150
1997	24,9	0,00021	1,1	2.487
1998	24,8	0,00020	1,1	2.518
1999	24,7	0,00020	1,1	2.544
2000	24,7	0,00019	1,1	2.569

1 A 3 e Other Transportation

Methodology / Emission factors / Activity Data

The sector *1 A 3 e Other Transport* covers transport from military activities. For confidentiality reason this sector presents only rough estimations [PISCHINGER, 2000]. Activities used for estimating the emissions and the implied emission factors are presented in the following table.

Table 48: Emission factors and activity data for the sector Military 1999–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	71,2	0,00006	6,3	30
1991	71,2	0,00006	6,3	30
1992	71,2	0,00006	6,3	30

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1993	71,2	0,00006	6,3	30
1994	71,2	0,00005	6,9	30
1995	70,9	0,00005	7,0	30
1996	70,6	0,00005	7,1	30
1997	70,3	0,00005	7,2	30
1998	70,0	0,00005	8,0	30
1999	69,4	0,00005	7,7	30
2000	69,0	0,00004	8,2	30

1 A 4 b Household and Gardening

The applied methodology is described at the beginning of chapter 4.1.1.3.2. Activities used for estimating the emissions and the implied emission factors are presented in the following table.

Table 49: Emission factors and activity data for the sector Household and Gardening 1990–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	2,6	0,045	0,004	54.426
1991	2,6	0,045	0,004	54.631
1992	2,6	0,045	0,004	54.936
1993	2,6	0,045	0,004	55.089
1994	2,6	0,045	0,004	55.217
1995	2,6	0,044	0,004	55.371
1996	2,6	0,044	0,004	55.482
1997	2,6	0,044	0,004	55.591
1998	2,5	0,043	0,004	55.695
1999	2,5	0,043	0,004	56.232
2000	2,5	0,042	0,004	56.739

1 A 4 c Agriculture and Forestry

The applied methodology is described at the beginning of chapter 4.1.1.3.2. Activities used for estimating the emissions and the implied emission factors are presented in the following tables.

Table 50: Emission factors and activity data for the sector Agriculture 1990–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	10,8	0,00013	2,5	101.568
1991	10,8	0,00013	2,5	102.092
1992	10,8	0,00013	2,5	103.699
1993	10,8	0,00013	2,5	104.412
1994	10,8	0,00013	2,6	105.127
1995	10,7	0,00013	2,6	105.816
1996	10,7	0,00013	2,7	107.254
1997	10,7	0,00012	2,8	108.786
1998	10,7	0,00012	2,8	108.019
1999	10,7	0,00012	2,8	106.917
2000	10,6	0,00012	2,8	107.686

Table 51: Emission factors and activity data for the sector Forestry 1990–2000

Year	CO_2 [kg/h]	CH_4 [kg/h]	N_2O [kg/h]	Activity [1000 h/year]
1990	10,4	0,00014	2,4	47.728
1991	10,4	0,00014	2,4	47.692
1992	10,4	0,00014	2,4	48.747
1993	10,6	0,00013	2,5	48.108
1994	10,3	0,00014	2,4	50.157
1995	10,3	0,00013	2,5	49.945
1996	10,2	0,00013	2,5	51.453
1997	10,2	0,00013	2,6	51.730
1998	10,3	0,00013	2,7	50.819
1999	10,3	0,00013	2,7	50.389
2000	10,2	0,00012	2,7	50.725

Memo Item International Bunkers - Aviation

See chapter *1 A 3 a Civil Aviation*.

Memo Item International Bunkers - Marine

Emissions from international marine bunkers to not occur as Austria is a land locked country. It is the understanding of Austria that (international) transport by ship on the Danube is not part of international bunkers.

4.1.1.3.3 1 A 3 b Road Transport

Methodology

Mobile combustion is differentiated into the categories *Passenger Cars*, *Light Duty Vehicles*, *Heavy Duty Vehicles* and *Buses, Mopeds and Motorcycles*. In order to apply the CORINAIR methodology a split of the fuel consumption of different vehicle categories is needed. Calculations of emissions from *Mobile Combustion* are based on the GLOBEMI study [HAUSBERGER, 1998].

Energy consumption and emissions of the different categories are calculated by multiplying the yearly road performance (km/vehicle and year) and the specific energy use with emission factors (g/km, g/kWh, g/kg fuel). The emissions from cold starts are calculated separately – taking into account temperature, interception periods and driving distances.

Emission factors

Implied emission factors for this category are listed in Table 52.

Table 52: Implied Emission Factors of Road Transport for the year 2000

Emission Source	Fuel	Activity [TJ]	Emission Factors		
			CO_2 [kg/GJ]	N_2O [g/GJ]	CH_4 [g/GJ]
Passenger Car	Diesel	52.008	73,67	2,30	0,63
	Petrol	77.441	74,19	18,07	13,65
Light Duty Vehicles < 3,5 t	Diesel	18.969	73,66	2,71	0,78
	Petrol	2.784	74,22	9,61	7,62
Heavy Duty Vehicles/ Busses	Diesel	71.154	73,67	2,33	1,91
	Petrol	391	74,42	2,82	4,14
Mopeds & Motorcycles < 50 ccm	Petrol	387	74,19	1,78	555,51
Motorcycles > 50 ccm	Petrol	1.317	74,19	0,98	58,47

Activity data

The calculation of the activity data is based on the study GLOBEMI [HAUSBERGER, 1998]. Information on the number of new vehicles is published yearly by STATISTIK AUSTRIA. Information on the yearly road performance of the vehicles is supplied by the Austrian automobile clubs throughout the annual vehicle inspection system.

The yearly road performance of the vehicle categories for different street categories is calculated as a function of vehicle size and vehicle age. The extrapolation of the yearly vehicle stock- and performance share (by vehicle age, motor type and vehicle size) is based on a dynamic, vehicle specific drop out- and road performance function.

Based on the GLOBEMI model CO_2 emissions are calculated, the model is calibrated by comparing the data with information on sold fuel provided by the national energy balance which is compiled by STATISTIK AUSTRIA and WIFO.

Uncertainties

Uncertainties regarding CO_2 emission occur due to bunker fuels and the carbon content of the fossil fuel. Bunker fuels are not taken into account as it is assumed that the amount of exported and imported fuel is balanced. The carbon content of different fuel categories may vary over time.

N_2O emission factors are determined in vehicle emission tests, mostly carried out on test benches. Therefore emission factors are prone to uncertainties for the following reasons:

- test driving cycles cannot reflect real driving behaviour
- uncertainties of test equipment and emission measurement equipment
- emission factor varies over time because of chemical characteristics of the fuels
- the influence of aging and maintenance of the vehicle stock

Planned Improvements

For the category *1 A 3 b* the following improvements are planned:

- improve and widen the underlying data sources for emission factors
- validate database with emission factors based on real driving cycles

4.1.1.4 1 B 1 a Fugitive Emissions from Fuels

1 B 1 a Fugitive Emissions from Fuels-Coal Mining

This category covers emissions from one brown coal surface mine.

Methodology

Emissions are calculated by multiplying the amount of brown coal produced (= activity data) with a country-specific emission factor.

Activity data

Activity data are taken from the national energy balance: 1.137.888 t of brown coal were produced in 2000.

Emission factors

The emission factor selected for methane is: 7,11 g CH_4/t coal.

The selected factor is very low compared to those of other countries, because in Austria brown coal is only surface mined. It is taken from a national study [BMUJF, 1994].

1 B 1 b Fugitive Emissions from Fuels – Solid Fuel Transformation

This category includes emissions from coke production. There is no other known occurrence of solid fuel transformation.

There is one steel plant that produces coke oven coke, it reports the emissions from all its processes and combustion plants together. They are reported under category *2 C 1 Metal Production.*

1 B 2 a Fugitive Emissions from Fuels – Oil

Methodology

CH_4 emissions are calculated using IPCC Tier 1 methodology (reference manual chapter 1.8).

Activity data

Yearly activity data are submitted by the *Association of the Austrian Petroleum Industry.*

In the year 2000 the consumption of the oil refinery was 8,28 Mio tons of crude oil.

Emission factors

An average value of 745 kg CH_4/PJ crude oil input was selected from table 1-58 of the IPCC Reference Manual.

1 B 2 b Fugitive Emissions from Fuels – Natural Gas

Category *1 B 2 b* includes emissions from natural gas production, distribution, venting and flaring.

Methodology

CO_2 emissions from natural gas production are reported by the *Association of the Austrian Petroleum Industry* and include emissions from category *1 B 2 c Venting and Flaring*.

Emissions from natural gas distribution are calculated by multiplying the gross inland consumption with a constant emission factor. As this emission factor is based on national energy consumption emissions from gas transit are not considered.

Activity data

Natural gas distribution

Corresponds to the gross inland consumption of the energy balance: 7.791 Mm^3 Gas in the year 2000.

Natural gas production

Reported by the *Association of the Austrian Petroleum Industry*: 581 Mm^3 Gas in the year 2000.

Emission factors

Emission factors from natural gas distribution are calculated by means of net losses for the year 1990: 697,90 kg CH_4 / Mm^3 Gas distributed; 2.950 kg CO_2 / Mm^3 Gas distributed.

1 B 2 c Fugitive Emissions from Fuels-Venting and Flaring

Methodology

Emissions from venting and flaring are included in category *1 B 2 b.*

4.2 Industry (IPPC Category 2)

This chapter includes information and descriptions of methods for estimating greenhouse gas emissions and references of activity data and emission factors reported under IPCC Category *2 Industrial Processes* relevant for the period from 1990 to 2000 in the Common Reporting Format.

The process emissions addressed in this chapter include emissions from the following IPCC categories: *Mineral Products*, *Chemical Industry*, *Metal Production*, *Other Production –Food and Drink* and *Consumption of Halocarbons and* SF_6.

The Industrial processes sector is mainly a source of methane (CH_4), carbon dioxide (CO_2) and nitrous oxide (N_2O) emissions.

This chapter also includes information on emissions of HFC, PFC and SF_6. It presents results for the years 1990 to 2000 and the national methodology for emission calculation for the use of HFC, PFC and SF_6.

For CO_2, CH_4 and N_2O the base year is 1990. For the F-gases the year 1995 has been selected as base year, since the data are considered to be more reliable than those from 1990.

Concerning some categories in this sector there are no emissions occurring in Austria as there is no such production in Austria. There are other categories where the emissions have not been estimated or emissions are included elsewhere. All these categories are all listed in Table 53.

Table 53: IPCC categories and the corresponding SNAP categories for IPCC Category 2, where emissions are NO, NE or IE.

IPCC-Category	SNAP / SPLIT-Category	Description	Status
2 A		**MINERAL PRODUCTS**	
2 A 3	04 06 18	Limestone and Dolomite Use	NE
2 A 4	04 06 19	Soda Ash Production and Use	NE
2 A 6	04 06 11	Road Paving with Asphalt	NE
2 B		**CHEMICAL INDUSTRY**	
2 B 3	04 05 21	Adipic Acid Production	NO – No production in Austria.
2 B 4	04 04 12	Carbide Production	NE
2 C		**METAL PRODUCTION**	
2 C 2	04 03 02	Ferroalloys Production	NE
2 D		**OTHER PRODUCTION**	
2 D 1	04 06 01	Chipboard	IE – Under *1 A 2 f* because emissions from pulp and paper are mainly emissions from combustion
2 D 1	04 06 02	Paper pulp (Kraft process)	IE – Under *1 A 2 f* because emissions from pulp and paper are mainly emissions from combustion
2 D 1	04 06 03	Paper pulp (acid sulphite process)	IE – Under *1 A 2 f* because emissions from pulp and paper are mainly emissions from combustion

2 D 1	04 06 04	Paper pulp (Neutral Sulphite Semi-Chemical process)	IE – Under *1 A 2 f* because emissions from pulp and paper are mainly emissions from combustion
2 E		**PRODUCTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE**	
2 E 1	04 08 01	Halogenated hydrocarbons production – By products	NO – No production in Austria.
	04 08 04	Sulphur hexafluoride production – By products	NO – No production in Austria.
2 E 2	04 08 02	Halogenated hydrocarbons production – Fugitive	NO – No production in Austria.
	04 08 05	Sulphur hexafluoride production – Fugitive	NO – No production in Austria.
2 E 3	04 08 03	Halogenated hydrocarbons production – Other	NO – No production in Austria.
	04 08 06	Sulphur hexafluoride production – Other	NO – No production in Austria.
2 F		**CONSUMPTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE**	
2 F 4	06 05 06	Aerosols	NO – No consumption in Austria.
2 F 5	06 01 – 06 04	Solvents	NO – No consumption in Austria.

Emission trends for aggregated greenhouse gas emissions

Table 54 presents the emissions of greenhouse gases in total and by gas for the period from 1990 to 2000 for the IPCC Category *2 Industrial Processes*.

In 2000 the greenhouse gas emissions from the industrial processes sector amounted to 14.105 Gg CO_2 equivalents. This represents about 20% of the total greenhouse gas emissions in Austria in 2000 compared with 21% in the base year.

As can be seen in Table 54 the greenhouse gas emissions from Industrial Processes fluctuated during the period from 1990 to 2000, but the overall trend was decreasing greenhouse gas emissions. In 2000 the greenhouse gas emissions from Industrial Processes was 5% below the level of the base year.

Table 54: Trends in greenhouse gas emissions of the sector Industrial Processes 1990 – 2000

GHG	Baseyr*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend Baseyr – 2000
	CO_2 equivalents [Gg]												
TOTAL	**14.844**	**14.592**	**14.224**	**12.779**	**12.523**	**13.375**	**14.266**	**13.910**	**15.058**	**14.035**	**13.913**	**14.105**	**-4,98%**
CO_2	12.919	12.919	12.371	11.297	11.458	12.093	12.357	11.847	12.999	12.063	12.104	12.187	-5,67%
CH_4	2,96	2,96	3,04	2,84	3,12	3,24	3,35	3,33	3,72	4,19	2,98	2,98	+0,68%
N_2O	186	186	187	170	180	176	170	174	171	177	180	180	-3,25%
HFCs	546	4	6	9	12	17	546	625	718	816	870	1.033	+89,22%
PFCs	16	963	974	576	48	54	16	15	18	21	25	25	+61,08%
SF_6	1.175	518	683	725	823	1.033	1.175	1.246	1.148	955	730	677	-42,37%

* Base year: 1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

Emission trends by gas for greenhouse gas emissions

Table 55 presents the greenhouse gas emissions of the base year and 2000 from the Industrial Processes sector and their share of the of the greenhouse gas emissions from the sector.

Table 55: Greenhouse gas emissions from the Industrial Processes sector in the base year and in 2000.

GHG	Base year*	2000	Base year*	2000
	CO_2 equivalents [Gg]		[%]	
Total	**14.844**	**14.105**	**100**	**100**
CO_2	12.919	12.187	87,03	86,4
CH_4	2,96	2,98	0,02	0,02
N_2O	186	180	1,25	1,27
HFCs	546	1.033	3,68	7,33
PFCs	16	25	0,11	0,18
SF_6	1.175	677	7,91	4,8

*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

The major greenhouse gas emissions from this sector are the emissions of CO_2, which represented 86% of the emissions from this sector in 2000 compared with 87% in the base year, followed by HFCs (7,3% 2000 respectively 3,7% in the base year) and SF_6 (4,8% 2000 respectively 7,9% in the base year).

CO_2 emissions

As can be seen in Table 54 the CO_2 emissions from the industrial processes sector fluctuated during the period from 1990 to 2000, but the overall trend was decreasing CO_2 emissions. In 2000 the CO_2 emissions from Industrial Processes amounted to 12.919 Gg CO_2 equivalents. This was 5,7% below the level of the base year.

The CO_2 emissions from this sector mainly arise from *Metal Production (Iron and Steel Production)* and *Mineral Products (Cement Production)* but also from *Chemical Industry (Ammonia Production)* and *Food and Drink Production*.

CH_4 emissions

As can be seen in Table 54 the CH_4 emissions from Industrial Processes fluctuated during the period from 1990 to 2000. In 2000 the CH_4 emissions from the industrial processes sector amounted to 2,98 Gg CO_2 equivalents. This was 0,68% above the level of the base year.

The CH_4 emissions from this sector mainly arise from *Chemical Industry (Ammonia Production and Production of Urea)* but also from *Mineral Products (Asphalt Roofing)* and *Metal Production (Electric Furnace Steel Plants, Rolling Mills)*.

N_2O emissions

As can be seen in Table 54 the overall trend concerning the industrial processes sector was slightly decreasing N_2O emissions. In 2000 the N_2O emissions from Industrial Processes amounted to 180 Gg CO_2 equivalents. This was 3,3% below the level of the base year.

The N_2O emissions from this sector arise from the *Chemical Industry (Nitric Acid Production)*.

HFC emissions

As can be seen in Table 54 the HFC emissions increased remarkably during the period. In 2000 the HFC emissions amounted to 1.033 Gg CO_2 equivalents. This was 89,2% above the level of the base year (1995).

The HFC emissions arise from *Refrigeration and Air Conditioning Equipment*, *Foam Blowing* and *XPS/ PU plates*.

PFC emissions

As can be seen in Table 54 the PFC emissions increased remarkably during the period. In 2000 the PFC emissions amounted to 26 Gg CO_2 equivalents. This was 61% above the level of the base year (1995).

The PFC emissions arise from semiconductor manufacture.

SF_6 emissions

As can be seen in Table 54 the SF_6 emissions decreased during the period. In 2000 the SF_6 emissions amounted to 677 Gg CO_2 equivalents. This was 42% below the level of the base year (1995).

The SF_6 emissions arise mainly from semiconductor manufacture, magnesium production and filling of noise insulate glasses.

Emission trends by sources for greenhouse gas emissions

Table 56 presents the greenhouse gas emissions for the period from 1990 to 2000 from the different sources within the IPCC Sector *2 Industrial Processes*.

Table 56: GHG emissions from different sources within IPCC Sector 2 Industrial Processes 1990–2000

GHG	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend 1990–2000
	CO_2 equivalents [Gg]											
TOTAL	**14.592**	**14.224**	**12.779**	**12.523**	**13.375**	**14.266**	**13.910**	**15.058**	**14.035**	**13.913**	**14.105**	**-3,34%**
2 A	3.975	3.839	3.900	3.730	3.865	3.233	3.230	3.371	3.110	3.109	3.057	-23,11%
2 B	612	623	567	610	584	661	660	649	701	674	674	+10,22%
2 C	9.651	9.259	7.737	7.532	8.144	9.029	8.695	9.457	8.549	8.478	8.598	-10,91%
2 D	59	59	53	47	52	51	50	46	48	48	48	-19,31%
2 E	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2 F	294	445	521	606	730	1.293	1.275	1.535	1.627	1.603	1.728	> 100%

The dominant sources in this sector during the year 2000 were the categories *2 C Metal Production*, *2 A Mineral Products* and *2 F Consumption of Halocarbons and SF_6*, where the greenhouse gas emissions represented 61, 22 respectively 12% of the total greenhouse gas emissions from this sector in 2000 compared with 66, 27 respectively 2% in 1990.

2 A Mineral Products

For the source *Mineral Products* the greenhouse gas emissions decreased by 23% from 1990 to 2000. This was mainly due to decreasing CO_2 emissions from cement production and magnesite sinter plants due to a decrease in production.

2 B Chemical Industry

For the source *Chemical Industry* the greenhouse gas emissions increased by 10% from 1990 to 2000. This was mainly due to increasing CO_2 emissions from ammonia production.

2 C Metal Production

For the source *Metal Production* the greenhouse gas emissions decreased by 11% from 1990 to 2000. This was mainly due to decreasing emissions of PFCs from primary aluminium production (the production was terminated in 1992).

2 D Other Production

For the source Other production (*Pulp and Paper* and *Food and Drink*) the greenhouse gas emissions decreased by 19% from 1990 to 2000. This was mainly due to decreasing CO_2 emissions from food and drink production.

2 F Consumption of Halocarbons and SF_6

For the source Consumption of Halocarbons and SF_6 the greenhouse gas emissions increased by more than 100 % from 1990 to 2000. This was mainly due to increasing HFC emissions from refrigeration and air conditioning equipment and foam blowing and increasing SF_6 emissions from semiconductor manufacture.

Key sources

The key source analysis is presented in Chapter 3. This chapter includes information about the key sources in the IPCC Sector 2 *Industrial Processes*. Table 57 shows the source categories according to the level of aggregation for the key source analysis.

Table 57: Source categories – key sources of the sector Industrial Processes

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
2 A 1	Industrial Processes_Mineral Products_Cement Production	CO_2	LA1990, LA2000, TA
2 A 2	Industrial Processes_Mineral Products_Lime Production	CO_2	LA1990
2 A 5	Industrial Processes_Mineral Products_Asphalt Roofing		
2 A 7 a	Industrial Processes_Mineral Products_Otherl_Glass-decarbonizing		

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	CO_2	LA1990, LA2000, TA
2 B 1	Industrial Processes_Chemical Industrie_Ammonia Production	CO_2	LA1990, LA2000
2 B 2	Industrial Processes_Chemical Industrie_Nitric Acid Production		
2 B 5	Industrial Processes_Chemical Industrie_Other		
2 C 1	Industrial Processes_Metal Production_Iron and Steel	CO_2	LA1990, LA2000
2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	SF_6	TA
		PFC	LA1990
2 C 5	Industrial Processes_Metal Production_Other		
2 D 2	Industrial Processes_Other Production_Food and Drink		
2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	HFC	LA2000, TA
		SF_6	LA2000, TA

* shaded cell: source category is not a key source
LA1990 = Level Assessment 1990
LA2000 = Level Assessment 2000
TA = Trend Assessment 1990–2000

As can be seen in Table 57 the IPCC Sector *2 Industrial Processes*, had nine key sources. Together they contributed 17,24 % to the total greenhouse gas emissions in Austria in 2000. The key sources and their share of the total greenhouse gas emissions are listed in Table 58.

In the previous submission, for 1990 to 1999, there were six key sources in this sector and together they contributed 16,75% to the total greenhouse gas emissions in the year 1999.

The four additional key sources for 2000 were CO_2 from *Lime Production*, SF_6 and PFC from *Aluminium and Magnesium Foundries* and HFC from *Consumption of Halocarbons and Sulphur Hexafluoride*. PFC from *Consumption of Halocarbons and Sulphur Hexafluoride* was a key source in 1999, but not in 2000.

Table 58: Key source categories in the IPCC Sector 2 Industrial Processes

IPCC Category	Description	GHG	Share of total GHG emissions 1999 (NIR 2001)	Share of total GHG emissions 2000
2 A 1	Cement Production	CO_2	3,00%	2,94%
2 A 2	Lime Production	CO_2	No key source	0,37%
2 A 7 b	Magnesite Sinter Plants	CO_2	0,43%	0,42%
2 B 1	Ammonia Production	CO_2	0,60%	0,59%
2 C 1	Iron and Steel	CO_2	10,67%	10,77%
2 C 4	SF_6 used in Aluminium and Magnesium Foundries	SF_6	No key source	0,01%
2 C 4	SF_6 used in Aluminium and Magnesium Foundries	PFC	No key source	0,00%
2 F	Consumption of Halocarbons and Sulphur Hexafluoride	SF_6	0,92%	0,84%

IPCC Category	Description	GHG	Share of total GHG emissions 1999 (NIR 2001)	Share of total GHG emissions 2000
	Sulphur Hexafluoride			
2 F	Consumption of Halocarbons and Sulphur Hexafluoride	PFC	0,03%	No key source
2 F	Consumption of Halocarbons and Sulphur Hexafluoride	HFC	No key source	1,30%
Total			**16,75%**	**17,24%**

Quality Assurance and Quality Control (QA/ QC)

For the Austrian Inventory there is an internal quality management system, for further information see Chapter 1.3.

Concerning measurement and documentation of emission data there are also specific regulations in the Austrian legislation as presented in Table 59. This legislation also addresses verification. Some plants that are reporting emission data have quality management systems according to the ISO 9000–series or to similar systems.

Table 59: Austrian legislation with specific regulations concerning measurement and documentation of emission data

IPCC Source Category	Austrian legislation
2 A 1	BGBI 1993/ 63 Verordnung für Anlagen zur Zementerzeugung
2 A 7	BGBI 1994/ 498 Verordnung für Anlagen zur Glaserzeugung
2 C 1	BGBI 1994/ 447 Verordnung für Gießereien
2 C 1	BGBI II 1997/ 160 Verordnung für Anlagen zur Erzeugung von Eisen und Stahl
2 C 1	BGBI II 1997/ 163 Verordnung für Anlagen zum Sintern von Eisenerzen
2 A 2 B 2 C 2 D	BGBI II 1997/ 331 Feuerungsanlagen-Verordnung
2 C 2 2 C 3 2 C 5	BGBI II 1998/ 1 Verordnung zur Erzeugung von Nichteisenmetallen
2 A 2 B 2 C 2 D	BGBI 1988/ 380 Luftreinhaltegesetz für Kesselanlagen
2 A 2 B 2 C 2 D	BGBI 1989/ 19 Luftreinhalteverordnung für Kesselanlagen

Extracts of the applicable paragraphs are provided in Annex 2.

Uncertainty Assessment

A first comprehensive uncertainty analysis was performed as a pilot study [WINIWARTER & RYPDAL, 2001] on the greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997.

No information is available concerning uncertainty assessment of subsector data for this submission, but it will be compiled until the next one. For further information concerning uncertainty assessment, see chapter 1.4.

Planned improvements

For the next submission compilation of information about QA/QC and uncertainty assessment for subsector data is planned.

Recalculation to previous submission

In Category *2 Industrial Processes* recalculations were done concerning:

<u>*2 A 1 Cement Production*</u>

New data was available through the study from the Austrian Cement Industry [HACKL, MAUSCHITZ, 2001] and this lead to recalculated emissions for 1997 to 1999.

<u>*2 A 2 Lime Production*</u>

The method for estimating CO_2 emissions was changed from a national method to an IPCC-Tier 1 method. The previously used emission factor in the national method was too small (0,37 t/ t) in comparison with the IPCC default values (0,79 – 0,91 t/ t) and thus the reported emissions are higher in this submission than in the previous ones.

The previous estimation of activity data for 1999 was replaced by data from national statistics reported in a study [WINIWARTER et al., 2001].

Methodology

The general method for estimating emissions for the industrial processes sector, as recommended by the IPCC, involves multiplying production data for each process by an emission factor per unit of production.

In some categories the emission and production data were reported directly by industry or Associations of industries and thus represent plant specific data. For IPCC key source categories, methodologies for industry reporting are described in more detail.

Table 60 shows the IPCC categories and the corresponding SNAP categories for which the actual calculations were made in this sector. No changes have been made in the list since the previous submission.

Table 60: IPCC categories and the corresponding SNAP categories for IPCC category 2, Industrial Processes.

IPCC-Category		SNAP / SPLIT-Category	Description
2 A	**MINERAL PRODUCTS**		
2 A 1	**Cement Production**	040612	Cement (decarbonising)
2 A 2	**Lime Production**	040614	Lime (decarbonising)
2 A 3	**Limestone and Dolomite Use**	040618	Limestone and Dolomite Use
2 A 4	**Soda Ash Production and Use**	040619	Soda Ash Production and Use
2 A 5	**Asphalt Roofing**	040610	Roof covering with asphalt materials
2 A 6	**Road Paving with Asphalt**	040611	Road paving with asphalt
2 A 7	**Other**		
2 A 7 a		040613	Glass (decarbonising)
2 A 7 b		040617	Other (including asbestos products manufacturing) Magnesite Sinter Plants
2 B	**CHEMICAL INDUSTRY**		
2 B 1	**Ammonia Production**	040403	Ammonia
2 B 2	**Nitric Acid Production**	040402	Nitric acid
2 B 3	**Adipic Acid Production**	040521	Adipic acid
2 B 4	**Carbide Production**	040412	Calcium carbide production
2 B 5	**Other**		
		040407	NPK fertilisers
		040408	Urea
2 C	**METAL PRODUCTION**		
2 C 1	**Iron and Steel Production**		
		040202	Blast furnace charging
2 C 2	**Ferroalloys Production**	**040302**	**Ferro alloys**
2 C 3	**Aluminium Production**	**040301**	**Aluminium production (electrolysis) – except SF_6**
2 C 4	**SF6 Used in Aluminium and Magnesium Foundries**	**030310** **040301** **040304**	**Secondary Aluminium Production** **Aluminium Production – SF_6 only** **Magnesium Production – SF_6 only**
2 C 5	**Other**		
2 C 5 a		040207	Electric furnace steel plant
2 C 5 b		040208	Rolling mills
2 D	**OTHER PRODUCTION**		
2 D 1	**Pulp and Paper**		
		040601	Chipboard

IPCC-Category		SNAP / SPLIT-Category	Description
		040602	Paper pulp (Kraft process)
		040603	Paper pulp (Acid Sulphite process)
		040604	Paper pulp (Neutral Sulphite Semi-Chemical process)
2 D 2	**Food and Drink**		
		040605	Bread
		040606	Wine
		040607	Beer
		040608	Spirits
2 E	**PRODUCTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE**		
2 F	**CONSUMPTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE**		
2 F 1	**Refrigeration and Air Conditioning Equipment**	060502	Refrigeration and air conditioning equipments
2 F 2	**Foam Blowing**	060504	Foam Blowing
2 F 3	**Fire Extinguishers**	060505	Fire Extinguishers
2 F 4	**Aerosols**	060506	Aerosols
2 F 5	**Solvents**	0601–0604	Solvents concerning halocarbons
2 F 6	**Other**		
2 F 6 a		0601–0604	Sources concerning SF_6
2 F 6 b		060507	Electrical equipment
2 F 6 c		060508	Other

4.2.1 Source Categories

4.2.1.1 Category 2 A Mineral Products

2 A 1 Cement Production

Emission: CO_2

Key Source: Yes

In the year 2000 CO_2 emission from production of cement were a key source. The CO_2 emissions from cement production contributed 2,94% to the total amount of greenhouse gas emissions in Austria (see Table 58).

Process specific CO_2 is emitted during the production of clinker (calcinations process), if calcium carbonate ($CaCO_3$) is heated in a cement kiln to temperatures of about 1.300°C. It is converted into lime (CaO – Calcium Oxide) and CO_2.

Table 61 presents the total CO_2 emissions (from combustion and calcination) from the production of cement for the period from 1990 to 2000.

As can be seen in the table, the CO_2 emissions have varied from year to year. The most significant change was in 1995, where there was a decrease of 21,7% compared to the previous year, mainly due to reduction of the production rate for cement of nearly 20%. There was an overall 24% decrease from 1990 to 2000.

Table 61: Total CO_2 emissions (from combustion and calcination) from cement production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	3.088	3.043	3.212	3.070	3.191	2.498	2.496	2.643	2.382	2.381	2.343

For the following reasons it is not possible to spit CO_2 emissions from combustion according to individual fuels (including waste):

The cement industry measures the total amount of emitted CO_2. It is possible to calculate the CO_2 generated by the chemical reaction of carbon-containing minerals (calcination). By subtracting the amount of process-specific CO_2 from total CO_2 emissions, the total amount of CO_2 emissions from combustion is calculated. However, there are no fuel-specific or fuel-substitute specific emissions factors for the cement industry available. Therefore it is not possible to split emissions from combustion according to the fuels used[10]. Therefore the IPPC-category *2 A 1* in the Austrian inventory contains the total CO_2 emissions from cement production.

Methodology

Information about CO_2 emissions from cement production was taken from three studies of emissions from the Austrian cement production industry [HACKL, MAUSCHITZ, 1995, 1997 and 2001]. The data include emissions from combustion processes as well as from calcination.

For the studies mentioned above CO_2 emissions from all cement production plants in Austria were investigated. The determination of the emission data took place by inspection of every single plant, recording and evaluation of plant specific records and also plant specific measurements and analysis carried out by independent scientific institutes.

[10] Fuels used are: about 40% coal and coke, 40% oil, 5% gas and 15% waste (used tyres, waste oil, waste solvents, waste fiber and also waste plastics)

These data (single measurement data or half-hourly mean values from continuous measurements) were summarised to mean yearly emission concentrations for every single plant. With the average flow of dry waste gas the plant specific CO_2 emission mass stream and consequently the plant specific emission factors (related to ton clinker and/ or ton cement) were calculated.

Emission factors

Emission factors for total CO_2 emissions (from combustion and calcination) for each plant were calculated from emission and activity data provided by the study mentioned above. Table 62 presents the calculated mean values of the plant specific emission factors for each year of the period from 1990 to 1999.

Table 62: Calculated mean values of plant specific emission factors 1990–1999

Year	IEF CO_2 from combustion		IEF process–specific CO_2	
	[g/t_{Ce}]	[g/t_{Cl}]	[g/t_{Ce}]	[g/t_{Cl}]
1990	229.171	290.340	441.847	559.783
1991	215.510	285.817	416.365	552.198
1992	242.272	305.808	460.613	581.410
1993	213.154	281.518	417.128	550.911
1994	228.632	287.221	441.404	554.519
1995	225.835	295.933	424.889	556.772
1996	227.912	295.374	432.447	560.450
1997	225.534	284.094	450.468	567.432
1998	218.749	283.303	430.640	557.723
1999	216.790	277.925	433.984	556.367

CO_2 emissions from the raw meal calcination were calculated as follows:

$$M_{(CO2\ calc)} = \sum_k (m_{(raw\ meal)})_k \bullet x_{(CaCO3)k} \bullet (44{,}0088/100{,}0892)$$

Whereas:

m mass stream [kg/a]

x mass portion

k for the kth cement plant

No cement kiln dust (CKD) correction factor was considered because cement kiln dust is returned back into the raw material.

Emission factors related to ton clinker and ton cement were calculated as follows:

$$EF_{(clinker)} = \sum_k m_{i,k} / \sum_k m_{(clinker)k} \quad \text{with } m_{i,k} = c_{i,k} \bullet V_{(waste\ gas)k}$$

$$EF_{(cement)} = \sum_k m_{i,k} / \sum_k m_{(cement)k} \quad \text{with } m_{i,k} = c_{i,k} \bullet V_{(waste\ gas)k}$$

Whereas:

c medium concentration of pollutant in the waste gas (mean value from single measurements) [kg/m³]

V plant specific, dry waste gas volume flow [m^3/a] i for the i[th] pollutant

CO_2 emissions from combustion result from plant specific CO_2 concentrations in specific waste gas volume flows.

Table 63 presents the calculated emission factors for the total CO_2 emissions from cement production as reported in the studies [HACKL, MAUSCHITZ, 1995, 1997 and 2001]. These emission factors were used for the CRF for the period from 1990 to 2000. For the year 2000 it was assumed that the emission data from 1999 has not changed.

The emission factors are high compared to the IPCC default values because, as mentioned above, the total CO_2 emissions from cement production (both from combustion and process–specific) were taken into account and reported together in this category.

Table 63: Calculated emission factors for the period 1990–2000

Year	IEF for overall CO_2 emissions from cement production [t/t_{Ce}]
1990	0,67
1991	0,63
1992	0,70
1993	0,63
1994	0,67
1995	0,65
1996	0,66
1997	0,68
1998	0,65
1999	0,65
2000	0,65

Activity data

The activity data for clinker and cement for the period from 1990 to 1999 were taken from the studies [HACKL, MAUSCHITZ, 1995, 1997 and 2001]. These activity data represent production data directly from individual plants (Good Practice recommended by IPPC, Tier 2 Method). For 2000 the activity data for cement was obtained from the *Association of the Cement Industry*.

Table 64 presents the activity data for clinker and cement production for the period from 1990 to 2000.

Table 64: Activity data - Clinker and cement production 1990–2000

Year	Clinker [t/a]	Cement [t/a]
1990	3.693.539	4.679.409
1991	3.635.462	4.821.480
1992	3.820.397	4.822.304
1993	3.678.293	4.858.012
1994	3.791.131	4.762.651
1995	2.929.973	3.839.415
1996	2.915.956	3.779.074
1997	3.103.312	3.909.083
1998	2.832.262	3.668.076
1999	2.853.437	3.658.102
2000	NA	3.580.570

NA: not available

Recalculations

New data was available through the study from the Austrian Cement Industry [HACKL, MAUSCHITZ, 2001] and this lead to recalculated emissions for the years 1997 to 1999.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Separation of process-specific emissions and combustion-specific emissions
- Allocation of emissions due to energy combustion from *Industrial Processes* to *Energy*

2 A 2 Lime Production

Emission: CO_2

Key Source: Yes

CO_2 emissions from lime production was a key source, they contributed 0,37% to the total amount of greenhouse gas emissions of Austria in 2000 (see Table 58).

CO_2 is emitted during the calcination step of the lime production. Calcium carbonate ($CaCO_3$) in limestone and calcium/ magnesium carbonates in dolomite rock ($CaCO_3$•$MgCO_3$) are decomposed to form CO_2 and quicklime (CaO) or dolomite quicklime (CaO•MgO) respectively.

Only CO_2 emissions generated during the calcination step of lime manufacturing (no CO_2 emissions from combustion) were considered.

Table 65 presents the CO_2 emissions from lime production for the period from 1990 to 2000.

As can be seen in the table, the CO_2 emissions from this category varied over the period from 1990 to 2000, there was no clear trend. However, in the year 2000 emissions were 6,9% less than in 1990 due to lower lime production (see Table 66).

Table 65: CO_2 emissions from lime production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	318	299	287	291	287	304	304	304	304	296	296

Methodology

The estimation of CO_2 emissions from lime production was carried out in accordance with the IPCC Good Practice:

$$\text{Emissions [t]} = \text{Emission factor [kg } CO_2 / t_{time}] \times \text{Lime production [t]}$$

Emission factor

The used emission factors were in accordance with IPCC Good Practice:

EF (high calcium quicklime) = 785 kg CO_2 / t
EF (dolomite quicklime) = 913 kg CO_2 / t

IPCC default value for production rate of high calcium/ dolomite lime: 85/ 14

Activity data

For 1990 to 1993 only national statistic data (ÖSTAT) with the total amount of lime used in Austria (including imported lime) were available. The activity data for 1994 and 1995 were reported from the *Association of the Stone & Ceramic Industry* directly to the UBAVIE.

Since no other data was available the activity data from 1995 was used for the years 1996 to 1998 also. For 1999 the activity data was taken from a study [WINIWARTER, TRENKER, HÖFLINGER, 2001] and this value was also used to estimate the emissions for 2000.

Table 66 presents the activity data for lime production for the period from 1990 to 2000.

Table 66: Activity data - Lime production 1990–2000

Year	Lime [t/a]
1990	394.821
1991	372.290
1992	356.295
1993	361.992
1994	357.495
1995	377.733
1996	377.733
1997	377.733
1998	377.733
1999	367.504
2000	367.504

Recalculation

The method for estimating CO_2 emissions was changed from a national method to an IPCC-Tier 1 method. The previously used emission factor in the national method was too small (0,37 t/ t) in comparison with the IPCC default values (0,79 – 0,91 t/ t) and thus the reported emissions are higher in this submission than in the previous ones.

The previous estimation of activity data for 1999 was replaced by data from national statistics reported in a study [WINIWARTER, TRENKER, HÖFLINGER, 2001].

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- The production data should be broken down by type of lime (high-calcium lime, dolomite lime, hydraulic lime) instead of using the IPCC default value for production rate of high calcium/ dolomite lime
- Different default emissions factors should be used for different types of lime

2 A 3 Limestone and Dolomite Use

NE

Greenhouse gas emissions from this IPCC-category were not estimated. This category was also of no relevance to the other pollutants that should be reported in the CRF.

2 A 4 Soda Ash Production and Use

NE

Greenhouse gas emissions from this IPCC-category were not estimated. This category is also of no relevance to the other pollutants that should be reported in the CRF.

2 A 5 Asphalt Roofing

Emission: CH_4

Key Source: No

In this category CH_4 emissions from the production and laying of asphalt roofing are considered. CO_2 emissions can be disregarded.

Table 67 presents CH_4 emissions from asphalt roofing for the period from 1990 to 2000.

As can be seen in the table, the CH_4 emissions increased during the period. From 1990 to 2000 the CH_4 emissions increased by 14%. The amount of asphalt roofing also increased during the period.

Table 67: CH_4 emissions from asphalt roofing 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Gg]	0,036	0,036	0,038	0,040	0,041	0,041	0,041	0,041	0,041	0,041	0,041

Methodology

Estimation of CH_4 emissions from asphalt roofing was carried out applying an emission factor in g of m² produced asphalt roofing (CORINAIR simpler methodology).

$$\text{Emission [Mg]} = (\text{Emission factor } [g_{CH4}/m^2_{\text{asphalt roofing}}] \times \text{Activity } [m^2])/1000000$$

Emission factor

An emission factor of 1,3 g/m² of produced asphalt roofing was applied [BUWAL, 1995]. The consumption of bitumen was assumed to be 1,2 kg/m² of asphalt roofing.

Activity data

Activity data for 1990 to 1995 were data from national statistics (ÖSTAT). For the years 1996 to 2000 the activity value from 1995 was used.

Table 68 presents activity data for asphalt roofing for the period from 1990 to 2000.

Table 68: Activity data - asphalt roofing 1990–2000

Year	Asphalt roofing [m²/a]
1990	27.945.000
1991	28.007.000
1992	29.311.000
1993	30.731.000
1994	31.745.000
1995	31.229.000
1996	31.229.000
1997	31.229.000
1998	31.229.000
1999	31.229.000
2000	31.229.000

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- More recent activity data has to be collected (the most recent activity value is from 1995)

2 A 6 Road Paving with Asphalt

NE

Green house gas emissions from this IPCC-category are not estimated. This category is also of no relevance for the other pollutants that should be reported in the CRF.

2 A 7 Mineral Products – Other

In this category glass and magnesite sinter production are addressed.

2 A 7 a Glass Production and 2 A 7 b Magnesite Sinter Production

Emission: CO_2

Key Source: Production of magnesia sinter: Yes

Production of glass: No

This category includes CO_2 emissions from the production of magnesia sinter (calcination step) and the production of glass (decarbonising step).

CO_2 emission from magnesite sinter production is a key source. In 2000 it contributed 0,42% to the total amount of greenhouse gas emissions in Austria (see Table 58).

During production of magnesia sinter CO_2 is generated during the calcination step, when magnesite ($MgCO_3$) is roasted at high temperatures in a kiln to produce MgO. Magnesia sinter is processed in the refractory industry.

During production of glass, CO_2 is generated through decomposition of carbonates.

Table 69 presents the CO_2 emissions from production of magnesia sinter and glass for the period from 1990 to 2000.

As can be seen in the table, CO_2 emissions from both magnesia sinter plants and glass production varied during the period. The overall trend for the sector magnesia sinter plants was decreasing CO_2 emissions, they were 30% less in 2000 than ten years before. For glass production no clear trend was obvious, however the emissions in 2000 were 5,9% less than in 1990.

Table 69: CO_2 emissions from production of magnesia sinter and glass 1990–2000

CO_2 emissions [Gg]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Magnesite Sinter	485	400	316	282	294	339	339	339	339	339	339
Glass Production	84	96	85	85	91	91	91	85	85	93	79

Methodology

Estimation of CO_2 emissions was accomplished by applying an emission factor:

$$Emission\ [Gg] = (Emission\ factor\ [kg_{CO2}/Mg_{activity}] \times Activity\ [Mg])/1000000$$

Emission factor

An emission factor of 1100 kg CO_2 emission per Mg magnesia sinter was applied [MAYER, 2000].

For glass production an emission factor of 210 kg CO_2 per Mg glass was applied.

Activity data

Activity data for the production of magnesia sinter for the years 1990 to 1995 were taken from national statistics (ÖSTAT). For the other years the value from 1995 was used after contact with the producer.

Activity data for the production of glass for 1990 were derived from national statistics (ÖSTAT), for the other years they were reported from the *Association of the Glass Industry* directly to the UBAVIE.

Table 70 presents activity data for production of magnesia sinter and glass for the period from 1990 to 2000.

Table 70: Activity data - magnesia sinter and glass production 1990–2000

Year	Magnesia Sinter [t/a]	Glass [t/a]
1990	441.167	398.515
1991	363.201	458.666
1992	286.945	405.863
1993	256.616	406.222
1994	267.169	434.873
1995	307.768	435.094
1996	307.768	435.094
1997	307.768	405.760
1998	307.768	405.760
1999	307.768	445.069
2000	307.768	375.348

Planned Improvements

Emissions from the IPCC Categories *2 A 4 Soda Ash Production and Use* and *2 A 6 Road Paving with Asphalt* that were not estimated so far are planned to be estimated.

4.2.1.2 Category 2 B Chemical Industry

<u>2 B 1 Ammonia Production</u>

Emission: CO_2 *and* CH_4

Key source: yes (CO_2*)*

In 2000 CO_2 emission from production of ammonia was a key source, it contributed 0,59% to the total amount of greenhouse gas emissions in Austria (see Table 58).

Ammonia (NH_3) is produced by catalytic steam reforming of natural gas or other light hydrocarbons (e.g. liquefied petroleum gas, naphtha). CO_2 is produced by stoichiometric conversion and is mainly emitted during the primary reforming step.

CH_4 is generated in the so called methanator: small amounts of CO and CO_2, remaining in the synthesis gas, are poisonous for the ammonia synthesis catalyst and must be removed by conversion to CH_4 in the methanator.

Table 71 presents CO_2 and CH_4 emissions from ammonia production for the period from 1990 to 2000.

As can be seen in the table, the emissions varied during the period. There was an overall increase of 19% from 1990 to 2000, the most significant change for CO_2 emissions was an increase of 22,8% from 1994 to 1995. Concerning CH_4 emissions there was no clear trend, but in 2000 the CH_4 emissions were 11% lower than in 1990.

Table 71: CO_2 and CH_4 emissions from ammonia production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	396	408	371	403	381	468	465	457	501	472	472
CH_4 emission [Gg]	0,062	0,064	0,058	0,063	0,06	0,061	0,059	0,081	0,102	0,055	0,055

Methodology

The data source for emissions from 1994 to 1999 was the report of emissions presented to the local authority by the only ammonia producer in Austria. These emission data represent plant specific data. With the emission and activity data an annual emission rate was calculated. Emissions for the years 1990 to 1993 were calculated by applying the calculated emission factor for the year 1994.

For 2000 the emissions for 1999 were updated after contact with the producer.

Emissions are measured at the only ammonia producer in Austria, using sampling in time and extrapolation to annual loads. The measurements are performed 2 to 12 times per year for both CO_2 and CH_4.

Emission factors

For the years 1994 onwards emissions were reported directly from industry to the UBVAVIE, thus representing plant specific data. No emission factors were applied for these years, for the years before (1993 to 1990) the calculated emission factor of 1994 was applied on the activity data retrospectively .

The calculated emission factors are presented in Table 72.

Table 72: Implied emission factors for CO_2 and CH_4 emissions from ammonia production 1990–2000

Year	IEF [t CO_2 /t NH_3]	IEF [kg CH_4 / t NH_3]
1990	0,86	0,14
1991	0,86	0,14
1992	0,86	0,14
1993	0,86	0,14
1994	0,86	0,14

Year	IEF [t CO_2 /t NH_3]	IEF [kg CH_4 / t NH_3]
1995	0,99	0,13
1996	0,96	0,12
1997	0,95	0,17
1998	1,03	0,21
1999	0,96	0,11
2000	0,96	0,11

Activity data

Ammonia production data were obtained directly from the only ammonia producer in Austria and thus represent plant specific data. For 2000 the data from 1999 were updated after contact with the producer.

Table 73 presents the activity data for ammonia production for the period from 1990 to 2000.

Table 73: Activity data - ammonia production 1990–2000

Year	Ammonia [t/a]
1990	461 000
1991	475 000
1992	432 000
1993	469 000
1994	444 000
1995	473 000
1996	484 772
1997	479 698
1998	484 449
1999	490 493
2000	490 493

2 B 2 Nitric Acid Production

Emission: N_2O, CO_2

Key Source: No

Nitric acid (HNO_3) is manufactured via the reaction of ammonia (NH_3) whereas in a first step NH_3 reacts with air to NO and NO_2 and is then transformed with water to HNO_3.

In Austria there is only one producer of HNO_3.

Table 74 presents N_2O and CO_2 emissions from production of nitric acid for the period from 1990 to 2000.

As can be seen in the table the emissions varied over the period and there were no clear trends. In the year 2000 N_2O emissions were 3,3% and CO_2 emissions 3,7% lower than in 1990.

Table 74: N_2O and CO_2 emissions from nitric acid production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N_2O emission [Gg]	0,599	0,605	0,548	0,580	0,567	0,547	0,560	0,553	0,571	0,579	0,579
CO_2 emission [Gg]	0,41	0,42	0,38	0,40	0,39	0,37	0,38	0,36	0,38	0,40	0,40

Methodology

Estimation of N_2O emissions was carried out applying an emission factor:

$$\text{Emission [Mg]} = (\text{Emission factor } [g_{N2O}/Mg_{activity}] \times \text{Activity [Mg]})/1000000$$

CO_2 emissions from 1995 to 1999 were directly reported from the only ammonia producer in Austria, thus these emission data represent plant specific data. With the emission and activity data an annual emission rate was calculated. Emissions for 1990 to 1994 were calculated by applying the calculated emission factor from 1995. For 2000 the emissions for 1999 were updated after contact with the producer.

Emission factors

An emission factor of 1130 g N_2O /Mg nitric acid was applied. This value was taken from a study about N_2O emissions in Austria [ORTHOFER, KNOFLACHER, ZÜGER, 1995]. The emission factor in this study is based on direct enquiries at the Austrian nitric acid producer. At this plant the N_2O emissions are measured regularly. From these measurements the following emission factors were calculated:

Process	emission factor
Oxidation without pressure:	0,6 $kg_{N2O}/t_{nitric\ acid}$
Oxidation with medium pressure:	1,5 $kg_{N2O}/t_{nitric\ acid}$

The average value of these two emission factors was applied.

For the years 1995 onwards CO_2 emission factors were calculated from directly reported emission and activity data. For the years before the emission factors were taken from a national study [BMUJF, 1994], these values were also confirmed by the plant operator (see Table 75).

Table 75: Implied emission factors for emissions of CO_2 from nitric acid production 1990–2000

Year	IEF [kg CO_2/Mg product]
1990	0,78
1991	0,78
1992	0,78
1993	0,78
1994	0,78
1995	0,76
1996	0,76

1997	0,73
1998	0,75
1999	0,78
2000	0,78

Activity data

Activity data were directly reported from the nitric acid producer (plant-level production data). For 2000 the value for 1999 was updated after contact with the producer.

Table 76 presents activity data for nitric acid production for the period from 1990 to 2000.

Table 76: Activity data- nitric acid production 1990–2000

Year	Nitric acid [t/a]
1990	530.000
1991	535.000
1992	485.000
1993	513.000
1994	502.000
1995	484.000
1996	495.738
1997	489.375
1998	504.977
1999	512.798
2000	512.798

2 B 3 Adipic Acid Production

NO

Emissions from this IPCC-category were not estimated because there is no adipic acid production in Austria.

2 B 4 Carbide Production

NE

Greenhouse gas emissions from this IPCC-category were not estimated. This category was of no relevance to the other pollutants that are reported in the CRF.

2 B 5 Chemical Industry – Other – Production of NPK-fertilizers and Urea

Emission: CH_4, CO_2

Key Source: No

This category includes CH_4 emissions from the production of urea (CO_2 emissions are negligible) and CO_2 emissions from the production of NPK-fertilizers.

There is only one producer of urea and NPK-fertilizers in Austria.

Table 77 presents the CH_4 and CO_2 emissions for this category for the period from 1990 to 2000.

As can be seen in the table, the CH_4 emissions increased over the period, in 2000 they were 10% higher than in 1990. The production of urea also increased over the period (see Table 78). The trend concerning CO_2 emissions was decreasing emissions. From 1990 to 2000 they decreased by 27% due to lower NPK-fertilizers production (see Table 78).

Table 77: CH_4 emissions from production of urea and CO_2 emissions from production of NPK-fertilizers 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Gg]	0,040	0,042	0,036	0,043	0,051	0,055	0,056	0,053	0,055	0,044	0,044
CO_2 emission [Gg]	27,43	25,19	23,38	24,76	24,26	19,95	18,38	17,57	18,97	19,94	19,94

Methodology

Emissions for 1994 to 1999 were reported by industry directly and thus represent plant-specific data. With the emission and activity data from 1994 an emission factor for 1994 was calculated and applied for the years 1993 to 1990.

CO_2 emissions from NPK-fertilizer production were calculated by industry using a mass balance.

For 2000 the emissions for 1999 were updated after contact with the producer.

Emission factors

For the estimation of CO_2 emissions from the production of NPK-fertilizers no emission factors were applied for the years until 1995. With the plant specific activity data and the directly-reported emission data from industry emissions were calculated. The average calculated emission factor of the years 1995–1999 was applied on the activity data from the years before retrospectively.

Since 1995 CH_4 emissions from urea production were reported directly to the UBAVIE, for the years before the calculated emission factor of the year 1995 was applied.

Activity data

Production data for urea were directly reported from the Austrian producer of urea and thus represent plant-specific data.

Production data for NPK-fertilizers for 1990 to 1994 were taken from national statistics (ÖSTAT), for 1995 to 1999 the production data were reported directly from industry. For 2000 the data for 1999 was updated after contact with the producer.

Table 78 presents the activity data for the period from 1990 to 2000.

Table 78: Activity data – Chemical Industry – other 1990–2000

Year	NPK-fertilizers [t/a]	Urea [t/a]
1990	1.388.621	282.000
1991	1.273.467	295.000
1992	1.182.595	259.000
1993	1.250.804	305.000
1994	1.222.578	360.000
1995	916.265	393.000
1996	940.313	417.705
1997	924.856	392.017
1998	977.212	395.288
1999	988.662	408.386
2000	988.662	408.386

Planned Improvements

Emissions from the IPCC Category *2 B 4 Carbide Production* that was not estimated so far are planned to be estimated.

4.2.1.3 Category 2 C Metal Production

2 C 1 Iron and Steel

Emission: CO_2

Key Source: Yes

In 2000 CO_2 emission from production of iron and steel was a key source. They contributed 10,77% to the total amount of greenhouse gas emissions in Austria (see Table 58).

In Austria the iron and steel (basic oxygen furnace) production is concentrated mainly at two integrated sites operated by the same company. The emission data in Table 79 contains CO_2 emissions from all sites (seven in total) operated by this company.

The total amount of CO_2 emissions contains process related CO_2 emissions from sinter plants, blast furnaces and basic oxygen steel plants. Emissions from combustion processes of sinter plants, coke oven, rolling mills and energy supply were also included in sector *2 C 1*.

Table 79 presents CO_2 emissions (process related and emissions due to fuel combustion) from the production of iron and steel for the period from 1990 to 2000.

CO_2 emissions from Iron and Steel production in 2000 are similar to those of 1990 (1,5% higher), although they have varied from year to year (see Table 79). Both activity and emission data were directly reported by industry.

Table 79: CO_2 emissions from production of iron and steel 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	8.461	8.041	6.949	7.254	7.771	8.585	8.084	9.107	8.385	8.456	8.591

Methodology

Activity and emission data were directly reported by industry and thus represent plant-specific data. With the emission and activity data an emission factor was calculated.

CO_2 emissions were calculated by industry using a carbon mass balance. At the two main integrated sites for iron and steel production process related and CO_2 emissions due to combustion were calculated separately. For the other sites the different emissions were not calculated independently from each other.

For the carbon mass balance all carbon containing mass streams (inputs and outputs) of the respective processes and sites were monitored. For every carbon mass stream an average carbon content was assumed except for the gases for which the carbon content was known. In case of processes assumptions of the generation of carbon monoxide (CO) were made and taken into account. CO_2 emissions from iron and steel production were calculated separately. The total amount of CO_2 emissions was reduced by the amount of carbon that remains in steel. CO_2 emissions represent the difference of carbon in input and output mass streams (excl. extracted air).

The CO_2 emissions of the single processes of the two integrated sites and the total emissions from the other sites were summed up.

For the calculation of CO_2 emissions from fuel burning the plant operator used emission factors from literature.

Emission factors

No emission factors were applied. With the directly reported emission and activity data from industry an emission factor was calculated which are presented in Table 80.

Table 80: Implied emission factors for CO_2 emissions from Iron and Steel Production 1990–2000

Year	IEF [kg CO_2/ Mg product]
1990	2,16
1991	2,06
1992	1,93
1993	1,94
1994	1,96
1995	1,90
1996	2,00
1997	1,94
1998	1,78
1999	1,78
2000	1,67

Activity data

The activity data were plant specific data and were directly reported by the iron and steel industry.

Table 81 presents activity data for metal, sinter and coke production for the period from 1990 to 2000.

Table 81: Activity data - metal, sinter and coke production 1990–2000

Year	Metal production [t/a]	Sinter production [t/a]	Coke production [t/a]
1990	3.922.000	4.384.000	1.724.836
1991	3.896.000	4.412.000	1.539.527
1992	3.592.000	3.026.000	1.486.728
1993	3.736.000	2.986.000	1.401.623
1994	3.964.000	3.264.000	1.432.476
1995	4.529.000	3.565.000	1.447.886
1996	4.041.000	3.197.000	1.558.524
1997	4.700.205	3.425.000	1.566.370
1998	4.707.370	3.353.053	1.598.073
1999	4.751.994	3.371.721	1.607.903
2000	5.150.174	3.552.153	1.385.000

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Review of the methodology for estimating emissions (including emission factors, since IEF for CO_2 is high compared to IPCC default value)
- To specify emissions from steel plant, blast furnace, sinter plant and coke oven separately
- To allocate emissions due to energy combustion from *Industrial Processes* to *Energy*

2 C 2 Ferroalloys Production

NE

Greenhouse gas emissions from this IPCC-category were not estimated. This category was of no relevance to the other pollutants that are reported in the CRF either.

2 C 3 Aluminium Production – except SF_6

Emission: PFCs

Key Source: No

This category includes emissions of PFCs from aluminium production. The two PFCs, tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6) are emitted from the process of primary aluminium smelting. They are formed during the phenomenon known as the anode effect (AE).

PFC emissions from primary aluminium production were only relevant for the years 1990 to 1992 (termination of primary aluminium production in Austria since 1992).

Table 82 presents the PFC emissions from primary aluminium production for the period from 1990 to 1992.

Table 82: PFC emissions from primary aluminium production from 1990 to 1992

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PFC emission [Gg CO_2-equivalent]	937	941	535	NO	NO	NO	NO	NO	NO	NO	NO

Methodology

PFC emissions were estimated using the IPCC Tier 1b methodology. The specific CF_4 emissions (and C_2F_6 emissions respectively) of the anode effect were calculated by applying the following formula [BARBER, 1996], [GIBBS, 1996], [TABERAUX, 1996]:

$$\text{kg } CF_4/t_{Al} = (1{,}7 \times AE/pot/day \times F \times AE_{min})/CE$$

Where:

AE/pot/day	=	frequency of occurrence of the anode effect (dependent on type of oxide supply (1,2 / day)
t_{Al}	=	effective production capacity per year [t]
AE_{min}	=	anode effect duration in minutes (5 min)
F	=	fraction of CF_4 in the anode gas (13%)
CE	=	current efficiency (85%)
1,7	=	constant resulting from Faraday's law

In Austria so called “Søderberg” anodes were used. The frequency of the anode effect (AE/pot/day) was about 1,2 per day. The duration of the anode effect (AE_{min}) was in the range of 4 to 6 minutes. The average fraction of CF_4 formed in percent of the anode gas (F) can be determined as a function of the duration of the anode effect. International values are about 10% after two minutes, 12% after three minutes and after that there is only a marginal increase. Therefore for Austrian aluminium production a CF_4 fraction in the anode gas of 13% was assumed.

Because C_2F_6 is formed only during the first minute of the anode effect, the rate of C_2F_6 is the higher the shorter the duration of the anode effect is. For the aluminium production in Austria the rate of C_2F_6 is about 8% and the current efficiency (CE) about 85,4%.

The production capacity (83.000 t_{Al}/a) represents plant specific data.

By inserting these data into the formula mentioned above an emission factor of 1,56 kg CF_4 / t aluminium was calculated.

2 C 4 SF_6 Used in Aluminium and Magnesium Foundries

Aluminium and Magnesium Production – SF_6 only

Emission: SF_6

Key Source: Yes

This category includes emissions of SF_6 from magnesium and aluminium foundries.

In 2000 SF_6 emission from aluminium and magnesium foundries was a key source due to its contribution to the trend in total greenhouse gas emissions from 1990 to 2000 and also due to its contribution to the total greenhouse gas emissions in 1990. They contributed 0,01% to the total amount of greenhouse gas emissions in Austria (see Table 58).

Table 83 presents the potential SF_6 emissions from magnesium and aluminium foundries for the period from 1990 to 2000.

As can be seen in the table, the potential SF_6 emissions have been fluctuating during the period, but the overall trend has been decreasing potential SF_6 emissions, from 1990 to 2000 they decreased by 97%.

Table 83: SF_6 emissions from magnesium and aluminium foundries 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SF_6 emission [Gg]	0,0106	0,0116	0,0106	0,0116	0,0156	0,0185	0,0256	0,0146	0,0069	0,0009	0,0003

Methodology

SF_6 used in aluminium foundries

Information about the amount of SF_6 used in aluminium foundries was obtained directly from the aluminium producers in Austria and thus represent plant-specific data. Actual emissions of SF_6 correspond to the annual consumption of SF_6 in the aluminium foundries.

SF_6 used in magnesium foundries

Estimation of actual SF_6 emissions from magnesium foundries was carried out by applying an emission factor (no potential emissions occur):

$$\text{Emission [Mg]} = (\text{Emission factor } [g_{SF6}/Mg_{activity}] \times \text{Activity [Mg]})/1.000.000$$

Emission factor

SF_6 used in magnesium foundries

For estimation of SF_6 from magnesium foundries an emission factor of 4 kg SF_6 per ton of magnesia die cast was applied. This emission factor was derived from a worldwide survey of 20 producers of magnesia die cast [LEISEWITZ, 1996].

Secondary Aluminium Production

There were no process specific GHG emissions from secondary aluminium production. CO_2 emissions due to combustion from secondary aluminium production have been accounted in the IPPC Category *1 Energy*.

2 C 5 Metal Production - Other

In this category production in electric furnace steel plants and rolling mills are addressed.

2 C 5 a Electric furnace steel plants

Emission: CH_4

Key Source: No

This category includes CH_4 emissions from electric furnace steel plants. Table 84 presents these emissions for the period from 1990 to 2000.

As can be seen in the table the CH_4 emissions were constant during the period due to constant production.

Table 84: CH_4 from electric furnace steel plant 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Gg]	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002

Methodology

Estimation of CH_4 emissions was carried out applying an emission factor:

$$\text{Emission [Mg]} = (\text{Emission factor } [g_{CH4}/Mg_{activity}] \times \text{Activity [Mg]})/1.000.000$$

Emission factors

An emission factor of 5 g CH_4 /Mg electric steel was applied.

An emission factor for VOC emissions from production of steel in Austria was taken from a study published by the Austrian chamber of commerce, section industry [WINDSPERGER & TURI, 1997]. It was assumed that total VOC emissions are composed of 10% CH_4 and 90% NMVOC (expert judgement UBAVIE).

Activity data

Activity data were obtained from the *Association of Mining and Steel* and thus represent plant specific data.

Table 85 presents activity data for electric steel production for the period from 1990 to 2000.

Table 85: Activity data - Electric steel production 1990–2000

Year	Electric steel production [t/a]
1990	431.000
1991	431.000
1992	431.000
1993	431.000
1994	431.000
1995	431.000
1996	431.000

Year	Electric steel production [t/a]
1997	431.000
1998	431.000
1999	431.000
2000	431.000

2 C 5 b Rolling Mills

Emission: CH_4

Key Source: No

This category includes CH_4 emissions from rolling mills.

Table 86 presents CH_4 emissions from this category for the period from 1990 to 2000.

As can be seen in Table 86 the CH_4 emissions increased steadily over the period, by the year 2000 they were 31% higher than in the base year. The steel production in rolling mills increased also during the same period, which explains the increased emissions.

Table 86: CH_4 emissions from Rolling Mills 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Mg]	0,39	0,39	0,36	0,37	0,40	0,45	0,40	0,47	0,47	0,48	0,52

Methodology

Estimation of CH_4 emissions was carried out applying an emission factor:

$$\text{Emission [Mg]} = (\text{Emission factor } [g_{CH4}/Mg_{activity}] \text{ x Activity [Mg]})/1.000.000$$

Emission factors

An emission factor of 0,1 g CH_4 /Mg steel was applied.

An emission factor for VOC emissions from rolling mills was reported directly by industry and thus represents plant specific data. It was assumed that VOC emissions are composed of 10% CH_4 and 90% NMVOC (expert judgement UBAVIE).

Activity data

The activity data were plant specific data and were directly reported by the iron and steel industry.

Table 87 presents the activity data for rolling mills for the period from 1990 to 2000.

Table 87: Activity data – Rolling mills (steel production) 1990–2000

Year	Rolling mills (Steel production) [t/a]
1990	3.922.000
1991	3.896.000
1992	3.592.000
1993	3.736.000
1994	3.964.000
1995	4.529.000
1996	4.041.000
1997	4.700.205
1998	4.707.370
1999	4.751.994
2000	5.150.174

Planned Improvements

Emissions from the IPCC Category *2 C 4 Ferroalloys Production* that were not estimated so far is planned to be estimated.

4.2.1.4 Category 2 D Other Production

In this category production of pulp and paper and food and drink are addressed.

2 D 1 Pulp and Paper

IE

Emissions from this IPCC-category were included under category *1 A 2 f* because emissions from pulp and paper production are mainly emissions due to combustion.

2 D 2 Food and Drink

Emission: CO_2

Key Source: No

This category includes CO_2 emissions from the production of bread, wine, sprits and beer.

Table 88 presents the total CO_2 emissions from this category for the period from 1990 to 2000.

As can be seen in the table the CO_2 emissions varied during the period, but the overall trend was decreasing CO_2 emissions. From 1990 to 2000 the CO_2 emissions decreased by 19%.

Table 88: CO_2 emissions from food and drink production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	60	59	54	47	52	51	50	47	48	48	48

Methodology

Emissions were calculated by multiplying the annual production rate with an emission factor.

Emission factors[11]

The following emission factors were applied:

Bread: 7 kg_{CO2}/Mg_{bread}

Wine: 10 kg_{CO2}/hl_{wine}

Beer: 0,5 kg_{CO2}/hl_{beer}

Sprits: 80 kg_{CO2}/hl_{spirit}

All emission factors were taken from [BUWAL, 1995] because of the very similar structures and standards of industry in Austria and Switzerland.

Activity data[12]

The bread production data were taken from national statistics (STATISTIK AUSTRIA) and originated from an internal study of the Federal Ministry of Environment. Production data for wine were obtained from the Standing Committee of the Presidents of the Austrian Chambers of Agriculture. Production data for beer and spirits were obtained from national statistics and from the Association of the Food Industry.

Table 89 presents activity data for bread, wine, beer and spirits production for the period from 1990 to 2000.

Table 89: Activity data - Food and drink production 1990–2000

Year	Bread [t/a]	Wine [t/a]	Beer [t/a]	Spirits [t/a]
1990	240.374	3.166.290	10.176.200	260.100
1991	240.374	3.093.259	10.176.200	260.100
1992	240.374	2.588.215	10.176.200	260.100
1993	240.374	1.865.479	9.788.520	266.140
1994	240.374	2.646.635	9.934.760	235.950
1995	240.374	2.228.969	9.473.950	276.710
1996	240.374	2.110.332	9.370.693	276.710
1997	240.374	1.801.747	9.303.437	276.710
1998	240.374	1.956.040	8.836.673	276.710

[11] There are no emission factors in the CRF sectoral background data table 2(I), because it is not possible to give one emission factor for all the food and drink industry (different units of emission factors). The same can be applied for activity data.

[12] NA: not applicable means that it is not possible to give summarised activity data for all food and drink industry, because for different sectors different units of production data exist.

Year	Bread [t/a]	Wine [t/a]	Beer [t/a]	Spirits [t/a]
1999	240.374	1.956.040	8.836.673	276.710
2000	240.374	1.956.040	8.836.673	276.710

4.2.1.5 Category 2 E Production of Halocarbons and SF_6

NO

There is no production of Halocarbons and SF_6 in Austria.

4.2.1.6 Category 2 F Consumption of Halocarbons and SF_6

Emission: HFC, PFC, SF_6

Key Source: Yes

This category includes the following emission sources: refrigeration and air conditioning equipment, foam blowing, fire extinguishers, aerosols/metered dose inhalers, semiconductor manufacture, electrical equipment and other sources (electrical transmission and distribution, noise insulation windows).

Potential emissions are only reported as sums under category *2 F*, estimation of actual emissions see the respective sub-categories.

In the year 2000 SF_6 emission from consumption of halocarbons and sulphur hexafluoride was a key source. They contributed 1,3% to the total amount of greenhouse gas emissions in Austria (see Table 58).

The basic data about consumption of HFC, PFC and SF_6 were determined from the following sources:

- Data from national statistics
- Data from Associations of Industry
- Direct information from importers and end users

2 F 1 Refrigeration and air conditioning equipment

Consumption data was obtained directly from the most important importers of refrigerants. The volume of stocks of household, industrial and commercial refrigerators, heat pumps, cold storage warehouses, automobiles with mobile air condition and imported mobile refrigeration systems were obtained from Associations of Industry.

HFC-125, HFC-143a and HFC-32 were not in use as individual gases but are parts of the blends used for stationary refrigeration where actual emissions normally accord with the respective equipment installation stock.

2 F 2 Foam blowing and XPS/PU plates

Production data and information about the used blowing agent were obtained from Associations of Industry (construction industry).

The actual emissions were calculated from the total consumption of XPS/PU plates in Austria - about 75% of the XPS/ PU plates are imported. Based on expert judgement it was assumed that for plates of common thickness (40 to 60 mm) about 5 kg blowing agent per m³ plate are used. About 30% of that amount (that are 1,5 kg) is emitted during production and storage at the place of production. The rest - about 3,5 kg per m³ XPS/ PU plate - is emitted gradually by diffusion. These diffusion losses were calculated using the half-life-time with the following formula:

$$T½ \approx 0{,}8 \times 10^{-6} \times d^2/D$$

Where: d = thickness of the plates [cm]

D = Diffusion coefficient [cm²/s]

T½ = half-life-time [days]

For HFC R134a a diffusion coefficient of $2{,}9\times10^{-9}$ cm²/s and for HFC R152a a diffusion coefficient of $0{,}21\times10^{-6}$ cm²/s was assumed.

The consumption per capita of XPS/ PU plates in Austria is higher than in all other European countries.

2 F 3 Fire Extinguishers

From 1992 to 1995 1.000 t of R 3110 for the use in fire extinguishers in Austria was sold. The potential emissions therefore are 1.000 t minus the actual emissions from the years before. Actual emissions were assumed to be 1%.

HFC-23 and HFC-227ea in fire extinguishers were first introduced to the Austrian market in 1995. It was assumed that the actual emissions correspond to 1,5% of the annual potential emissions. Potential emissions correspond to the sum of consumption data of all years before.

Consumption data were obtained directly from the producers of fire extinguishers.

2 F 4 Aerosols/Metered Dose Inhalers

NO

There was no consumption of Halocarbons and SF_6 under this category in Austria.

2 F 5 Solvents concerning Halocarbons

NO

There was no consumption of Halocarbons and SF_6 under this category in Austria.

2 F 6 a Semiconductor Manufacture

SF_6 is used for etching in semiconductor manufacture and for insulation purposes for high frequency measurements.

All consumption data and data about actual emissions of SF_6 from semiconductor manufacture were based upon direct information from industry. Potential emissions were assumed to be the actual emissions plus 5% of the total consumption (Usual potential emissions are the consumption figures!).

2 F 6 b Electrical Equipment

All consumption data and data about emissions of PFCs from electrical equipment were based upon direct information from industry. The actual emissions correspond to approximately 8% (CF_4), respectively 1% (C_2F_6) of the total consumption. Potential emissions were not relevant.

2 F 6 c Other - SF_6 from electrical transmission and distribution

Based on information from energy supplier and industry it was estimated that in 1998 about 100 tons SF_6 were used for electrical transmission and distribution purposes. From these 100 tons about 97% can be assigned to the high voltage sector and about 3% can be assigned to the middle voltage sector.

With the following assumptions the SF_6 emissions were calculated:

- Consumption of SF_6 means first filling of equipment installations and covering of losses.
- There are no emissions during first filling on site. When equipment installation is opened for servicing or if there is leakage, emissions are below 1% of total filled SF_6 (expert judgement).
- The potential emissions correspond to the respective equipment installation stock.

2 F 6 c Other - SF_6 from noise insulate glass

Activity data were based upon direct information from industry. The average consumption of SF_6 was calculated by multiplying the area of SF_6 filled insulate glass produced with the average SF_6 consumption per square meter glass (11 litre SF_6/m^2 – 8 litre filling plus 3 litre losses). The calculated volume was multiplied with a density of 6.18 g/litre.

The actual emissions were the annual congestion losses based on annual production data plus the leakage's losses (1%) of the total stock of insulate glasses filled with SF_6. The potential emissions correspond to the total SF_6 included in insulate glasses (about 50 g SF_6/m^2), minus the amount of SF_6 which escaped before by diffusion.

4.3 Solvent and Other Product Use (IPCC category 3)

This Chapter describes the methodology used for calculating solvent use in Austria and its relation to CO_2-emissions. Solvents are chemical compounds, which are used to dissolve substances as paint, glues, ink, rubber, plastic, pesticides or for cleaning purposes (degreasing). After application of these substances or other procedures of solvent use most of the solvent is released into air. Because solvents consist mainly of NMVOC, solvent use is the major source for anthropogenic NMVOC emissions in Austria. Once released into the atmosphere NMVOCs react with reactive molecules (mainly HO-radicals) or high energetic light to finally form CO_2.

Estimations for N_2O emissions from other product use are addressed as well.

Emission Trends

In the year 2000 this category has a contribution of 0,8% to the total of Austria's greenhouse gas emissions (not considering CO_2 from LUCF). The trend of GHG emissions from 1990 to 2000 shows a decrease of 16,8% for this sector (see Table 90) due to change in activity data.

Table 90: Trend in greenhouse gas emissions of Category 3 Solvent and Other Product Use 1990–2000

GHG	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990–2000 Trend
	CO_2 equivalents [Gg]											
TOTAL	**755**	**669**	**614**	**593**	**594**	**613**	**612**	**638**	**628**	**628**	**628**	**–16,8%**
CO_2	523	436	381	361	361	381	379	406	396	396	396	–24,3%
N_2O	233	233	233	233	233	233	233	233	233	233	233	0,0%

Key sources

Category *Solvent and other Product Use* is defined as an independent source category for the key source analysis. This sector was determined as a Key Source within CO_2 emissions due to the Level Assessments 1990 and 2000 and also due to the Trend Assessment 1990–2000.

Table 91: Source categories – key sources of category Solvent and other Product Use.

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
3	Solvent and other Product Use	CO_2	LA1990, LA2000, TA

LA1990 = Level Assessment 1990
LA2000 = Level Assessment 2000
TA = Trend Assessment 1990–2000

Quality Assurance and Quality Control (QA/QC)

For the Austrian Inventory there is an internal quality management system, comprising the whole emission inventory (see Chapter 1.3.).

Inquiries from industry show inconsistencies with the statistical data – see *Planned Improvements* at the end of this chapter and in chapter 4.3.2.

Uncertainty Assessment

A first comprehensive uncertainty analysis was performed as a pilot study [WINIWARTER & RYPDAL, 2001] on the greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997.

For further information concerning uncertainty assessment see chapter 1.4.

Recalculation to previous submission

No recalculations were done in this category.

Methodology

Table 92 shows the IPCC categories and the corresponding SNAP categories for which the actual calculations are made.

Table 92: IPCC category 3 and corresponding SNAP categories

IPCC-Category	SNAP-Category	Description
3 A	**0601**	**PAINT APPLICATION**
	060101	Paint application: manufacture of automobiles
	060102	Paint application: car repairing
	060107	Paint application: wood
	060108	Other industrial paint application
	060109	Other non industrial paint application
3 B	**0602**	**DEGREASING AND DRY CLEANING**
3 C	**0603**	**CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING**
	060307	Paints manufacturing
	060312	Textile finishing
3 D	**0604**	**OTHER**
		Use of N_2O
	060501	Anaesthesia
	060505	Fire Extinguishers
	060506	Aerosol Cans
	060508	Other
		Other Use of Solvents and Related Activities
	060403	Printing industry
	060405	Application of glues and adhesives

4.3.1 Source Categories

3 A Paint Application - 3 B Degreasing and Dry Cleaning - 3 C Chemical Products, Manufacture and Processing - 3 D Other – Other Use of Solvents and Related Activities

Methodology

Estimation of CO_2 emissions include the following steps:

Step 1: Estimation of the consumption of each product group of the statistical data set.

Step 2: Estimation of the solvent content of each product group of the statistical data set.

Step 3: Estimation of the NMVOC content of solvents.

Step 4: Estimation of the carbon content of NMVOC.

Step 5: Calculation of CO_2 emissions

Emission factors

Steps 3–5 of the above mentioned methodology are performed as follows:

The NMVOC content of each of the substances is estimated by expert judgement . It is assumed to be on average 85% for all solvents.

The carbon content of NMVOC is also estimated by expert judgement and is assumed to be on average 85% for total NMVOC.

Calculate CO_2 emissions with formula:

$$CO_2[Gg] = \text{carbon content}[Gg] \times 44 / 12$$

Activity data

Steps 1–2 of the above mentioned methodology are performed by using a national study [SCHÖRNER & SCHÖNSTEIN, 1999] As there is no standard IPCC methodology in the GPG for calculating emissions from solvent use a revised version of the CORINAIR detailed methodology is applied.

CORINAIR detailed methodology:

> *This method is based on a mass balance per solvent. The sum of all solvent mass balances equals the NMVOC emission due to solvent use. In formula the solvent mass balance is:*
>
> *consumption = production + import - export - destruction/disposal - hold-up*

The simplified formula without consideration of destruction/disposal and hold-up is:

consumption = production + import - export

The data used to perform step 1 are from STATISTIK AUSTRIA. The number of solvent containing substances is 83 organic compounds in 65 product categories. Each compound or product category has a specific solvent content, which has to be estimated by expert judgement. Unfortunately statistical data are not consistent because of different categories of the production- and import/export-statistics. Changes in the meaning of product categories lead to further inconsistencies of time series.

It has to be noted that a sectoral approach of the category *Solvent Use* is difficult when using the top down methodology. For the sectoral approach some additional information from industry and manufacturers is gathered, which is also used for verification purposes.

Table 93 shows the total solvent use and respective CO_2 emissions.

Table 93: Total solvent consumption

Year	Solvent-Consumption [Gg]	CO_2 emissions from Solvent Use [Gg]
1990	197,29	522,65
1991	164,75	436,44
1992	143,99	381,45
1993	136,22	360,87
1994	136,42	361,41
1995	143,68	380,64
1996	143,10	379,09
1997	153,05	405,46
1998	149,34	395,64
1999 (1)	149,34	395,64
2000 (1)	149,34	395,64

(1) Preliminary estimate: Value of 1998

3 D Other – Use of N_2O

Anaesthesia

Methodology/ Emission factors/ Activity data

100% of N_2O used for anaesthesia is released into atmosphere, therefore the emission factor is 1,00 Mg N_2O / Mg product use.

It is assumed that the use of N_2O for anaesthesia is constant at 350 tons per year. This estimation is based upon expert judgement and industry inquiries.

Fire Extinguishers

N_2O emissions from this category are not estimated. It is assumed that emissions from this source are very low in Austria since N_2O driven fire extinguishers are not in a widespread use, the uncertainty of emission estimations would be very high and emissions are not expected to vary widely over time.

Aerosol Cans

Methodology/ Emission factors/ Activity data

100 % of N_2O used for aerosol cans is released into atmosphere, that's why the emission factor used is 1,00. It is assumed that the use of N_2O for aerosol cans is constant at 400 tons per year. This estimation is based upon expert judgement and industry inquiries.

Other

No other occurrences of N_2O emissions were considered.

4.3.2 Planned Improvements

Verification of the results obtained by inquiries from industry shows that there are some inconsistencies with the statistical data.

The assumed NMVOC factor of 85% for all solvents is generally too high and in reality not constant over the time series because NMVOC contents of the substance groups have become lower over time in order to comply with the new solvent directives. It is recommended to estimate the NMVOC content for each product group separately.

Because of methodological changes and inconsistencies of the statistical data the actual top down method may be improved by combining it with a bottom up approach which is based on inquiries of industry and manufacturers.

4.4 Agriculture (IPCC Category 4)

This chapter includes information about the estimation of greenhouse gas emissions of the sector *Agriculture* in Austria in correspondence to the data which are reported under the IPCC category 4 in the Common Reporting Format.

The following sources occur in Austria: domestic livestock activities with enteric fermentation and manure management, agricultural soil management and agricultural residue burning.

In the sector Agriculture only CH_4 and N_2O emissions are estimated as greenhouse gases. Anthropogenic CO_2 emissions from *Agricultural Soils* resulting from *Cropland Management* and *Grazing Land Management* are not included within the Austrian Inventory for the time being.

The requirements of the Good Practice Guidelines for the estimation of greenhouse gas emissions for the key source categories are not fulfilled now. A quality improvement program has been launched in 2001 with the aim to fully implement the 1996 Revised IPCC Guidelines as well as the Good Practice Guidance. Based on the outcome of this program Austria will be in position to report updated figures in its 2003 submission. Key issues of the improvement of this sector are described as well.

To give an overview of Austria's farm structure some information is provided below (according to the 1999 Farm Structure Survey – full survey) [BMLFUW, 2001]:

Agriculture in Austria is small-structured: 217.508 farms are managed, 41% of these farms manage less than 10 ha cultivated area. More than 85.000 holdings are classified as situated in handicap zones. Related to the federal territory Austria has the highest share of mountainous areas in the EU (70%).

The agricultural area comprises 3,4 million hectares that is a share of ~ 41% of the total territory (forestry ~46%, other area ~13%). The shares of the different agricultural activities are as follows:

- 41% arable land
- 27% grassland (meadows mown several times and seeded grassland)
- 30% extensive grassland (meadows mown once, litter meadows, rough pastures, Alpine pastures and mountain meadows)
- 2% other types of agricultural land-use (vineyards, orchards, house gardens, vine and tree nurseries)

Emission Trends

In the year 2000 the sector Agriculture has a contribution of 6% to the total of Austria's greenhouse gas emissions (not considering CO_2 emissions from LUCF). The trend of GHG emissions from 1990 to 2000 shows a decrease of 14% for this sector (see Table 94) due to change in activity data.

Table 94: Trend in greenhouse gas emissions for the sector Agriculture 1990–2000

GHG	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990–2000 Trend
	CO_2 equivalents [Gg]											
TOTAL	**5.596**	**5.525**	**5.372**	**5.338**	**5.287**	**5.144**	**5.082**	**5.052**	**5.031**	**4.927**	**4.812**	**-14,00%**
CH_4	4.569	4.496	4.340	4.304	4.263	4.131	4.068	4.038	4.027	3.933	3.823	-16,34%
N_2O	1.026	1.029	1.032	1.035	1.024	1.014	1.014	1.015	1.004	994	990	- 3,59%

The contribution of the subcategories in the sector Agriculture for the year 2000 is shown in Table 95. *Enteric Fermentation* (share of 54%) and *Agricultural Soils* (35%) are the most important sources for the release of greenhouse gas emissions in this sector. Also CH_4 emissions from the category *Manure Management* (10%) is considered as key source. Since 1990 field burning of agricultural residues is legally restricted, the respective subcategory has only minor importance on the release of greenhouse gases in Austria.

Table 95: Greenhouse gas emissions from Agriculture in the year 2000

Greenhouse gas source and sink categories	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
4. Agriculture	**NE**	**3 822,72**	**989,51**	**NO**	**NO**	**NO**	**4 812,24**
4A. Enteric Fermentation	NO	2 596,56	NO	NO	NO	NO	2 596,56
4B. Manure Management	NO	504,08	NE	NO	NO	NO	504,08
4C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO
4D. Agricultural Soils	NE	717,66	987,05	NO	NO	NO	1 704,72
4E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO
4F. Field Burning of Agricultural Residues	NO	4,42	2,46	NO	NO	NO	6,88

Key sources

Table 96 shows the source categories at the level of aggregation for the key source analysis (for the key source analysis see Chapter 3).

Table 96: Source categories – key sources of the sector Agriculture

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
4 A 1	Agriculture_Enteric Fermentation_Cattle	CH_4	LA1990, LA2000, TA
4 A 3	Agriculture_Enteric Fermentation_Sheep		
4 A 4	Agriculture_Enteric Fermentation_Goats		
4 A 6	Agriculture_Enteric Fermentation_Horses		
4 A 8	Agriculture_Enteric Fermentation_Swine		
4 B 1	Agriculture_Manure Management_Cattle	CH_4	LA1990
4 B 3	Agriculture_Manure Management_Sheep		
4 B 4	Agriculture_Manure Management_Goats		

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
4 B 6	Agriculture_Manure Management_Horses		
4 B 8	Agriculture_Manure Management_Swine		
4 B 9	Agriculture_Manure Management_Poultry		
4 D	Agriculture_Agricultural Soils	CH_4	LA1990, LA2000
		N_2O	LA1990, LA2000
4 F	Agriculture_Field Burning of Agricultural Wastes		

* shaded cell: source category is not a key source
LA1990 = Level Assessment 1990
LA2000 = Level Assessment 2000
TA = Trend Assessment 1990–2000

The IPCC-categories *Enteric Fermentation* and *Manure Management* are disaggregated to animal species. This division is considered as reasonable because different emission factors are used for the estimation of CH_4 emissions. Cattle have a contribution of 93% to the CH_4 release within *Enteric Fermentation* and has been identified as a key source.

In comparison to last year's key source assessment now also CH_4 emissions from *Manure Management-Cattle* has been identified as a key source category. The contribution to Austria's total is 0,41% in the year 1990 and 0,32% in the year 2000.

The source category *Agricultural Soils* is identified as key source category due to its CH_4 and N_2O emissions. Because of the methodology used to estimate emissions from this category, a disaggregation to subcategories is not possible. (see also *Chapter 4.3.1 - 4 D Agricultural Soils*)

Quality Assurance and Quality Control (QA/QC)

For the Austrian Inventory there is an internal quality management system, comprising the whole emission inventory (see Chapter 1.3)

Uncertainty Assessment

A first comprehensive uncertainty analysis was performed as a pilot study by WINIWARTER & RYPDAL, 2001 on the greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997.

This analysis is described in chapter 1.4.

It states in general that the uncertainty of statistical activity data is low, in return uncertainty of used emission factors and methodology is high for this sector.

Following uncertainties of sub-categories have been estimated:

Activity data: animal population 10%
agricultural used land 5%

CH_4 – Emission factor: *Enteric Fermentation*: 50%
Agricultural Soils: 100%

N_2O – Emission factor: *Agricultural Soils*: up to 143%

The method used to estimate emissions in the sector Agricultural Soils has an uncertainty for CH_4-Emissions from –105% to +205%, for N_2O-Emissions from 32% to 766%.

Uncertainty in both activity data and emission factors relating to *Burning of Agricultural Residues* are assumed to be 100%

Recalculation to previous submission

Recalculations since the submission 2001 have been made in two categories of Agriculture:

<u>Category *4 D Agricultural Soils*:</u>

Activity data for the years 1998 and 1999 have been updated according to results of a 1999 Farm Structure Survey in Austria. In the 2001 submission activity data of the year 1997 were used as proxy for following years since no other information was available. These recalculations have minor effects on the total of greenhouse gas emissions.

<u>Category *4 F Field Burning of Agricultural Residues*:</u>

1990-1999: In the submission 2001 emissions from open burning of residual wood from vinicultures were reported under category *6 C 2 Waste Incineration*. According to a proposal of the in country review team in October 2001 these emissions have been reallocated and are included now in sector *4 F*. This does not change the total amount of emissions but helps to improve comparability.

Methodology

Estimations of greenhouse gas emissions for the sector *Agriculture* are based on a simple methodology (Emission = Activity x Emission Factor). The same methodology and a constant emission factor from 1990 to 2000 are used.

Table 97 shows the IPCC categories and the corresponding SNAP categories for which the actual calculations are made.

Table 97: IPCC categories and the corresponding SNAP categories for IPCC Category 4

IPCC-Category		SNAP-Category	Description
4 A	**ENTRIC FERMENTATION**		
4 A 1 a	Dairy Cattle	100401	Dairy cows
4 A 1 b	Non-Dairy Cattle	100402	Other cattle
4 A 2	**Buffalo**	100414	Buffalos
4 A 3	**Sheep**	100403	Ovines
4 A 4	**Goats**	100407	Goats
4 A 5	**Camels and Lamas**	100413	Camels
4 A 6	**Horses**	100405	Horses
4 B 7	**Mules and Asses**	100406	Mules and asses
4 A 8	**Swine**	100404	Fattening pigs
4 A 9	**Poultry**	100408 100410	Laying hens Other poultry (ducks, gooses, etc.)

IPCC-Cate-gory		SNAP-Cate-gory	Description
4 B	**MANURE MANAGEMENT**		
4 B 1	**Cattle**		
4 B 1 a	Dairy Cattle	100501	Manure Management of organic compounds - Dairy cows
4 B 1 b	Non-Dairy Cattle	100502	Manure Management of organic compounds - Other cattle
4 B 2	**Buffalo**	100514	Manure Management of organic compounds - Buffalos
4 B 3	**Sheep**	100505	Manure Management of organic compounds - Ovines
4 B 4	**Goats**	100511	Manure Management of organic compounds - Goats
4 A 5	**Camels and Lamas**	100513	Manure Management of organic compounds - Camels
4 B 6	**Horses**	100506	Manure Management of organic compounds - Horses
4 B 7	**Mules and Asses**	100506	Manure Management of organic compounds - Mules and asses
4 B 8	**Swine**	100503	Manure Management of organic compounds - Fatten-ing pigs
4 B 9	**Poultry**	100507 100509	Manure Management of organic compounds - Laying hens -Other poultry
4 C	**RICE CULTIVATION**		
4 D	**AGRICULTURAL SOILS**		
		100101	Cultures with fertilizers - Permanent crops
		100102	Cultures with fertilizers - Arable land crops
		100104	Cultures with fertilizers - Market gardening
		100105	Cultures with fertilizers - Grassland
		100205	Cultures without fertilizers - Grassland
		100206	Cultures without fertilizers - Fallows
4 E	**PRESCRIBED BURNING OF SAVANNAS**		
4 F	**FIELD BURNING OF AGRICULTURAL WASTE**		
4 F 1	**Cereals**	100301	Cereals
4 F 5	**Other- Vine**	0907	Open burning of agricultural wastes (except 10.03)

4.4.1 Source Categories

4.4.1.1 Categories 4 A and 4 B Domestic Livestock: Enteric Fermentation and Manure Management

For these categories CH_4 emissions are estimated using the CORINAIR97 source categories. *Enteric Fermentation* as well as *Manure Management for Cattle* have been identified as key source categories.

N_2O emissions of the category *Manure Management* are not yet reported – it is planned to include them in the 2003 submission.

The requirements of the Good Practice Guidelines for the estimation of greenhouse gas emissions for the key source categories are not fulfilled now. A quality improvement program has been launched in 2001 with the aim to fully implement the 1996 Revised IPCC Guidelines as well as the Good Practice Guidance. Based on the outcome of this program Austria will be in position to report updated figures for categories *4 A* and *4 B* in its 2003 submission.

Methodology

CORINAIR-Simple Methodology (Emission = Activity x Emission Factor) was used.

> *The simpler approach for estimating methane emissions from animal husbandry is to use an average emission factor per animal for each class of animal and to multiply this factor with the number of animals counted in the annual agricultural census.*

(citation from EMEP/CORINAIR Guidebook (1999) page B1040-3)

Emission factors

Table 98 lists the default and country specific CH_4 emission factors used.

4 A Enteric Fermentation:

For the categories Dairy Cattle and Non-Dairy Cattle the emission factors used are lower compared to the IPCC default values for the region based upon expert judgement taking into account the less intensive agricultural practice in Austria compared to those countries for which the emission factors have been estimated.

The information on milk yield in the CRF Background table is only mentioned for comparison reason and is not yet used for the determination of the emission factor. It will be taken into account in the new approach.

4 B Manure Management:

The emission factors used are also based upon expert judgement and are all lower compared to IPCC default values for the clime "cool" for the same reason as described above.

Table 98: Emission factors used for CH_4-Emissions Domestic Livestock

	Enteric Fermentation	Manure Management
	[kg CH_4/head/a]	
Dairy Cattle	92,00	8,70
Non Dairy Cattle	38,00	4,30
Sheep	8,00	0,22

Goats	5,00	0,14
Horses	18,00	1,63
Swine	1,50	4,30
Poultry	0,00	0,09

Activity data

Animal population data are reported annually and are based on a general counting of domestic livestock („Die Allgemeine Viehzählung AVZ“) at December 1st. It is carried out by STATISTIK AUSTRIA according to national regulations.

STATISTIK AUSTRIA publishes these annual animal population data in Statistical Yearbooks[13].

Further animal population data are used to distinguish between the categories Dairy Cattle and Other Cattle, provided by PRÄKO (for the years 1990-1998) and from AMA[14] (for the years 1999 and 2000). These data are also based on the AVZ.

The cattle population for the year 2000 within the AVZ was estimated using the "Cattle-Database" (Rinderdatenbank), which is operated by AMA for veterinary-hygienic reasons and which is the basis for paying compensation to farmers since 1995 when Austria became a member of the EU.

Since 1999 the category *4 A 6 / 4 B 6 Horses* also includes *4 A 7 / 4 B 7 Mules and Asses*, because in the AVZ solipeds are included under ‘horses’. This category was not asked for in the AVZ 2000, therefore the animal number from the previous year (1999) has been used also for the year 2000.

The emission calculation for swine does not count piglets below 20 kg, therefore a major difference exists in the swine population number reported in the CRF and the FAO-data. It is assumed that emissions from small piglets are negligible. However, they will be included in the updated figures for the submission 2003.

Emissions from buffalos, camels and lamas (Categories *4 A 2 / 4 B 2* and *4 A 5 / 4 B 5*) were not considered as their number in Austria is negligible.

A comparison between data from STATISTIK AUSTRIA and FAO on animal population numbers shows inconsistencies although the FAO data are based upon data submitted by STATISTIK AUSTRIA via EUROSTAT. However, due to lack of detailed international rules about preparing the statistical data, the data submitted by STATISTIK AUSTRIA are modified.

For the emission inventory STATISTIK AUSTRIA data are used as these are the best available and most reliable national data in the view of the UBAVIE and their background is more transparent to the UBAVIE compared to that of the data published by FAO.

An analysis reveals that there is often a one year time gap between the two statistics. As an example the comparison for cattle is shown in Table 99. FAO value 1990 corresponds to the STATISTIK AUSTRIA data 1989 and FAO data 1994–2000 corresponds to STATISTIK AUSTRIA data 1993-99. Only the years 1991 and 1992 are inconsistent with this one-year time lag.

[13] The Statistical Yearbook 2002 with the population tables is available on the internet: http://www.oestat.gv.at/ and has summarised information about the process of the AVZ.

[14] http://www.ama.at/AMA-Marktordnung/download/archiv/nutztierhaltung.pdf

Table 99: Comparison of cattle head datasheets from STATISTIK AUSTRIA and FAO

Year	STATISTIK AUSTRIA [1000 heads]	FAO [1000 heads]
1989	2 562	2 541
1990	2 584	2 562
1991	2 534	2 534
1992	2 401	2 501
1993	2 334	2 532
1994	2 329	2 334
1995	2 326	2 329
1996	2 727	2 326
1997	2 198	2 727
1998	2 172	2 198
1999	2 153	2 172
2000	2 155	2 153

An overview of animal populations in Austria from 1990 to 2000 and its trend is presented in Table 100.

Table 100: Domestic livestock population and its trend from 1990 to 2000

IPCC categories	Population Size [1000 heads]											Trend 1990-1999
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Dairy Cattle	905	876	842	828	810	707	698	720	729	698	621	-31,35%
Non Dairy Cattle	1.679	1.658	1.559	1.506	1.519	1.619	1.574	1.478	1.443	1.455	1.534	-8,63%
Sheep	309	326	312	334	342	365	381	384	361	352	339	+9,68%
Goats	37	41	39	47	50	54	55	58	54	58	56	+50,42%
Horses	49	58	61	65	67	73	73	74	75	82	82	+65,79%
Swine	2.555	2.524	2.571	2.822	2.763	2.759	2.711	2.728	2.843	2.570	2.495	-2,36%
Poultry	13.821	14.397	13.684	14.509	14.179	13.959	12.980	14.760	14.361	14.498	11.787	-14,72%

4.4.1.2 Category 4 C Rice Cultivation

NO

There is no rice cultivation in Austria.

4.4.1.3 Category 4 D Agricultural Soils

Emissions of N_2O and CH_4 from the IPCC Category *4 D Agricultural Soils* have been identified as key source categories because of their contribution to the total GHG emissions (Level Assessment 1990 and 2000). The estimation of greenhouse gases from this source does not fulfil the requirements of the Good Practice Guidance yet. Subcategories are related to area size of fertilized and unfertilised cultivation's but the methodology does not consider the amount of fertilizer used for the subcategories as demanded by the IPCC Guidelines. Therefore only the aggregated amount of emissions from the CORINAIR97 sub-categories of *Agricultural Soils* are reported in IPCC Category *4 D*.

That's why this category is included in the ongoing improvement program of the sector *Agriculture*, which is described in chapter 4.4.2. Results of the new study will be included in the submission 2003. For this year's submission activity data from the year before was assumed to be still valid, emission factors and methodology are the same as in previous years.

Anthropogenic CO_2 emissions resulting from *Cropland Management* and *Grazing Land Management* or CO_2 removals from *Agricultural Soils* are not included within the Austrian Inventory because of lack of data and the strong effort needed to collect these data due to the diverse structure of soils in Austria.

Methodology

A simple method (Emission = Activity x Emission Factor) using country specific emission factors was used. Activity data (=area that is used for agricultural activities) is sub classified into fertilized and unfertilised cultures according to CORINAR 97 Snap Level 3.

Each subcategory is multiplied by the corresponding emission factor, the sum of emissions are reported. Background data for calculation for the year 2000 are shown in Table 101.

Table 101: Background data for emission calculation for Agricultural Soils for the year 2000

CORINAIR 97 SNAP-Category	Description	Activity data [ha]	EF CH_4 [g/ha/a]	CH_4 Emissions [Mg/a]	EF N_2O [g/ha/a]	N_2O Emissions [Mg/a]
100101	Cultures with fertilizers - Permanent crops	68.606	5.000	343	1.062	73
100102	Cultures with fertilizers - Arable land crops	1.381.996	5.000	6.910	1.062	1.468
100104	Cultures with fertilizers - Market gardening	6.593	25.000	165	1.062	7
100105	Cultures with fertilizers - Grassland	889.336	20.000	17.787	1.600	1.423
100205	Cultures without fertilizers - Grassland	1.028.056	8.400	8.636	200	206
100206	Cultures without fertilizers - Fallows	39.777	8.400	334	200	8
TOTAL				**34.174**		**3.184**

Emission Factors

CH_4 emission factors were taken from BUWAL [BUWAL, 1995]. For SNAP Category 100206 the same emission factor is used as for 100205.

Emission factors for N_2O emissions are based on expert judgement (UBAVIE). No further reference or background-information can be provided for these values.

Activity data

STATISTIK AUSTRIA provides the size of cultivated area in the Statistical Yearbook. Data are available for the years with Farm Structure Survey (whole survey: 1990, 1995 and 1999, sample survey: 1993 and 1997). UBAVIE interpolated activity data for the years in between (1991, 1992, 1994, 1996 and 1998).

For last year's submission the activity data of the Farm Structure Survey 1999 in Austria has not been taken into account, that’s why the data from 1997 were also used for the years 1998 and 1999. The results of the survey are published now and considered in this year submission. Therefore recalculations for these two years have been made. The next Farm Structure Survey is expected for 2003.

No up-dated information on activity data for 2000 was available, except for arable land, where STATISTIK AUSTRIA revised the data due to new results for cultivation of field crops. For all other areas it was assumed that the value of 1999 is still valid.

4.4.1.4 Category 4 E Prescribed Burning of Savannas

NO

There are no savannas in Austria.

4.4.1.5 Category 4 F Field Burning of Agricultural Residues

This category comprises burning straw from cereals and residual wood of vinicultures on open fields in Austria. The second source was reported under IPCC Category *6 C* in the previous submissions, but is now allocated to Category *4 F 5 Other*.

Data reported for the years 1990–1999 in this year's submission for sector *4 F* do not match the data reported in previous submission because of this change in allocation. However the data for the individual activities have not changed.

Burning agricultural residues on open fields in Austria is legally restricted by provincial law and since 1993 additionally by federal law and is only occasionally permitted on a very small scale, which explains the strong reduction. Therefore the contribution of emissions from the category *Field Burning of Agricultural Residues* to the total emissions is very low.

Although the uncertainty of activity data and emission factors is very high, due to the small contribution of emissions, improvement of the methodology in this sector has little priority.

Methodology

A simple method (Emission = Activity x Emission Factor) using country specific emission factors was used.

Emission factors

The applied emission factors are based upon expert judgement (UBAVIE) and correspond to burning wood with a calorific value of 7,1 MJ/kg in poor operation furnace systems.

For CH_4 emissions the IEF are lower than IPCC default values , whereas for N_2O they are higher. It is planned to use IPCC default factor in the future.

Activity data

According to an expert judgement from Dr. Johannes Schima [PRÄKO, 1996] about 30.000 t straw are burned on open areas every year. This judgement is based on the size of areas and an average amount of biomass burned per hectare.

Also the amount of burned residual wood from vinicultures is based on expert judgement. The area used for viniculture (58.188 ha) is multiplied by the expected residue per hectare (1,5 t/ha) giving an amount of 87.282 t residues in the year 1996.

The values obtained are applied for all years.

4.4.2 Planned Improvements

As the estimated emissions from the category *Agriculture* have the highest uncertainty and furthermore the methodologies used to estimate the GHG emissions of the key sources do not fulfil the requirements of IPCC Good Practice Guidance, a strong need for improvement of the applied methodologies is given.

In awareness of these defaults the UBAVIE has already established co-operation to expert institutes and universities to make progress in fulfilment of the qualitative needs on the emission estimation in this sector. A new study covering the requirements of the IPCC Good Practice Guidance in emission estimation as well taking into account the national agricultural structure (extensive-intensive) has been commissioned by the UBAVIE. It comprises the categories *Enteric Fermentation*, *Manure Management* and *Agricultural Soils*.

As data collection needed more time than expected, revised data will be included not until the submission 2003.

4.5 Land Use Change and Forestry (IPCC Category 5)

3,9 Mio ha (46%) of Austria are forest land [FBVA, 1997]. The sustaining of the Austrian forests in the past helped to restore an important carbon stock in the Austrian landscape and to avoid net CO_2 emissions to the atmosphere from the Sector LULUCF: In 1990 the Austrian forests represented a carbon stock of 320 ± 42 Mt carbon from biomass and 463 ± 185 Mt carbon from soil, i.e. humus layer plus mineral soil to 50 cm depth. This total carbon stock represents approximately 40 times the Austrian CO_2 equivalent emissions of the greenhouse gases CO_2, CH_4 and N_2O in the year 1990 [Weiss et al., 2000].

Table 102 shows the IPCC categories and the corresponding SNAP categories for which the actual calculations are made.

Table 102: IPCC categories and the corresponding SNAP categories for IPCC Category 5

IPCC-Category	SNAP / SPLIT-Category	Description
5 A 2		**Temperate Forests**
5 A 2	112102 Deciduous	Temperate forests
5 A 2	112102 Evergreen	Temperate forests

Other IPCC categories are IE, NE or NO. The quantitatively most relevant sub-categories of *5 B Forest and Grassland Conversion* and *5 C Abandonment of Managed Lands* are included in the figures for category *5 A Changes in Forest and Other Woody Biomass Stocks* (see chapter 4.5.2).

Emission trends

In the period 1961 to 1996 changes in the Austrian forest biomass (*IPCC Category 5 A*) led to a mean annual net carbon sink of 2.527 kt carbon (from 1.014 kt C to 3.689 kt C with an uncertainty of ±748 kt C). Between 1980 and 1996 the net carbon sink of this category equals to about 15% of the gross CO_2 equivalent emissions of the GHGs CO_2, CH_4 and N_2O in this period [Weiss et al., 2000]. Between 1990 and 1996 a decrease in the net sink of category *5 A* was detected (mean: 2.371 kt C; range: 1.469 to 3.683 kt C), and so the offset of category *5 A* to the total GHG emissions in the individual years of this period was between 6,7 and 16,6% (mean value: 11,2%).

The time series of accurate and measured values for individual years ends with the year 1996. For the years after 1996 the means for the last period (1992 to 1996) of the National Forest Inventory (NFI) have been reported (the rationale in behind this procedure is given in chapter 4.5.2). Therefore, the reported annual data for category *5 A* are constant after 1996. A revision of the data for these years will be carried out when the results of the follow-up NFI will be available, which will be in 2003.

Details on the methodology, uncertainty assessment, quality assurance, quality control and verification are given in chapter 4.5.2

4.5.1 Source Categories

<u>5 A Changes in Forest and Other Woody Biomass Stocks</u>

Methodology

A national method is applied which follows to some extent the IPCC methodology. However, it gives more accurate and appropriate figures for the Austrian forests.

The main basis of the estimates are measured data on forest area, volume increment of the growing stock and harvest (for both stem wood over bark with a diameter at breast height > 5 cm) according to the Austrian NFI [SCHIELER et al., 1995], [FBVA, 1997], [WINKLER, 1997]. The NFI was carried out in the periods 1961-70, 1971-80, 1981-85, 1986-90, 1992-96. Recently, the follow-up NFI is running – the new data will be available in 2003. The NFI uses a permanently below ground marked 4 x 4 km grid across all of Austria with four permanent sample plots of 300 m^2 size at each grid point.

In addition to the NFI harvest data, which are based on measurements in the forests, further harvest statistics exist: the annually reported records of wood felled and the Austrian wood balance [BITTERMANN and GERHOLD 1995], [BMLF 1964-1998]. These statistics are not based on measured data. Therefore, it is assumed that the NFI provides more accurate figures on the harvest and for this reason the estimates are based on NFI harvest figures. However, the results of the other statistics are used to derive "relative harvest indices for individual years" (see below). In addition, the absolute harvest figures of these statistics are also included in the uncertainty analysis to guarantee an overall consistency of the calculated figures (see below).

Further comments for a better understanding of the NFI increment and harvest data:

The NFI increment data include all possible reasons for biomass increments in the forests. Therefore, the figures for "Total biomass increment in Commercial Harvest" include also the biomass increments due to abandonment of managed land and regrowth by forests. The NFI harvest data include also all possible reasons for biomass losses in the forests. This means, that the figures for "Total biomass removed in Commercial Harvest" include in addition: e.g. traditional (non-commercial) fuel wood consumption, biomass losses by forest conversion, forest fires[15] and losses due to other damages. Therefore, to provide accurate and representative figures for the entire commercial forests of Austria and to avoid double accounting as well as further conflicting matters with the categories *5 B Forest and Grassland Conversion* and *5 C Abandonment of Managed Lands*, these figures are reported as a total in category *5 A Changes in Forest and Other Woody Biomass Stocks*.

The NFI provides means of annual increment and harvest for the individual periods. Instead of using these means or interpolated values for single years, these NFI means are converted with indices[16] to obtain annual data of increment and harvest. For harvest these relative indices are derived from further national statistics on harvest which are the annually reported records of wood felled and the wood balance [BITTERMANN and GERHOLD 1995], [BMLF 1964-1998]. For increment a representative Austrian set of tree ring cores [HASENAUER et al. 1999a, b] is used to calculate the relative indices. The means of these estimated annual data on increment and harvest for a certain inventory period are equal to the measured periodic means provided by the NFI. This method allows more accurate estimates of the figures for individual years for the category *5 A*. The figures for annual growth and for annual harvest

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[15] In the 90-ies the annual maximum area affected by forest fires in Austria was 135 ha, but usually this annually affected area is much lower. Hence, biomass losses and emissions of other GHGs by forest fires are negligible in Austria.

[16] Values for the relative variation in the individual years of the time series

differ year by year for several reasons (e.g. weather conditions; timber demand and prices, wind throws). Such reasons for different growth and different harvest in individual years explain the high annual variations in the CO_2 net removals by the Austrian forests.

Conversion factors are used to convert the measured m^3 stem wood over bark to t carbon increment and t carbon harvest of the whole trees (including also below ground biomass). These conversion factors are not based on default values given by the IPCC (1997) but on estimates, which give more accurate figures for the Austrian forests. These estimates of the used conversion factors are based on the species and age class composition of increment and harvest according to NFI and literature values for the wood densities for all individual tree species (compiled in [KOLLMANN, 1982], [LOHMANN, 1987]), literature values on the dry mass relations of stem wood to the other tree compartments for the main tree species in Austria and for individual age classes (compiled in [KÖRNER et al., 1993]) and literature values on C contents for individual tree compartments and species (Table 103). The conversion factors are calculated for each inventory period and separately for increment and harvest respectively.

Further details on the approach and methodology are given in [WEISS et al., 2000].

Table 103: Conversion factors for the Austrian forests [WEISS et al. 2000]

Conversion factors	Coniferous	Deciduous
m^3 o.b. → t dm (stemwood)	0,39	0,53
t dm stemwood → t dm whole tree (incl. also below ground biomass)		
increment	1,45	1,46
harvest	1,54	1,50
t dm whole tree → t C whole tree	0,49	0,48

The time series of accurate and measured values for individual years ends with the year 1996. For the years after 1996 the means for the last inventory period (1992/96) and therefore constant values have been reported. An extrapolation of trends for increment and harvest from the 2nd but last inventory period (1986/90) to the 90ies led to figures which had to be strongly revised downwards after the last inventory (1992/96). One of the main reasons was that increment did not increase as in the years before. A use of means for increment and for harvest, which are based on the last NFI results, for years after the last NFI provides more probable figures than an extrapolation of trends which are rather uncertain. This is particularly true for increment which strongly depends on weather conditions, but also for harvest, when - for instance – storm fellings are taken into consideration. A revision of these means and constant figures for the years after 1996 will be carried out when the results of the follow-up forest inventory will be available, which will be in 2003[17].

Other sub-categories under *5 A* were not estimated or are not occurring. The area of temperate forest plantations (category *5 A 2 c*) is very small in Austria (< 2.000 ha). Therefore, the C stock changes at these plantations are negligible. There are not sufficient data to estimate accurately the emissions and removals from other wooded land like vineyards, orchards, parks, forest nurseries and Christmas tree cultures. This is also the case for the emissions and removals from grasslands. However, it is assumed that figures for this cate-

[17] The last recalculation was carried out for the year-2000-submission for the period 1990 to 1998. The rationale was the inclusion of the results of the latest NFI (1992/96) and a development of a more detailed approach compared to the estimates before.

gory are also of minor relevance for the Austrian GHG balance. Estimates on the subcategory *5 A 2 d Harvested Wood* will be made in the near future.

Quality assurance and control (QA/QC), verification, uncertainty assessment

The NFI is based on a very comprehensive quality assurance system which allows the exact identification of the right location of the grid and sample points, guarantees the repeated measurement of the right trees (permanent marked grid) and indicates at once implausible figures for individual parameters during the measurements on site and any missing trees compared to the period before (further details are given in [SCHIELER and HAUK, 2001]).

The calculation of the data for category *5 A* is embedded in the overall QA/QC-system of the Austrian GHG inventory (see chapter 1.3):

The calculation of the uncertainty of the reported data for category *5 A* took into account:

- the statistical uncertainty of the forest inventory,
- the uncertainty related to the calculation of annual data,
- the uncertainty related to the missing consistency of different statistics[18]
- and the uncertainty of each conversion and expansion factor.

The estimates of the uncertainty includes a consistency approach with other national statistics. Because of the differing quality of the data classic statistical approaches were not always adequate. For instance, the uncertainties of the conversion factors were estimated in a pragmatic as well as conservative way (Table 104, details are described in [WEISS et al., 2000]). Such an approach takes into account that the conversion factors were not measured by a systematic inventory (like NFI) but derived from a few local ecosystem studies (expansion factors) and literature data on wood densities and C contents. Therefore, the uncertainty related to these conversion factors is comparably higher than the one of the systematically measured stem wood volume of increment and harvest. Error propagation was used to calculate the overall uncertainty.

The absolute uncertainty of the Austrian annual net carbon balance of category *5 A* is ±748 kt C. This corresponds to varying relative uncertainties between ±20% and ±74% (mean ±30%) for the individual years of the time period 1960 to 1996 depending on the individual annual net C sequestration of category *5 A*.

In the near future a further estimate on the uncertainties of the carbon figures of category *5 A* which uses Monte Carlo simulations will be available.

[18] e.g.: there are three different Austrian statistics for annual harvest: measured harvest according to NFI, national annual records of wood felled and the national wood balance

Table 104: Relative uncertainties of the used data for the calculations [WEISS et al. 2000]

	Relative uncertainties in %				
	Forest inventory	Uncertainty related to the calculation of annual data and to the necessary consistency of different statistics	Conversion factor „m^3 o.b. → t dm“	Conversion factor „t dm stemwood → t dm whole tree“	Conversion factor „t dm → t C“
Increment	2,0	3,2	11,1	6,5	2,0
Harvest	3,5	12,2			

5 B Forest and Grassland Conversion, 5 C Abandonment of Managed Lands

Categories *5 B* and *5 C* are indirectly included in the figures of category *5 A* as far as changes of tree biomass of the Austrian forests are concerned (afforestation, reforestation in the sense of IPCC, abandonment of managed lands and regrowth of forests and deforestation; see also above). Under Austrian ecological conditions abandonment of managed lands is usually followed by regrowth of forests. Therefore, the quantitatively more important activities under the categories 5B and 5C and their impact on the biomass C stock changes are covered by the figures of sector 5A. Grassland conversions (category *5 B 4*) as well as abandonment of managed land and regrowth by grasslands (category *5 C 4*) also occur in Austria, but data which would allow to estimate accurately the emissions/removals from these sub-categories are lacking. It is assumed that activities under these two sub-categories are of minor relevance for the Austrian GHG balance and mainly lead to changes in the soil carbon pools, whereas the related changes in the biomass carbon pools are assumed to be much less significant. Changes of soil carbon pools related to all activities of the categories *5 B* and *5 C* would be included in category *5 D* if these data were already available (see below).

Hence, the non-reporting of specific figures for the categories *5 B* and *5 C* does not represent a data gap but avoids double-accounting. In addition, the relative uncertainty of these specific figures for the categories *5 B* and *5 C* would be considerably higher than those of category *5 A* because the Austrian NFI (as most forest inventories) is designed to provide accurate figures on a nation-wide basis. Each estimate of respective figures for a sub-category, e.g. previous and new forest areas (afforestation, reforestation, deforestation), is related with much higher relative uncertainties or would even need a completely different approach to obtain accurate figures. This is very much a question of costs and resources for measurement and of weighing up the necessary efforts against the gain of information (particularly as figures for these categories are already included in other categories). However, it should be noted that in the future measurement, calculation and reporting of figures for specific parts of the categories 5B and 5C might be necessary under the Kyoto-Protocol (Article 3.3). Such preliminary Austrian estimates for Article 3.3 were given in a supporting submission for the Kyoto-negotiations (UNFCCC 2000).

5 D CO_2 Emissions and Removals from Soil

As given in the introduction, Weiss et al. (2000) estimated the carbon-stock of the Austrian forest soils by using data of the Austrian forest soil survey (humus layers and mineral soil layers 0-50 cm were sampled at the grid points of an 8,7 x 8,7 km grid across all Austria in the period 1987 to 1989; FBVA 1992). Similar carbon stock estimates are also available for the Austrian agricultural soils (see UNFCCC submission 2000).

CO_2 emissions or removals from soils are not reported at the moment. The changes in the carbon content of the soils are very small and slow and no reassessments of the Austrian soil inventories have taken place that would allow estimates for the carbon stock changes of the soils. Modelling approaches were used to estimate the carbon stock change of the Austrian forest soils in the period 1961 to 1996 [WEISS et al., 2000]. According to these estimates it is assumed that the Austrian forest soils were a carbon sink of about 10% of the net carbon sink of the forest biomass in the period 1961–1996. However, these results have to be considered as hypothetical because repeated soil measurements are missing, which would help to verify the modelled carbon stock changes. It is planned to carry out such a reassessment of the forest soil inventory in the near future. This will allow to provide measured figures for the carbon stock changes in this category.

4.6 Waste (IPCC Category 6)

This chapter includes information and descriptions of methods for estimating greenhouse gas emissions as well as references of activity data and emission factors concerning waste management and treatment activities reported under IPCC Category *6 Waste*.

The emissions addressed in this chapter include emissions from the IPCC categories *6 A Solid Waste Disposal on Land*, *6 B Wastewater Handling*, *6 C Waste Incineration* and *6 D Other* (*Sludge Spreading* and *Compost Production*).

Waste management and treatment activities are sources of methane (CH_4), carbon dioxide (CO_2) and nitrous oxide (N_2O) emissions.

Emission Trends

Table 105 presents the greenhouse gas emissions for the period from 1990 to 2000 for the IPCC Category *6 Waste*.

The overall greenhouse gas emissions from the waste management and treatment activities during the year 2000 corresponded to 5.332 Gg CO_2 equivalents. This represented about 7,4% of the total greenhouse gas emissions in Austria in 2000 compared with 9,1% in the base year.

As can be seen in Table 105 the trend for the years 1990 to 2000 concerning greenhouse gas emissions from the waste sector was decreasing. In 2000 the greenhouse gas emissions from the waste sector amounted to 5.332 Gg CO_2 equivalents, this was 14,8% below the level of the base year.

Table 105: *Trends in greenhouse gas emissions of the sector Waste 1990–2000*

GHG	Base year*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend 1990–2000
	CO_2 equivalents [Gg]												
TOTAL	6.261	6.261	6.155	6.146	6.023	5.931	5.820	5.712	5.556	5.335	5.313	5.332	–14,84%
CO_2	38	38	40	92	93	115	126	116	121	110	88	106	+>100%
CH_4	6.200	6.200	6.091	6.029	5.905	5.791	5.668	5.569	5.409	5.198	5.199	5.200	–16,1 %
N_2O	23	23	24	25	25	26	26	26	26	27	26	26	+14,21%

*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

Emission trends by greenhouse gas

Table 106 presents the greenhouse gas emissions of the base year (1990) and 2000 from the Waste sector and their share in greenhouse gas emissions from the sector.

Table 106: Greenhouse gas emissions from the Waste sector in the base year and in 2000.

Greenhouse gas emissions	Base year*	2000	Base year	2000
	CO_2 equivalents [Gg]		[%]	
Total	**6.260,76**	**5.331,94**	100	100
CO_2	38,17	105,98	0,61	1,99
CH_4	6.199,50	5.199,59	99,02	97,52
N_2O	23,09	26,37	0,37	0,49

*1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6

The major greenhouse gas emissions from this sector were emissions of CH_4, which represented 97,5% of all emissions from this sector in 2000 compared with 99% in 1990, followed by CO_2 (2,0% 2000 respectively 0,6% 1990) and N_2O (0,5% 2000 respectively 0,4% 1990).

CO_2 emissions

As can be seen in Table 105 the overall trend concerning CO_2 emissions in sector *6 Waste* was increasing emissions. In 2000 the CO_2 emissions from this sector amounted to 106 Gg CO_2 equivalents, this was more than 100% above the level of the base year.

The CO_2 emissions arise from *Waste Incineration* (*Municipal Solid Waste, Waste Oil and Incineration of Corpses*), The amount of waste being incinerated has also increased during the period (for further information see Chapter 4.1/ *1 A 5 Other* and Chapter 4.6/ *6 C Waste Incineration*).

CH_4 emissions

As can be seen in Table 105 the trend of CH_4 emissions arising from the sector *Waste* was decreasing emissions. In 2000 they amounted to 5.200 Gg CO_2 equivalents, this was 16,1% below the level of the base year.

The CH_4 emissions arise from most subcategories within the sector but the main source is the *Solid Waste Disposal on Land* (landfill gas). As a result of waste management policies the amount of land filled waste has decreased during the period.

N_2O emissions

N_2O emissions from the waste sector increased over the considered period (see Table 105). In 2000 the N_2O emissions from the Waste sector amounted to 26,37 Gg CO_2 equivalents. This was 14,2% above the level of the base year.

The N_2O emissions arise from the *Wastewater Handling* (*Domestic and Commercial Wastewater* and *Industrial Wastewater*) and *Waste Incineration* (*Municipal Solid Waste* and *Waste Oil*).

Emission trends by sources

Table 107 presents the greenhouse gas emissions for the period from 1990 to 2000 from the different sources within the IPCC *Category 6 Waste*.

Table 107: Greenhouse gas emissions from different sources within IPCC category 6, Waste 1990–2000

GHG	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Trend 1990–2000
	CO_2 equivalents [Gg]											
TOTAL	**6.261**	**6.155**	**6.146**	**6.023**	**5.931**	**5.820**	**5.712**	**5.556**	**5.335**	**5.313**	**5.332**	**– 14 ,84 %**
6 A.	5.438	5.327	5.261	5.133	5.018	4.894	4.795	4.634	4.424	4.424	4.424	– 18,66 %
6 B.	310	314	318	321	323	324	324	325	326	326	326	+ 5,18 %
6 C.	40	42	95	97	119	130	120	125	113	92	110	> 100 %
6 D.	472	472	472	472	472	472	472	472	472	472	472	0 %

The dominant source in this sector was *6 A Solid Waste Disposal on Land* where the greenhouse gas emissions represented 83% of the total greenhouse gas emissions from this sector in 2000 compared with 87% in 1990.

6 A Solid Waste Disposal on Land

For the source *Solid Waste Disposal on Land* the greenhouse gas emissions decreased by 18,7% from 1990 to 2000. This was mainly due to decreasing CH_4 emissions from landfills.

6 B Wastewater Handling

For the source *Wastewater Handling* the greenhouse gas emissions increased by 5,2% from 1990 to 2000. This was mainly due to increasing CH_4 emissions from handling of industrial and domestic/ commercial wastewater.

6 C Waste Incineration

For the source *Waste Incineration* the greenhouse gas emissions increased by more than 100% from 1990 to 2000. This was mainly due to increasing CO_2 emissions from incineration of municipal solid waste.

6 D Other

This category addresses *Sludge Spreading* and *Compost Production*. The estimated greenhouse gas emissions from these sources were constant during the period.

Key sources

Key source analysis is presented in Chapter 3. This chapter includes information about the key sources in the IPCC Sector *6 Waste*. Table 108 shows the source categories in the level of aggregation for the key source analysis.

Table 108: Source categories – key sources of the sector Waste

IPCC 96 / Code	Source Categories	Key Sources*	
		GHG	KS-Assessment
6 A	Waste_Solid Waste Disposal on Land	CH_4	LA1990, LA2000, TA
6 B 1	Waste_Wastwater Handling_Industrial Wastewater		
6 B 2	Waste_Wastwater Handling_Domestic and Commercial Wastewater		
6 C	Waste_Diff No Fuel Combustion_Waste Incineration		
6 C liquid	Waste_Fuel Combustion_Waste Incineration		
6 C gase-ous	Waste_Fuel Combustion_Waste Incineration		
6 C other	Waste_Fuel Combustion_Waste Incineration		
6 D 1	Waste_Other Waste_Sludge spreading	CH_4	LA1990, LA2000
6 D 2	Waste_Other Waste_Compost production		

* shaded cell: source category is not a key source
LA1990 = Level Assessment 1990
LA2000 = Level Assessment 2000
TA = Trend Assessment 1990–2000

As can be seen in Table 108 the IPCC sector *6 Waste* had two key sources: *Managed Waste Disposal* and *Sludge Spreading*. Together they contributed 6,08% to the total green house gas emissions in Austria in 2000. The key source categories and their share of the total greenhouse gas emissions are listed in Table 109.

The key sources were the same as in the previous submission and their share of the total amount of greenhouse gas emissions was about the same. In 1999 they contributed 6,11% to the total green house gas emissions.

Table 109: Key source categories of sector 6 Waste.

IPCC Category	Description	GHG	Share of total GHG emissions 1999 (NIR 2001)	Share of total GHG emissions 2000
6 A 1	Managed Waste Disposal	CH_4	5,58%	5,55%
6 D 1	Sludge Spreading	CH_4	0,53%	0,53%
Total			**6,11%**	**6,08%**

Quality Assurance and Quality Control (QA/ QC)

For the Austrian Inventory there is an internal quality management system, for further information see Chapter 1.3.

Uncertainty Assessment

A first comprehensive uncertainty analysis was performed as a pilot study by WINIWARTER & RYPDAL, 2001 on the greenhouse gases CO_2, CH_4 and N_2O for the years 1990 and 1997.

Planned improvements

Further refinement of uncertainty assessment and extension of QA/QC (for key source categories) is planned.

Recalculation

In the Waste sector no recalculations were made, but there were other changes concerning following sources:

6 B Wastewater Handling

Estimations of N_2O emissions were made for the period from 1990 to 2000 by using IPCC methodology. In the previous submission the N_2O emissions were reported as "NE".

6 C 2 Waste Incineration

CH_4 emissions from *Open Burning of Agricultural Wastes* were reported under this category in the previous submission. In this submission they have been allocated to *4 F 5 Field Burning of Agricultural Wastes/ Other* as proposed by the expert review team.

Methodology

The general method for estimating emissions for the waste sector, as recommended by the IPCC, is multiplying activity data for each subcategory with an emission factor.

In some cases, however, country-specific methods were used. In those cases detailed information on the applied methods is provided in the corresponding subchapter.

Table 110 gives an overview of the IPCC categories and the corresponding SNAP categories for which the actual calculations were made in this sector.

Table 110: IPCC categories and the corresponding SNAP categories for IPCC Category 6 Waste.

IPCC-Category		SNAP / SPLIT-Category	Description
6 A	SOLID WASTE DISPOSAL ON LAND		
6 A 1	Managed Waste disposal	090401	Solid Waste Disposal on Land
6 A 2	Unmanaged Waste Disposal	090402	Unmanaged Waste Disposal
6 B	WASTEWATER HANDLING		
6 B 1	Industrial Wastewater	091001	Waste water treatment in industry
6 B 2	Domestic and Commercial Wastewater	091002	Waste water treatment in residential/commercial sect.
6 C	WASTE INCINERATION		
		090901	Incineration of corpses

IPCC-Category		SNAP / SPLIT-Category	Description
		090201	Incineration of domestic or municipal waste: Municipal Waste / Hazardous Waste / Sewage Sludge / Heavy Fuel Oil / Natural Gas / Other
		090207	Incineration of hospital wastes
		090202	Incineration of industrial wastes (except flaring)
		090205	Incineration of sludges from waste water treatment
		090208	Incineration of waste oil
6 D	OTHER WASTE		
		091003	Sludge spreading
		091005	Compost production

4.6.1 Source Categories

4.6.1.1 Category 6 A Solid Waste Disposal on Land

6 A 1 Managed Waste Disposal on Land

Emission: CH_4

Key source: *Yes*

In 2000 CH_4 emissions from managed waste disposal on land (landfills) was a key source. They contributed 5,55% to the total amount of greenhouse gas emissions in Austria (see Table 109).

Managed waste disposal on land accounts for the largest contribution to the CH_4 emissions in the IPCC Category *6 Waste*. The CH_4 emissions arise from landfills. By the anaerobic degradation of waste landfill gas is produced. Most active landfills in Austria have gas collection systems, but it is not possible to collect all gas.

Table 111 shows the CH_4 emissions from managed waste disposal on land for the period from 1990 to 2000.

As can be seen in the table, the trend during the period was decreasing CH_4 emissions. From 1990 to 2000 the CH_4 emissions decreased by 19% according to decreased amounts of waste being land filled as a result of waste management policies.

Table 111: CH_4 emissions from managed waste disposal on land 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Gg]	259	254	251	244	239	233	228	221	211	211	211

Methodology

Emissions from residual waste were calculated separately from the rest of the directly deposited waste (referred to as 'directly deposited waste except residual waste' hereafter) because for residual waste data was available for each year, whereas for the deposited waste except residual waste only an estimated number that was used for all years is known. Finally these two values were summed up to be reported in the CRF.

CH_4 emissions caused by residual waste were approximately two and a half times higher than the emissions of the rest of the directly disposed waste (see Table 112).

Table 112: CH_4 emissions in 1998 of residual waste and directly deposited waste except residual waste, respectively.

	CH_4 emissions [t/a]
Residual waste	152.669
Directly deposited waste except residual waste	57.987

Differences between the IPCC method and the Austrian methods

Both Austrian methods are similar to the default method of IPCC. The main differences are listed in Table 113.

Table 113: Differences of the two Austrian methods to the IPCC-methodology

Austrian method for residual waste	Austrian method for directly deposited waste except residual waste
The different types of sites are not taken into consideration	
The quantity of generated gas is calculated, based on the degradable organic carbon content of waste.	
CH_4 emissions from deposited waste are calculated by taking into account the amount of waste deposited in each year during the past 30 years.	The waste is split into three groups, depending on its bio-degradability (well, hardly and very hardly bio-degradable waste depending on the half life period[19]).
	The generation of landfill gas over 100 years is calculated based on the deposited waste of 1995.

Residual waste

Methodology

The emissions of residual waste were calculated according to an internal study of the Austrian Federal Environmental Agency [HÄUSLER, 2001]. Based on this study the quantity of emitted CH_4 was calculated by using the actual amount of residual waste (= activity data).

The detailed calculation is shown in Table 114.

First the overall amount of generated landfill gas per ton waste was calculated, taking the DOC-content of the waste and the average temperature at the landfill into account. Once disposed, waste emits landfill gas for many years, where the amount of gas emitted per year is not constant, it gets less over time. For the calculation only the amount of landfill gas pro-

[19] see paragraph on directly deposited waste except residual waste below

duced in the year of disposal and in the 30 years after disposal are taken into account. To determine the total amount of landfill gas emissions for one year, the amounts generated by waste disposed in the last 31 years are summed up. After subtracting the collected gas and multiplying by the CH_4 content of landfill gas (approximately 55%) the emitted quantity of CH_4 from residual waste was obtained.

Table 114: Calculation of the CH_4 emissions of residual waste

Calculation of	Formula		Explanation
G_L...Long term specific quantity of generated landfill gas [m^3/ t waste]	G_L=1,868*DOC*(0,014T +0,28)	T…………	Temperature of the disposal site (approximately 30°C) [K]
		DOC…….	Bio-degradable organic carbon content of directly deposited residual waste (estimated in [HACKL & MAUSCHITZ, 1999]) [%]
G_t…Cumulated specific quantity of gas after t years [m³/ t waste]	$G_t=G_L*(1-10^{(-kt)})$	G_L……….	Long term specific amount of generated landfill gas
		k………...	Degrade constant =0,035
		t…………	Number of years
$G_t(a)$...Specific accrued quantity of gas in the t^{th} year [m³/ t waste]	$G_t(a)=G_t-G_{t-1}$	G_t……….	Cumulated specific amount of gas in the year t
		G_{t-1}……...	Cumulated specific amount of gas in the year before t
G_{geb}...Quantity of incidental landfill gas in the year t [m³]	$G_{geb}=G_t(a)*waste_{t=0}$	$G_t(a)$…….	Specific accrued amount of gas in the year t
		$waste_{t=0}$…	Waste deposited in the year t=0
G^*...Total incidental gas in the year t [m³]	$G^*=\Sigma_0^{31}(G_{geb})$ Quantity of gas generated in the last 31 years is summed up	G_{geb}…….	Quantity of incidental landfill gas in the year t
G…Emitted gas [m³]	$G=G^**(1-j)$	G^*……….	Total incidental gas in the year t
		j…………	Collecting factor; estimated for 1999: j = 0,2
EM…Emitted CH_4 [kg]	$EM=G*0,55*(1-v)*\rho$	G………..	Emitted gas
		0,55…….	Concentration of CH_4 in landfill gas
		v………...	Percentage of methane, that is oxidized in the upper layer of the waste site, v=20%
		ρ………..	Density of methane, $\rho=0,72kg/m^3$

Activity data

Data going back to 1950, which were needed for the first calculation of the gas quantity generated over 31 years, were taken from a study [HACKL & MAUSCHITZ, 1999].

The current quantities of residual waste were taken from the current BAWP [BMUJF-BWAP, 1998]. As this report is only updated every three years, there are no actual numbers for 1999 and 2000. Therefore the reported amount of waste in 1998 was used to estimate the emissions of the next two years.

Table 115 presents the amounts of residual waste for the period from 1990 to 2000.

Table 115: Residual waste 1990–2000

Year	Residual waste [Mg/a]
1990	4.115.400
1991	3.998.900
1992	3.890.000
1993	3.739.400
1994	3.580.700
1995	3.529.400
1996	3.566.900
1997	3.599.600
1998	3.639.500
1999	3.639.500
2000	3.639.500

Directly deposited waste except residual waste

Activity data

Contrary to data for residual waste, there are no actual values for the rest of the deposited waste for each year. In 1995, the quantity of directly deposited waste except residual waste was estimated to be 2.905.000 t/a [BAUMELER et al., 1998]. This value was assumed to be constant for all years.

Methodology

The steps of calculation were based on an internal study of the Austrian Federal Environmental Agency [HÄUSLER, 2001]. For the calculation the methodology of Marticorena was used, with the assumption that the composition and quantity of deposited waste was constant. The deposited waste was split up into three groups and the incidental quantity of gas was calculated for each group.

1. Well bio-degradable waste (half-life period: 1-20 years)
2. Hardly bio-degradable waste (half-life period: 20-100 years)
3. Very hardly bio-degradable waste (half-life period: >>100 years)

After calculating the total emitted gas of each group the values were summed up, multiplied with the collecting factor and the share of CH_4 in the generated gas. This resulted in the emitted quantity of CH_4 of directly deposited waste except residual waste.

The detailed calculation steps are shown in Table 116.

Table 116: Calculation of the CH_4 emissions of directly deposited waste except residual waste

Calculation of	Formula		Explanation
Methodology of Marticorena to calculate the formation potential for 100 years	$M=M_0e^{-(kt)}$	M………..	Incidental quantity of gas [m³]
		M_0………..	Formation potential of landfill gas [m³]*
		k…………	Velocity constant $k=-\ln(0,5)/t_{1/2}$
		$t_{1/2}$………..	Half life (calculated for each group, weighted by the quantity of the deposited waste [BAUMELER, 1998]) [a]
		t…………	Running parameter; years from 0-100
G…Total emitted quantity of landfill gas after 100 years under the restriction, that the quantity and the formation of the deposited waste is constant during 100 years [m³]	$G=\Sigma_1^3(M_{t=0}-M_{t=100})$	$M_{t=0}$………	Gas formation potential in the year 0
		$M_{t=100}$…….	Gas formation potential in the year 100
		$M_{t=0}-M_{t=100}$..	Total emitted quantity of landfill gas in each group after 100 years
		Σ_1^3………..	Summation of the 3 groups
EM…Emitted CH_4 [kg]	EM=G*(j-1)*0,55* *(1-v)*ρ	G………..	Total emitted quantity of landfill gas [m³]
		j…………..	Collecting factor; estimated for 1999: j=0,2 => 1-j…Fraction of emitted gas
		0,55………	Concentration of CH_4 in landfill gas
		v…………	Percentage of CH_4, that is oxidized in the upper layer of the waste site, v=20%
		ρ…………	Density of CH_4, ρ=0,72kg/m³ (0°C;1 atm)

*For each of the 3 groups the kind of waste was specified, the quantity and the carbon-flow were listed. For each carbon flow, a formation potential of landfill gas was calculated, and the summed up formation potential was displayed as M_O.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Review of the methodology of estimating emissions (including emission factors)
- Review of the values of DOC and density of methane (as now calculations are made with the density of methane at normal temperature/ pressure)
- Update of activity data

6 A 2 Unmanaged Waste Disposal Sites

NO

There are no unmanaged waste disposal sites in Austria.

4.6.1.2 Category 6 B Wastewater Handling

The anaerobic degradation of organic material in wastewater treatment systems produces CH_4. For the calculation of these emissions the parts of the treatment plant that are mainly operating under anaerobic conditions – substantially sludge storage volumes – were taken into consideration [STEINLECHNER et al., 1994]. N_2O is also produced during the wastewater treatment process (denitrification).

6 B 1 Industrial Wastewater

Emissions: CH_4, N_2O

Key source: No

Table 117 shows the CH_4 and N_2O emissions from industrial wastewater handling for the period from 1990 to 2000.

As can be seen in the table CH_4 and N_2O emissions slightly increased during the period. From 1990 to 2000 the CH_4 emissions increased by 5%, the N_2O emissions by 13%.

Table 117: CH_4 and N_2O emissions from industrial wastewater handling 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emissions [Mg]	4.669	4.719	4.780	4.827	4.851	4.861	4.868	4.876	4.880	4.888	4.897
N_2O emissions [Mg]	16	17	17	17	17	17	18	18	18	18	18

Methodology

The CH_4 emissions were calculated by multiplying a national emission factor (unit: emissions/inhabitant) with the number of inhabitants.

N_2O emissions were calculated in accordance with IPCC methodology with the assumption that the industry introduces additionally 30% of the nitrogen from the human metabolism into the wastewater system [ORTHOFER et al., 1995]. Furthermore it was estimated in this study that about 10% of the nitrogen that enters wastewater treatment plants is denitrificated and that only 1% of the total nitrogen in the denitrification process is emitted as N_2O. This was taken into account when applying the following formula for estimating the N_2O emissions from this category:

$$N_2O\ Emissions = 0{,}3 * 0{,}1 * 0{,}01 * P * Frac_{NPR} * Inhabitants * F$$

Where:

P… annual protein intake per capita [kg protein/ person/ a][20]

$Frac_{NPR}$ ... Fraction of nitrogen in protein (IPCC default value – 0,16 kg N/kg protein)

Inhabitants … number of inhabitants in Austria

F … Factor [1,57 kg N_2O/ kg N]

[20] Daily protein intake per capita taken from FAO statistics: http://apps.fao.org/page/collections?subset=nutrition

Activity data

The number of inhabitants was provided by ÖSTAT.

Table 118 presents the number of inhabitants in Austria as well as the amount of protein in sewage as reported by FAO for the period from 1990 to 2000. It was assumed that the value for protein in sewage of 1999 was still valid for the year 2000.

Table 118: Number of inhabitants and protein per inhabitant in sewage 1990–2000.

Year	Inhabitants	Protein [g/ day/ inhabitant]
1990	7.729.000	102
1991	7.813.000	103
1992	7.914.000	104
1993	7.991.000	102
1994	8.030.000	103
1995	8.047.000	105
1996	8.059.000	107
1997	8.072.000	106
1998	8.078.000	109
1999	8.092.000	106
2000	8.107.000	106

Emission factor

The calculation of the emission factors for methane emissions based on the year 1993 is shown in Table 119 and was taken from a study [STEINLECHNER et al., 1994]. For the following years these factors were assumed to be constant and were multiplied by the current number of inhabitants.

To put in briefly first the amount of generated methane per unit of wastewater is determined for each of the three different types of treatments (mechanical/ biological/ further) separately. These factors were multiplied with the corresponding capacities of the Austrian wastewater treatment plants and then summed up, resulting in the total CH_4 emissions for the subsector *Commercial and Domestic Wastewater* of the year 1993. Emissions from *Industrial Wastewater* were calculated separately, its wastewater was treated like biological treated wastewater.

The emission factor for *Industrial* and *Domestic and Commercial Wastewater Treatment* respectively were obtained by dividing the corresponding emissions of 1993 by the population of this year.

The detailed calculation steps are shown in Table 119.

Table 119: Calculation of the emission factors for methane emissions (based on the year 1993)

Explanation	Calculation factors and ratings/ Calculation results
Biogas production potential BPP (the amount of biogas produced per amount of organic substance) is presumed:	BPP = 480 l biogas/ kg organic substance
By multiplying the BPP with the amount [kg] of methane contained in a litre biogas the amount of methane generated (MG) per unit of organic substance is calculated.	MG = 0,22 kg CH_4/ kg organic substance
Apart from temperature sewage provides ideal conditions for methane production: moisture, pH value and nutrient supply. The temperature is too low, this is taken into account by applying a methane conversion factor (MCF). Calculations are made with an average temperature of 20°C for 8 months and 10°C for the rest of the year.	$MCF_{20°C}$=35% (67% of a year) $MCF_{10°C}$=10% (33% of a year)
Using MCF the effective amount of incidental methane (EM) is calculated: $EM=MCF_{20}*MG*0,67+MCF_{10}*MG*0,33$	EM = 0,058 kg CH_4/ kg organic substance
For each of the three types of wastewater treatment (1: Mechanical/ 2: Biological/ 3: Further) the quantity of organic substance per inhabitant and day ($G_1..G_3$) as well as the share of dry substance for each type was assumed.	G_1= 45 g organic substance/ inhabitant/ day; including 70% dry substance G_2= 80 g organic substance/ inhabitant/ day; including 60% dry substance G_3= 45 g organic substance/ inhabitant/ day; including 35% dry substance
The factors $G_1..G_3$ are converted into the unit kg dry substance/ inhabitant/ year {e.g: $I_1=G_1$*days (365)*0,7 (share of dry substance)}	I_1=11,5 kg/ inhabitant/ year I_2= 17,5 kg/ inhabitant/ year I_3=12,8 kg/ inhabitant/ year
Multiplying the quantity of incidental dry organic substance per inhabitant and year ($I_1..I_3$) by the effective amount of incidental methane (EM) results in a factor for methane emissions per inhabitant and year ($F_1..F_3$)	F_1 =0,67 kg CH_4/ inhabitant/ year F_2 =1 kg CH_4/ inhabitant/ year F_3 =0,75 kg CH_4/ inhabitant/ /year
The capacity (WWT) of Austrian wastewater treatment plants given in population equivalents [pe] for each type of wastewater treatment (1: Mechanical/ 2: Biological/ 3: Further) are:	WWT_1=137.420 pe WWT_2=6.965.411 pe WWT_3=1.070.065 pe
Industrial wastewater treatment is calculated separately (IWWT): Inhabitants without public wastewater treatment are also considered (PWWT):	IWWT = 4.827.000 pe PWWT = 2.263.265 pe

Explanation	Calculation factors and ratings/ Calculation results
Domestic and commercial wastewater: By multiplying the delivery rates (WWTs) with the factor for methane emission per inhabitant and year (EM) the methane emission for each treatment type is calculated. These values are summed up (7.849 Mg/a) and also the CH_4 emissions of inhabitants without waste water treatment (these are handled like mechanical treatment – 1.516 Mg/a) are added.	Total CH_4 emissions of domestic and commercial wastewater treatment amount to 9.365 Mg/a
Industrial wastewater: Industrial wastewater is managed like biological treatment, so methane emissions of biological treatment (F_2) are multiplied by the delivery rate of industrial treatment plants (IWWT).	CH_4 emissions from industrial wastewater treatment amount to 4.827 Mg/a
The sustained emissions were divided by the inhabitants of the year 1993 (7.991.000), which results in the two activity factors:	
EF (Industrial wastewater handling):	604,05 g CH_4 /inhabitant
EF (Domestic and commercial wastewater handling):	171,94 g CH_4 /inhabitant

Main difference between the Austrian method and the one of IPCC

The main difference is that the Austrian emission factor is calculated per inhabitant and not per kg DOC. Therefore the amount of produced biogas was estimated together for industrial and domestic and commercial wastewater, based on the amount of organic waste. It was not calculated on the bases of BOD (biochemical oxygen demand) and COD (chemical oxygen demand).

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- To provide a new estimation of the methane recovery rate
- Review of the methodology of estimating emissions (including emission factors)

<u>6 B 2 Domestic and Commercial Wastewater</u>

Emissions: *CH_4, N_2O*

Key source: *No*

Table 120 shows the CH_4 and N_2O emissions from domestic and commercial wastewater handling for the period from 1990 to 2000.

As can be seen in the table, the trend during the period was increasing CH_4 and N_2O emissions. From 1990 to 2000 the CH_4 emissions increased by 5% and the N_2O emissions by 9%.

Table 120: CH_4 emissions from domestic and commercial wastewater handling 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emissions [Mg]	9.058	9.156	9.275	9.365	9.411	9.431	9.445	9.460	9.467	9.483	9.501
N_2O emissions [Mg]	54	55	56	56	57	58	59	59	60	59	59

Methodology

The CH_4 emissions were calculated by multiplying a national emission factor (unit: g emissions/inhabitant) with the number of inhabitants.

N_2O emissions were calculated in accordance with IPCC methodology [ORTHOFER et al., 1995]. According to this study about 75% of the domestic and commercial sewage in Austria treated in sewage plants. Furthermore it was estimated in this study that about 10% of the nitrogen that enters wastewater treatment plants is denitrificated and that only 1% of the total nitrogen in the denitrification process is emitted as N_2O. This was taken into account when applying the following formula for estimating the N_2O emissions from this category:

$$N_2O\ Emissions = 0{,}75 * 0{,}1 * 0{,}01 * P * Frac_{NPR} * Inhabitants * F$$

Where:

P… annual protein intake per capita [kg protein/ person/ a][21]

$Frac_{NPR}$ ... Fraction of nitrogen in protein (IPCC default value – 0,16 kg N/kg protein)

Inhabitants … number of inhabitants in Austria

F … Factor [1,57 kg N_2O/ kg N]

Activity data

The number of inhabitants was provided by ÖSTAT. The number of inhabitants during the period from 1990 to 2000 as well as the daily protein intake per capita are presented in Table 118.

Emission factor

See subchapter *6 B 1 Wastewater Handling* – Industrial wastewater.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Review of the methodology of estimating emissions (including emission factors)
- To provide a new estimation of the methane recovery rate

[21] Daily protein intake per capita taken from FAO statistics: http://apps.fao.org/page/collections?subset=nutrition

4.6.1.3 Category 6 C Waste Incineration

CO_2 emissions included in Category *6 Waste* are caused by waste incineration. Furthermore waste incineration has been identified as a source of N_2O emissions. These depend on the types of burned waste and the combustion temperature; they were not significant (0,01 Gg/a).

In this category CO_2 emissions from incineration of corpses, waste oil and non-biogenic waste are included as well as emissions of other gases from waste incineration.

Emissions from Category *Open Burning Of Agricultural Waste* is included in Chapter 4.4 *Agriculture*.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Review of the methodology of estimating emissions (including emission factors)
- Update activity data

Waste Incineration

Emission: *CO_2, N_2O, CH_4*

Key source: *No*

In this category emissions from incineration of hazardous waste, waste water sludge and municipal solid waste are considered.

Emissions from waste incineration were reported as a total as 'incineration of municipal solid waste', not split into the categories hazardous waste, waste water sludge and municipal solid waste.

It was assumed that 10% of the total waste were plastic and other non-biogenic waste. CO_2 emissions from combustion of the 90% biogenic part of the waste were reported under Category *1 A 5 a Other* (see explanation provided there).

Methodology

CORINAIR methodology was applied.

Emission factors

National emission factors for CO_2 and CH_4 are taken from [BMWA-EB, 1990], [BMWA-EB, 1996] and [UBAVIE, 2001]. N_2O emission factors are taken from national studies [STANZEL et al., 1995] and [BMUJF, 1994].

Table 121: Activity data and emission factors of category 1 A 5 a for the year 2000

SNAP	FUEL	CO_2 [kg/GJ]	CH_4 [g/GJ]	N_2O [g/GJ]	Activity [GJ]
090201	Municipal Waste	10,00	12,00	1,40	4.873.732
090201	Hazardous Waste	10,00	12,00	1,40	938.398
090201	Sewage Sludge	10,00	12,00	1,40	744.588
090201	Heavy Fuel Oil	80,00	1,00	1,00	393.736
090201	Natural Gas	55,00	1,50	1,00	307.202

<u>Incineration of corpses</u>

Emission: CO_2

Key source: *No*

This category includes CO_2 emissions from incineration of corpses.

Table 122 shows the CO_2 emissions for the period from 1990 to 2000.

As can be seen in the table, the reported CO_2 emissions were stable throughout the period.

Table 122: CO_2 emissions from incineration of corpses 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	2	2	2	2	2	2	2	2	2	2	2

Methodology

For calculation of CO_2 emissions in this category the number of incinerated corpses (=activity data) was multiplied with an emission factor (amount of CO_2 emitted per corpse).

The activity data as presented in Table 123 were taken from STATISTIK AUSTRIA. It was assumed that 12% of the total number of corpses were incinerated every year.

The emission factor of 175 kg CO_2/capita was taken from a Swiss study [BUWAL, 1995]. It was calculated based on medial measured values of CO_2 in the exhaust gases of crematories. Table 123 shows the number of incinerated corpses for the period from 1990 to 2000.

Table 123: Number of incinerated corpses 1990–2000

Year	Total number of corpses	Number of incinerated corpses
1990	82.952	9.954
1991	83.428	10.011
1992	83.162	9.979
1993	82.517	9.902
1994	80.684	9.682
1995	81.171	9.741
1996	80.790	9.695
1997	79.432	9.532
1998	78.339	9.401
1999	78.200	9.384
2000	78.200	9.384

<u>Incineration of Waste Oil</u>

Emission: CO_2

Key source: *No*

This category includes CO_2 emissions from incineration of waste oil.

Table 124 shows the CO_2 emissions for the period from 1990 to 2000.

As can be seen in the table the trend during the period has been increasing CO_2 emissions. From 1990 to 2000 the CO_2 emissions increased by 36% according to the increasing amounts of incinerated waste oil.

Table 124: CO_2 emissions from incineration of waste oil 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 emission [Gg]	7	5	6	7	8	8	9	9	9	10	10

Methodology

For calculation of CH_4 emissions in category incineration of waste oil the amount of incinerated waste oil (=activity data) was multiplied with a national emission factor.

Activity data

The activity data were taken from an internal study [IB 650, POP-Emissionsinventur, 2001], they are presented in Table 125.

Table 125: Incinerated amount of waste oil 1990 – 2000

Year	Incinerated amount of waste oil [Mg/a]
1990	2.200
1991	1.500
1992	1.800
1993	2.100
1994	2.500
1995	2.600
1996	2.700
1997	2.800
1998	2.900
1999	3.000
2000	3.000

Emission factor

The CO_2 emission factor of 80.000 kg/TJ [BMWA-EB, 1996] was multiplied by the heating value of waste oil (40,3 GJ/kg – according to heavy fuel oil), resulting in an emission factor of 3.224 kg/Mg. The N_2O emission factor of 0,6 g/GJ was also multiplied by the heating value of waste oil (see above), resulting in a N_2O emission factor of 24,18 g/Mg.

4.6.1.4 Category 6 D Other Waste

In this category sludge spreading and compost production are addressed.

Sludge Spreading

Emission: CH_4

Key source: *Yes*

For this category three kinds of sludge were important:

- Stabilized sludge from mechanical-biological waste water treatment, if not contained in other categories
- Residues of canalisation and wastewater treatment except sludge
- Wastewater resulting from water utilization

In 2000 CH_4 emissions from sludge spreading was a key source. It contributed 0,53% to the total amount of greenhouse gas emissions in Austria (see Table 109).

Table 126 shows the CH_4 emissions for the period from 1990 to 2000.

As can be seen in the table, the reported CH_4 emissions were stable throughout the period according to the estimation of a constant amount of sludge being spread yearly.

Table 126: CH_4 emissions from sludge spreading 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emission [Gg]	20	20	20	20	20	20	20	20	20	20	20

Methodology

Activity data and methodology were taken from a study [STEINLECHNER et al., 1994]. The amount of spread sludge was estimated to be constant throughout the period.

First the amount of total generated gas was calculated by multiplying the quantity of sludge (250.000 t) by its gas production potential (200 m^3/t). The amount of generated gas (50 mio m^3/a) was multiplied with the share of CH_4 in the generated gas which was assumed to be 55% as in all other categories. This resulted in a value of 20 Gg Ch_4 emitted from this source in the year 1990. As the amount of spread sludge was assumed to be constant throughout the period, this value was applied for all years.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Sludge Spreading will be reported in Category *6 B Wastewater Handling*
- Review of the methodology of estimating emissions (including emission factors)
- Update of activity data

Compost Production

Emission: CH_4

Key source: *No*

This category includes CH_4 emissions from compost production, they are presented in Table 127 for the period from 1990 to 2000.

As can be seen in the table, the reported CH_4 emissions were stable throughout the period according to the estimation of a constant amount of compost being produced yearly.

Table 127: CH_4 emissions from compost production 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CH_4 emissions [Gg]	2,48	2,48	2,48	2,48	2,48	2,48	2,48	2,48	2,48	2,48	2,48

Methodology

The CH_4 emissions were calculated by multiplying an emission factor by the quantity of treated waste (mechanical biological treated residual waste and composted waste).

The calculated value, based on data of the year 1995 was applied for all years.

Activity data

To obtain the activity data, the quantity of mechanical biological treated residual waste (345.000 t/a) and composted waste (930.000 t/a) are summed up (1.275.000 t/a). These data are taken from a national study [BAUMELER et al., 1998].

Emission factor

The quantity of emitted CH_4 for mechanical biological treated residual waste and composted waste, using the mean carbon flow is taken from a study [BAUMELER et al., 1998]. Therein the CH_4 emissions for residual waste amount to 0,38 Gg and 2,1 Gg for composted waste respectively. By adding up these emissions and multiplying them by the quantity of treated waste the emission factor for the year 1995 (1,945 kg CH_4 /t of waste) was obtained.

Planned Improvements

The following improvements are planned until the next submission of the National Inventory Report:

- Compost Production will be reported in Category *6 A Solid Waste Disposal on Land*
- Review of the methodology of estimating emissions (including emission factors)
- Update of activity data

5 IMPROVEMENT PROGRAM

Goals

The overall goal of the improvement programme is to produce emission inventories which are fully consistent with the UNFCCC reporting guidelines and the IPCC Guidelines.

The medium term goal is to implement by 2004 all those improvements which are necessary for consistency with the UNFCCC reporting guidelines and the reporting and monitoring guidelines under the Kyoto Protocol as well as the IPCC Guidelines.

Linkages

The improvement programme is driven by the results of any review process, e.g. internal Austrian review, review under the European Union Monitoring Mechanism, review under the UNFCCC and/or under the Kyoto Protocol. All those actions shall be triggered by the improvement programme that all problems identified by a review can be addressed. To this end the improvement programme may also inform other bodies/agencies/administration bodies if action is needed outside the Federal Environment Agency.

The improvement programme is supported by the QA/QC programme to support that the above goals are met within given time limits.

There should also be the possibility for a feedback to the process under the UNFCCC/the IPCC in order to initiate proposals for amendments of the UNFCCC reporting guidelines and the IPCC Guidelines, if any.

Timing

The improvement programme is updated every year by 15 April.

Responsibilities

The Federal Environment Agency is responsible for the management of the improvement programme.

Structure

The structure of the improvement programme follows the structure of the IPCC sectors. The improvement programme includes the inconsistency of the current emission inventory with the guidelines, the action which should be taken to achieve consistency, the timing and the responsibility for the action to be taken. Information about the key actions planned as well as the expected time of their implementation is included in the specific sections of the NIR.

Abbreviations

General

AMA	Agrarmarkt Austria
BAWP	Bundes-Abfallwirtschaftsplan Federal Waste Management Plan
BMLFUW	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft Federal Ministry for Agriculture, Forestry, Environment and Water Management
BMUJF	Bundesministerium für Umwelt, Jugend und Familie Federal Ministry for Environment, Youth and Family (before 2000, now domain of Environment: BMLFUW)
BMWA	Bundesministerium für Wirtschaft und Arbeit Federal Ministry for Economic Affairs and Labour
BUWAL	Bundesamt für Umwelt, Wald und Landschaft, Bern The Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern
COP	Conference of the Parties
CORINAIR	Core Inventory Air
CORINE	Coordination d´information Environmentale
CRF	Common Reporting Format
DKDB	Dampfkesseldatenbank Austrian annual steam boiler inventory
DOC	Degradable Organic Carbon
EC	European Community
EEA	European Environment Agency
EFTA	European Free Trade Association
EIONET	European Environment Information and Observation NETwork
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EN	European Norm
EPER	European Pollutant Emission Register
ETC/AE	European Topic Centre on Air Emissions
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
GHG	Greenhouse Gas
GLOBEMI	Globale Modellbildung für Emissions- und Verbrauchsszenarien im Verkehrssektor (Global Modelling for Emission- and Fuel consumption Scenarios of the Transport Sector) see [HAUSBERGER, 1998]
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IEA	International Energy Agency
ICAO	International Civil Aviation Organisation

ISO	International Standards Organisation
LTO	Landing/Take-Off cycle
LUCF	Land Use Change and Forestry – IPCC-CRF Category 5
LULUCF	Land Use and Land Use Change and Forestry
NACE	Nomenclature des activites economiques de la Communaute Europeenne
NAPFUE	Nomenclature for Air Pollution Fuels
NFI	National Forest Inventory
NISA	National Inventory System Austria
OECD	Organisation for Economic Co-operation and Development
OLI	Österreichische Luftschadstoff Inventur Austrian Air Emission Inventory
OMV	Österreichische Mineralölverwaltung Austrian Mineraloil Company
ÖSTAT	Former STATISTIK AUSTRIA
PHARE	Phare is the acronym of the Programme's original name: '**P**oland and **H**ungary: **A**ction for the **R**estructuring of the **E**conomy'. It covers now 14 partner countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, the Former Yugoslav Republic of Macedonia (FYROM), Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. (However, Croatia was suspended from the Phare Programme in July 1995.)
PRÄKO	Präsidentenkonferenz der Landwirtschaftskammern Österreichs Standing Committee of the Presidents of the Austrian Chambers of Agriculture
SNAP	Selected Nomenclature on Air Pollutants
UBAVIE	Umweltbundesamt Wien Austrian Federal Environment Agency, Vienna
UNECE / CLRTAP	United Nations Economic Commission for Europe, Convention on Long-range Transboundary Air Pollution
UNFCCC	United Nations Framework Convention on Climate Change
WIFO	Österreichisches Institut für Wirtschaftsforschung Austrian Institute of Economic Research
WWF	World Wide Fund For Nature (formerly known as the World Wildlife Fund)

Notation Keys

according to UNFCCC guidelines on reporting and review [FCCC/CP/1997/7]

"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 within a country;
"NE" (not estimated)	for existing emissions by sources and removals by sinks of greenhouse gases which have not been estimated. Where "NE" is used in an inventory for emissions or removals of CO_2 , CH_4 , N_2O, HFCs, PFCs, or SF_6 , the Party should indicate, using the completeness table of the common reporting format, why emissions could not be estimated;
"NA" (not applicable)	for activities in a given source/sink category that do not result in emissions or removals of a specific gas. If categories in the common reporting format for which "NA" is applicable are shaded, they do not need to be filled in;
"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. Where "IE" is used in an inventory, the Party should indicate, using the completeness table of the common reporting format, where in the inventory the emissions or removals from the displaced source/sink category have been included and the Party should give the reasons for this inclusion deviating from the expected category;
"C" (confidential)	for emissions by sources and removals by sinks of greenhouse gases which could lead to the disclosure of confidential information, given the provisions of paragraph 19 [FCCC/CP/1997/7];
"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. The amount should still be included in the national totals and any relevant subtotals. In the sectoral background tables of the common reporting format Parties should provide data as detailed as methods allow.

Chemical Symbols

Symbol	Name
Greenhouse gases	
CH_4	Methane
CO_2	Carbon Dioxide
N_2O	Nitrous Oxide
HFCs	Hydroflurocarbons
PFCs	Perfluorocarbons
SF_6	Sulphur hexafluoride
Further chemical compounds	
CO	Carbon Monoxide
Cd	Cadmium
NH_3	Ammonia
Hg	Mercury
NO_X	Nitrogen Oxides (NO plus NO_2)
NO_2	Nitrogen Dioxide
NMVOC	Non-Methane Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
POP	Persistent Organic Pollutants
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxides

Units and Metric Symbols

UNIT	Name	Unit for
g	gram	mass
t	ton	mass
W	watt	power
J	joule	calorific value
m	meter	length

Mass Unit Conversion		
1g		
1kg	= 1.000g	
1t	= 1.000kg	= 1Mg
1kt	= 1.000t	= 1Gg
1Mt	= 1 Mio t	= 1Tg

Metric Symbol	Prefix	Factor
P	peta	10^{15}
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
k	kilo	10^{3}
h	hecto	10^{2}
da	deca	10^{1}
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
µ	micro	10^{-6}
n	nano	10^{-9}

Annotation: 63,20 for example means sixtythree point twenty, whereas 63.200 would mean sixtythree-thousandtwohundred.

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TABLE A.1: Source Categories for the Key Source Analysis 2002

			1990						2000					
IPCC 96 / Code	Name	Unit	CO2	CH4(21)	N2O(310)	HFC	PFC	SF6	CO2	CH4(21)	N2O(310)	HFC	PFC	SF6
1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1849,78	0,55	8,74				1189,55	0,23	5,43			
1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	6379,30	1,50	23,09				4878,05	0,15	22,58			
1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4128,47	1,00	9,29				3646,01	1,97	4,20			
1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,00	0,04	1,24				0,00	0,36	9,49			
1 A 1 a other	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,85	0,02	0,04				0,00	0,00	0,00			
1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	2018,86	0,00	3,00				2384,00	0,00	3,27			
1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industries	GWP (Gg)	18,22	0,01	0,01				39,35	0,02	0,02			
1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	2620,56	1,23	9,42				2052,70	0,75	6,33			
1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1015,95	1,57	109,87				1057,64	1,36	106,50			
1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	608,69	0,73	2,70				827,63	0,73	3,68			
1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	4004,93	2,29	2,26				6618,23	3,79	3,73			
1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,00	0,30	8,97				0,00	1,42	41,92			
1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	199,55	5,03	8,66				50,73	1,28	2,20			
1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	9,18	0,04	0,17				6,87	0,03	0,13			
1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	60,30	0,01	0,15				107,11	0,02	0,26			
1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	7910,16	62,95	248,08				6107,30	28,80	443,01			
1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3738,39	3,38	47,82				10472,56	3,86	104,60			
1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,62	0,01	0,15				2,51	0,00	0,06			
1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	167,28	0,14	6,57				177,52	0,12	6,19			
1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	42,76	0,03	3,78				54,25	0,03	4,18			
1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	9,32	0,25	0,08				9,10	0,23	0,08			
1 A 3 e liquid	Energy_Fuel Combustion_Transport_Other	GWP (Gg)	0,00	0,00	0,00				0,00	0,00	0,00			
1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	6721,81	0,68	22,94				6274,18	0,56	23,51			
1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2559,00	49,74	19,64				1107,20	19,92	8,52			
1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2889,26	4,59	16,28				4450,50	1,36	25,08			
1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,00	288,74	116,59				0,00	183,11	83,64			
1 A 4 stat-other	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	3,87	0,10	0,17				0,00	0,00	0,00			
1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	141,81	2,21	7,37				140,00	2,03	6,75			
1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1549,86	3,29	162,77				1622,11	3,05	171,49			
1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	42,86	1,16	0,20				43,77	1,14	0,22			
1 B 1	Energy_Fugitve Emissions from Fuels_Solid fuels	GWP (Gg)	0,00	0,37	0,00				0,00	0,17	0,00			
1 B 2 a	Energy_Fugitve Emissions from Fuels_Other_Oil	GWP (Gg)	0,00	5,31	0,00				0,00	5,80	0,00			
1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	119,97	89,25	0,00				94,98	114,18	0,00			
2 A 1	Industrial Processes_Mineral Products_Cement Production	GWP (Gg)	3088,07	0,00	0,00				2342,92	0,00	0,00			
2 A 2	Industrial Processes_Mineral Products_Lime Production	GWP (Gg)	317,52	0,00	0,00				295,55	0,00	0,00			
2 A 5	Industrial Processes_Mineral Products_Asphalt Roofing	GWP (Gg)	0,00	0,76	0,00				0,00	0,85	0,00			
2 A 7 a	Industrial Processes_Mineral Products_Otherl_Glass-decarbonizing	GWP (Gg)	83,69	0,00	0,00				78,82	0,00	0,00			
2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	GWP (Gg)	485,28	0,00	0,00				338,54	0,00	0,00			
2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	396,00	1,31	0,00				472,12	1,15	0,00			
2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	0,41	0,00	185,66				0,40	0,00	179,63			
2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	27,43	0,83	0,00				19,94	0,92	0,00			
2 C 1	Industrial Processes_Metal Production_Iron and Steel	GWP (Gg)	8461,04	0,00	0,00				8590,51	0,00	0,00			
2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	GWP (Gg)	0,00	0,00	0,00	0,00	936,91	253,34	0,00	0,00	0,00	0,00	0,00	7,65
2 C 5	Industrial Processes_Metal Production_Other	GWP (Gg)	0,00	0,05	0,00				0,00	0,06	0,00			
2 D 2	Industrial Processes_Other Production_Food and Drink	GWP (Gg)	59,24	0,00	0,00				47,80	0,00	0,00			
2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	0,00	0,00	0,00	3,69	26,26	264,40	0,00	0,00	0,00	1033,25	25,16	669,30
3	Solvent and other Product Use	GWP (Gg)	522,65	0,00	232,50				395,64	0,00	232,50			
4 A 1	Agriculture_Enteric Fermentation_Cattle	GWP (Gg)	0,00	3087,77	0,00				0,00	2424,26	0,00			
4 A 3	Agriculture_Enteric Fermentation_Sheep	GWP (Gg)	0,00	51,96	0,00				0,00	56,99	0,00			
4 A 4	Agriculture_Enteric Fermentation_Goats	GWP (Gg)	0,00	3,92	0,00				0,00	5,89	0,00			
4 A 6	Agriculture_Enteric Fermentation_Horses	GWP (Gg)	0,00	18,60	0,00				0,00	30,83	0,00			
4 A 8	Agriculture_Enteric Fermentation_Swine	GWP (Gg)	0,00	80,48	0,00				0,00	78,58	0,00			
4 B 1	Agriculture_Manure Management_Cattle	GWP (Gg)	0,00	316,91	0,00				0,00	252,02	0,00			
4 B 3	Agriculture_Manure Management_Sheep	GWP (Gg)	0,00	1,43	0,00				0,00	1,57	0,00			
4 B 4	Agriculture_Manure Management_Goats	GWP (Gg)	0,00	0,11	0,00				0,00	0,16	0,00			
4 B 6	Agriculture_Manure Management_Horses	GWP (Gg)	0,00	1,68	0,00				0,00	2,79	0,00			
4 B 8	Agriculture_Manure Management_Swine	GWP (Gg)	0,00	230,72	0,00				0,00	225,26	0,00			
4 B 9	Agriculture_Manure Management_Poultry	GWP (Gg)	0,00	26,12	0,00				0,00	22,28	0,00			

TABLE A.1: Source Categories for the Key Source Analysis 2002

			1990						2000					
IPCC 96 / Code	Name	**Unit**	CO2	CH4(21)	N2O(310)	HFC	PFC	SF6	CO2	CH4(21)	N2O(310)	HFC	PFC	SF6
4 D	Agriculture_Agricultural Soils	GWP (Gg)	0,00	745,10	1023,91				0,00	717,66	987,05			
4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	0,00	4,42	2,46				0,00	4,42	2,46			
6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land	GWP (Gg)	0,00	5438,46	0,00				0,00	4423,78	0,00			
6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	0,00	98,04	5,05				0,00	102,84	5,50			
6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	0,00	190,22	16,82				0,00	199,52	18,34			
6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	8,83	0,00	0,02				11,31	0,00	0,02			
6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00	0,00	0,00				24,11	0,01	0,09			
6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,81	0,00	0,01				16,97	0,01	0,10			
6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	27,53	0,69	1,19				53,59	1,35	2,33			
6 D 1	Waste_Other Waste_Sludge spreading	GWP (Gg)	0,00	420,00	0,00				0,00	420,00	0,00			
6 D 2	Waste_Other Waste_Compost production	GWP (Gg)	0,00	52,08	0,00				0,00	52,08	0,00			
	SUMME	GWP (Gg)	62297,10	11298,20	2307,66	3,69	963,17	517,74	66102,04	9401,74	2515,09	1033,25	25,16	676,95

Blank Cells: No emission occurring

0,00 (Cero) has to be used for calculation-software-reason and stands for the Notation keys NO, NE, IE or 0,0

TABLE A.2: Level Assessment 1990 for the Key Source Analysis 2002

1990							
Ran	Cumulat.¨	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
1	0,1093	0,109333	CO2	2 C 1	Industrial Processes_Metal Production_Iron and Steel	GWP (Gg)	8461,04
2	0,2115	0,102215	CO2	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	7910,16
3	0,2984	0,086859	CO2	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	6721,81
4	0,3808	0,082433	CO2	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	6379,30
5	0,4511	0,070276	CH4	6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land	GWP (Gg)	5438,46
6	0,5045	0,053348	CO2	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4128,47
7	0,5562	0,051752	CO2	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	4004,93
8	0,6045	0,048307	CO2	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3738,39
9	0,6444	0,039904	CO2	2 A 1	Industrial Processes_Mineral Products_Cement Production	GWP (Gg)	3088,07
10	0,6843	0,039900	CH4	4 A 1	Agriculture_Enteric Fermentation_Cattle	GWP (Gg)	3087,77
11	0,7217	0,037335	CO2	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2889,26
12	0,7555	0,033863	CO2	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	2620,56
13	0,7886	0,033067	CO2	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2559,00
14	0,8147	0,026088	CO2	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	2018,86
15	0,8386	0,023903	CO2	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1849,78
16	0,8586	0,020027	CO2	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1549,86
17	0,8718	0,013231	N2O	4 D	Agriculture_Agricultural Soils	GWP (Gg)	1023,91
18	0,8850	0,013128	CO2	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1015,95
19	0,8971	0,012107	PFC	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	GWP (Gg)	936,91
20	0,9067	0,009628	CH4	4 D	Agriculture_Agricultural Soils	GWP (Gg)	745,10
21	0,9146	0,007866	CO2	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	608,69
22	0,9213	0,006754	CO2	3	Solvent and other Product Use	GWP (Gg)	522,65
23	0,9276	0,006271	CO2	2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	GWP (Gg)	485,28
24	0,9330	0,005427	CH4	6 D 1	Waste_Other Waste_Sludge spreading	GWP (Gg)	420,00
25	0,9381	0,005117	CO2	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	396,00
26	0,9422	0,004103	CO2	2 A 2	Industrial Processes_Mineral Products_Lime Production	GWP (Gg)	317,52
27	0,9463	0,004095	CH4	4 B 1	Agriculture_Manure Management_Cattle	GWP (Gg)	316,91
28	0,9501	0,003731	CH4	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	288,74
29	0,9535	0,003417	SF6	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	264,40
30	0,9568	0,003274	SF6	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	GWP (Gg)	253,34
31	0,9600	0,003206	N2O	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	248,08
32	0,9630	0,003004	N2O	3	Solvent and other Product Use	GWP (Gg)	232,50
33	0,9659	0,002981	CH4	4 B 8	Agriculture_Manure Management_Swine	GWP (Gg)	230,72
34	0,9685	0,002579	CO2	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	199,55
35	0,9710	0,002458	CH4	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	190,22
36	0,9734	0,002399	N2O	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	185,66
37	0,9755	0,002162	CO2	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	167,28
38	0,9776	0,002103	N2O	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	162,77
39	0,9795	0,001832	CO2	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	141,81
40	0,9810	0,001550	CO2	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	119,97
41	0,9825	0,001507	N2O	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	116,59
42	0,9840	0,001420	N2O	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	109,87

TABLE A.2: Level Assessment 1990 for the Key Source Analysis 2002

1990							
Ran	Cumulat.`	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
43	0,9852	0,001267	CH4	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	98,04
44	0,9864	0,001153	CH4	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	89,25
45	0,9875	0,001081	CO2	2 A 7 a	Industrial Processes_Mineral Products_Otherl_Glass-decarbonizing	GWP (Gg)	83,69
46	0,9885	0,001040	CH4	4 A 8	Agriculture_Enteric Fermentation_Swine	GWP (Gg)	80,48
47	0,9893	0,000813	CH4	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	62,95
48	0,9901	0,000779	CO2	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	60,30
49	0,9909	0,000766	CO2	2 D 2	Industrial Processes_Other Production_Food and Drink	GWP (Gg)	59,24
50	0,9915	0,000673	CH4	6 D 2	Waste_Other Waste_Compost production	GWP (Gg)	52,08
51	0,9922	0,000671	CH4	4 A 3	Agriculture_Enteric Fermentation_Sheep	GWP (Gg)	51,96
52	0,9928	0,000643	CH4	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	49,74
53	0,9935	0,000618	N2O	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	47,82
54	0,9940	0,000554	CO2	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	42,86
55	0,9946	0,000553	CO2	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	42,76
56	0,9949	0,000356	CO2	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	27,53
57	0,9953	0,000354	CO2	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	27,43
58	0,9956	0,000339	PFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	26,26
59	0,9960	0,000338	CH4	4 B 9	Agriculture_Manure Management_Poultry	GWP (Gg)	26,12
60	0,9963	0,000298	N2O	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	23,09
61	0,9966	0,000296	N2O	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	22,94
62	0,9968	0,000254	N2O	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	19,64
63	0,9970	0,000240	CH4	4 A 6	Agriculture_Enteric Fermentation_Horses	GWP (Gg)	18,60
64	0,9973	0,000235	CO2	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industries	GWP (Gg)	18,22
65	0,9975	0,000217	N2O	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	16,82
66	0,9977	0,000210	N2O	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	16,28
67	0,9978	0,000122	N2O	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	9,42
68	0,9980	0,000120	CO2	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	9,32
69	0,9981	0,000120	N2O	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	9,29
70	0,9982	0,000119	CO2	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	9,18
71	0,9983	0,000116	N2O	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	8,97
72	0,9984	0,000114	CO2	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	8,83
73	0,9985	0,000113	N2O	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	8,74
74	0,9986	0,000112	N2O	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	8,66
75	0,9987	0,000095	N2O	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	7,37
76	0,9988	0,000086	CO2	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,62
77	0,9989	0,000085	N2O	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,57
78	0,9990	0,000069	CH4	1 B 2 a	Energy_Fugitve Emissions from Fuels_Other_Oil	GWP (Gg)	5,31
79	0,9990	0,000065	N2O	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	5,05
80	0,9991	0,000065	CH4	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	5,03
81	0,9992	0,000059	CH4	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	4,59
82	0,9992	0,000057	CH4	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	4,42
83	0,9993	0,000051	CH4	4 A 4	Agriculture_Enteric Fermentation_Goats	GWP (Gg)	3,92
84	0,9993	0,000050	CO2	1 A 4 stat-other	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	3,87

TABLE A.2: Level Assessment 1990 for the Key Source Analysis 2002

1990							
Ran	Cumulat.¯	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
85	0,9994	0,000049	N2O	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	3,78
86	0,9994	0,000048	HFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	3,69
87	0,9995	0,000044	CH4	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3,38
88	0,9995	0,000043	CH4	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	3,29
89	0,9995	0,000039	N2O	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	3,00
90	0,9996	0,000035	N2O	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,70
91	0,9996	0,000032	N2O	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	2,46
92	0,9996	0,000030	CH4	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,29
93	0,9997	0,000029	N2O	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,26
94	0,9997	0,000028	CH4	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	2,21
95	0,9997	0,000023	CO2	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,81
96	0,9997	0,000022	CH4	4 B 6	Agriculture_Manure Management_Horses	GWP (Gg)	1,68
97	0,9998	0,000020	CH4	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1,57
98	0,9998	0,000019	CH4	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,50
99	0,9998	0,000018	CH4	4 B 3	Agriculture_Manure Management_Sheep	GWP (Gg)	1,43
100	0,9998	0,000017	CH4	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	1,31
101	0,9998	0,000016	N2O	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,24
102	0,9999	0,000016	CH4	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	1,23
103	0,9999	0,000015	N2O	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,19
104	0,9999	0,000015	CH4	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1,16
105	0,9999	0,000013	CH4	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,00
106	0,9999	0,000011	CO2	1 A 1 a other	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,85
107	0,9999	0,000011	CH4	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	0,83
108	0,9999	0,000010	CH4	2 A 5	Industrial Processes_Mineral Products_Asphalt Roofing	GWP (Gg)	0,76
109	0,9999	0,000009	CH4	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,73
110	0,9999	0,000009	CH4	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,69
111	1,0000	0,000009	CH4	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,68
112	1,0000	0,000007	CH4	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,55
113	1,0000	0,000005	CO2	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	0,41
114	1,0000	0,000005	CH4	1 B 1	Energy_Fugitve Emissions from Fuels_Solid fuels	GWP (Gg)	0,37
115	1,0000	0,000004	CH4	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,30
116	1,0000	0,000003	CH4	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,25
117	1,0000	0,000003	N2O	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	0,20
118	1,0000	0,000002	N2O	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,17
119	1,0000	0,000002	N2O	1 A 4 stat-other	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,17
120	1,0000	0,000002	N2O	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,15
121	1,0000	0,000002	N2O	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,15
122	1,0000	0,000002	CH4	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,14
123	1,0000	0,000001	CH4	4 B 4	Agriculture_Manure Management_Goats	GWP (Gg)	0,11
124	1,0000	0,000001	CH4	1 A 4 stat-other	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,10
125	1,0000	0,000001	N2O	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,08
126	1,0000	0,000001	CH4	2 C 5	Industrial Processes_Metal Production_Other	GWP (Gg)	0,05

TABLE A.2: Level Assessment 1990 for the Key Source Analysis 2002

1990							
Ran	Cumulat.`	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
127	1,0000	0,000001	CH4	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,04
128	1,0000	0,000000	N2O	1 A 1 a other	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,04
129	1,0000	0,000000	CH4	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,04
130	1,0000	0,000000	CH4	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,03
131	1,0000	0,000000	CH4	1 A 1 a other	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,02
132	1,0000	0,000000	N2O	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	0,02
133	1,0000	0,000000	CH4	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,01
134	1,0000	0,000000	CH4	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industries	GWP (Gg)	0,01
135	1,0000	0,000000	N2O	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industries	GWP (Gg)	0,01
136	1,0000	0,000000	N2O	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,01
137	1,0000	0,000000	CH4	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,01
138	1,0000	0,000000	CH4	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00

TABLE A.3: Level Assessment 2000 for the Key Source Analysis 2002

2000							
Ran	Cumulat.T	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
1	0,1313	0,131310	CO2	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	10472,56
2	0,2390	0,107712	CO2	2 C 1	Industrial Processes_Metal Production_Iron and Steel	GWP (Gg)	8590,51
3	0,3220	0,082983	CO2	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	6618,23
4	0,4007	0,078669	CO2	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	6274,18
5	0,4773	0,076576	CO2	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	6107,30
6	0,5384	0,061163	CO2	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4878,05
7	0,5942	0,055803	CO2	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	4450,50
8	0,6497	0,055468	CH4	6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land	GWP (Gg)	4423,78
9	0,6954	0,045716	CO2	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	3646,01
10	0,7258	0,030397	CH4	4 A 1	Agriculture_Enteric Fermentation_Cattle	GWP (Gg)	2424,26
11	0,7557	0,029892	CO2	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	2384,00
12	0,7851	0,029377	CO2	2 A 1	Industrial Processes_Mineral Products_Cement Production	GWP (Gg)	2342,92
13	0,8108	0,025738	CO2	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	2052,70
14	0,8311	0,020339	CO2	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1622,11
15	0,8461	0,014915	CO2	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1189,55
16	0,8599	0,013883	CO2	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	1107,20
17	0,8732	0,013261	CO2	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1057,64
18	0,8862	0,012955	HFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	1033,25
19	0,8985	0,012376	N2O	4 D	Agriculture_Agricultural Soils	GWP (Gg)	987,05
20	0,9089	0,010377	CO2	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	827,63
21	0,9179	0,008998	CH4	4 D	Agriculture_Agricultural Soils	GWP (Gg)	717,66
22	0,9263	0,008392	SF6	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	669,30
23	0,9322	0,005920	CO2	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	472,12
24	0,9378	0,005555	N2O	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	443,01
25	0,9430	0,005266	CH4	6 D 1	Waste_Other Waste_Sludge spreading	GWP (Gg)	420,00
26	0,9480	0,004961	CO2	3	Solvent and other Product Use	GWP (Gg)	395,64
27	0,9522	0,004245	CO2	2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	GWP (Gg)	338,54
28	0,9560	0,003706	CO2	2 A 2	Industrial Processes_Mineral Products_Lime Production	GWP (Gg)	295,55
29	0,9591	0,003160	CH4	4 B 1	Agriculture_Manure Management_Cattle	GWP (Gg)	252,02
30	0,9620	0,002915	N2O	3	Solvent and other Product Use	GWP (Gg)	232,50
31	0,9649	0,002824	CH4	4 B 8	Agriculture_Manure Management_Swine	GWP (Gg)	225,26
32	0,9674	0,002502	CH4	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	199,52
33	0,9696	0,002296	CH4	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	183,11
34	0,9719	0,002252	N2O	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	179,63
35	0,9741	0,002226	CO2	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	177,52
36	0,9763	0,002150	N2O	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	171,49
37	0,9780	0,001755	CO2	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	140,00
38	0,9795	0,001432	CH4	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	114,18
39	0,9808	0,001343	CO2	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	107,11
40	0,9821	0,001335	N2O	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	106,50
41	0,9835	0,001311	N2O	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	104,60
42	0,9847	0,001289	CH4	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	102,84

TABLE A.3: Level Assessment 2000 for the Key Source Analysis 2002

2000							
Ran	Cumulat.T	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
43	0,9859	0,001191	CO2	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	94,98
44	0,9870	0,001049	N2O	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	83,64
45	0,9880	0,000988	CO2	2 A 7 a	Industrial Processes_Mineral Products_Otherl_Glass-decarbonizing	GWP (Gg)	78,82
46	0,9890	0,000985	CH4	4 A 8	Agriculture_Enteric Fermentation_Swine	GWP (Gg)	78,58
47	0,9897	0,000715	CH4	4 A 3	Agriculture_Enteric Fermentation_Sheep	GWP (Gg)	56,99
48	0,9904	0,000680	CO2	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	54,25
49	0,9910	0,000672	CO2	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	53,59
50	0,9917	0,000653	CH4	6 D 2	Waste_Other Waste_Compost production	GWP (Gg)	52,08
51	0,9923	0,000636	CO2	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	50,73
52	0,9929	0,000599	CO2	2 D 2	Industrial Processes_Other Production_Food and Drink	GWP (Gg)	47,80
53	0,9935	0,000549	CO2	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	43,77
54	0,9940	0,000526	N2O	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	41,92
55	0,9945	0,000493	CO2	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy I	GWP (Gg)	39,35
56	0,9949	0,000387	CH4	4 A 6	Agriculture_Enteric Fermentation_Horses	GWP (Gg)	30,83
57	0,9952	0,000361	CH4	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	28,80
58	0,9955	0,000315	PFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	25,16
59	0,9959	0,000315	N2O	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	25,08
60	0,9962	0,000302	CO2	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	24,11
61	0,9965	0,000295	N2O	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	23,51
62	0,9967	0,000283	N2O	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	22,58
63	0,9970	0,000279	CH4	4 B 9	Agriculture_Manure Management_Poultry	GWP (Gg)	22,28
64	0,9973	0,000250	CO2	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	19,94
65	0,9975	0,000250	CH4	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	19,92
66	0,9977	0,000230	N2O	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	18,34
67	0,9980	0,000213	CO2	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	16,97
68	0,9981	0,000142	CO2	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	11,31
69	0,9982	0,000119	N2O	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	9,49
70	0,9983	0,000114	CO2	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	9,10
71	0,9984	0,000107	N2O	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	8,52
72	0,9985	0,000096	SF6	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	GWP (Gg)	7,65
73	0,9986	0,000086	CO2	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	6,87
74	0,9987	0,000085	N2O	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	6,75
75	0,9988	0,000079	N2O	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	6,33
76	0,9989	0,000078	N2O	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,19
77	0,9989	0,000074	CH4	4 A 4	Agriculture_Enteric Fermentation_Goats	GWP (Gg)	5,89
78	0,9990	0,000073	CH4	1 B 2 a	Energy_Fugitve Emissions from Fuels_Other_Oil	GWP (Gg)	5,80
79	0,9991	0,000069	N2O	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	5,50
80	0,9991	0,000068	N2O	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	5,43
81	0,9992	0,000055	CH4	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	4,42
82	0,9993	0,000053	N2O	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4,20
83	0,9993	0,000052	N2O	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	4,18
84	0,9994	0,000048	CH4	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3,86

TABLE A.3: Level Assessment 2000 for the Key Source Analysis 2002

2000							
Ran	Cumulat.T	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
85	0,9994	0,000048	CH4	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	3,79
86	0,9995	0,000047	N2O	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	3,73
87	0,9995	0,000046	N2O	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	3,68
88	0,9995	0,000041	N2O	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	3,27
89	0,9996	0,000038	CH4	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	3,05
90	0,9996	0,000035	CH4	4 B 6	Agriculture_Manure Management_Horses	GWP (Gg)	2,79
91	0,9996	0,000032	CO2	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	2,51
92	0,9997	0,000031	N2O	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	2,46
93	0,9997	0,000029	N2O	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	2,33
94	0,9997	0,000028	N2O	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,20
95	0,9998	0,000025	CH4	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	2,03
96	0,9998	0,000025	CH4	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,97
97	0,9998	0,000020	CH4	4 B 3	Agriculture_Manure Management_Sheep	GWP (Gg)	1,57
98	0,9998	0,000018	CH4	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	1,42
99	0,9998	0,000017	CH4	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	1,36
100	0,9999	0,000017	CH4	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1,36
101	0,9999	0,000017	CH4	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,35
102	0,9999	0,000016	CH4	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	1,28
103	0,9999	0,000014	CH4	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	1,15
104	0,9999	0,000014	CH4	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1,14
105	0,9999	0,000012	CH4	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	0,92
106	0,9999	0,000011	CH4	2 A 5	Industrial Processes_Mineral Products_Asphalt Roofing	GWP (Gg)	0,85
107	0,9999	0,000009	CH4	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	0,75
108	1,0000	0,000009	CH4	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,73
109	1,0000	0,000007	CH4	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,56
110	1,0000	0,000005	CO2	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	0,40
111	1,0000	0,000005	CH4	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,36
112	1,0000	0,000003	N2O	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,26
113	1,0000	0,000003	CH4	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,23
114	1,0000	0,000003	CH4	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,23
115	1,0000	0,000003	N2O	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	0,22
116	1,0000	0,000002	CH4	1 B 1	Energy_Fugitve Emissions from Fuels_Solid fuels	GWP (Gg)	0,17
117	1,0000	0,000002	CH4	4 B 4	Agriculture_Manure Management_Goats	GWP (Gg)	0,16
118	1,0000	0,000002	CH4	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,15
119	1,0000	0,000002	N2O	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,13
120	1,0000	0,000002	CH4	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,12
121	1,0000	0,000001	N2O	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,10
122	1,0000	0,000001	N2O	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,09
123	1,0000	0,000001	N2O	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,08
124	1,0000	0,000001	CH4	2 C 5	Industrial Processes_Metal Production_Other	GWP (Gg)	0,06
125	1,0000	0,000001	N2O	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,06
126	1,0000	0,000000	CH4	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,03

TABLE A.3: Level Assessment 2000 for the Key Source Analysis 2002

2000							
Ran	Cumulat.T	**Lev Asses.**	GHG	IPCC 96 / Code	Name	Unit	
127	1,0000	0,000000	CH4	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,03
128	1,0000	0,000000	CH4	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy I	GWP (Gg)	0,02
129	1,0000	0,000000	N2O	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	0,02
130	1,0000	0,000000	N2O	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy I	GWP (Gg)	0,02
131	1,0000	0,000000	CH4	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,02
132	1,0000	0,000000	CH4	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,01
133	1,0000	0,000000	CH4	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,01
134	1,0000	0,000000	CH4	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,00

TABLE A.4: Trend Assessment 1990 to 2000 for the Key Source Analysis 2002

90-2000								
Rankir	Cumulat.T	(%)Trend A	GHG	IPCC 96 / Code	Name	Unit	1990	2000
1	0,2621	0,2621	CO2	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3738,39	10472,56
2	0,3608	0,0986	CO2	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	4004,93	6618,23
3	0,4417	0,0810	CO2	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	7910,16	6107,30
4	0,5089	0,0672	CO2	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	6379,30	4878,05
5	0,5695	0,0606	CO2	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2559,00	1107,20
6	0,6278	0,0583	CO2	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2889,26	4450,50
7	0,6746	0,0468	CH4	6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land	GWP (Gg)	5438,46	4423,78
8	0,7153	0,0408	HFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	3,69	1033,25
9	0,7486	0,0332	CO2	2 A 1	Industrial Processes_Mineral Products_Cement Production	GWP (Gg)	3088,07	2342,92
10	0,7786	0,0300	CH4	4 A 1	Agriculture_Enteric Fermentation_Cattle	GWP (Gg)	3087,77	2424,26
11	0,8070	0,0284	CO2	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1849,78	1189,55
12	0,8328	0,0259	CO2	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	6721,81	6274,18
13	0,8585	0,0257	CO2	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	2620,56	2052,70
14	0,8826	0,0241	CO2	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4128,47	3646,01
15	0,8983	0,0157	SF6	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	264,40	669,30
16	0,9103	0,0120	CO2	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	2018,86	2384,00
17	0,9204	0,0100	SF6	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundries	GWP (Gg)	253,34	7,65
18	0,9283	0,0079	CO2	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	608,69	827,63
19	0,9357	0,0074	N2O	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	248,08	443,01
20	0,9421	0,0064	CO2	2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	GWP (Gg)	485,28	338,54
21	0,9482	0,0061	CO2	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	199,55	50,73
22	0,9539	0,0057	CO2	3	Solvent and other Product Use	GWP (Gg)	522,65	395,64
23	0,9590	0,0051	CO2	2 C 1	Industrial Processes_Metal Production_Iron and Steel	GWP (Gg)	8461,04	8590,51
24	0,9636	0,0045	CH4	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	288,74	183,11
25	0,9665	0,0030	CH4	4 B 1	Agriculture_Manure Management_Cattle	GWP (Gg)	316,91	252,02
26	0,9692	0,0027	N2O	4 D	Agriculture_Agricultural Soils	GWP (Gg)	1023,91	987,05
27	0,9717	0,0025	CO2	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	396,00	472,12
28	0,9739	0,0022	N2O	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	47,82	104,60
29	0,9759	0,0020	CH4	4 D	Agriculture_Agricultural Soils	GWP (Gg)	745,10	717,66
30	0,9777	0,0018	CO2	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	60,30	107,11
31	0,9792	0,0014	N2O	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	116,59	83,64
32	0,9806	0,0014	CH4	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	62,95	28,80
33	0,9819	0,0013	N2O	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	8,97	41,92
34	0,9831	0,0013	CO2	2 A 2	Industrial Processes_Mineral Products_Lime Production	GWP (Gg)	317,52	295,55
35	0,9844	0,0012	CH4	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	49,74	19,92
36	0,9855	0,0011	CO2	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	119,97	94,98
37	0,9865	0,0010	CO2	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	27,53	53,59
38	0,9875	0,0010	CO2	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1549,86	1622,11
39	0,9884	0,0010	CO2	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00	24,11
40	0,9893	0,0009	CH4	1 B 2 b	Energy_Fugitve Emissions from Fuels_Other_Natural gas	GWP (Gg)	89,25	114,18
41	0,9901	0,0008	CO2	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industrie	GWP (Gg)	18,22	39,35
42	0,9907	0,0006	CO2	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,81	16,97

TABLE A.4: Trend Assessment 1990 to 2000 for the Key Source Analysis 2002

90-2000								
Rankir	Cumulat.T (%)	Trend A	GHG	IPCC 96 / Code	Name	Unit	1990	2000
43	0,9913	0,0005	CO2	2 D 2	Industrial Processes_Other Production_Food and Drink	GWP (Gg)	59,24	47,80
44	0,9918	0,0005	CH4	6 D 1	Waste_Other Waste_Sludge spreading	GWP (Gg)	420,00	420,00
45	0,9923	0,0005	CH4	4 B 8	Agriculture_Manure Management_Swine	GWP (Gg)	230,72	225,26
46	0,9927	0,0005	N2O	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	19,64	8,52
47	0,9932	0,0005	N2O	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	185,66	179,63
48	0,9937	0,0005	CH4	4 A 6	Agriculture_Enteric Fermentation_Horses	GWP (Gg)	18,60	30,83
49	0,9941	0,0004	CO2	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1015,95	1057,64
50	0,9945	0,0004	CO2	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	42,76	54,25
51	0,9948	0,0003	CO2	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	27,43	19,94
52	0,9951	0,0003	N2O	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	16,28	25,08
53	0,9955	0,0003	N2O	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,24	9,49
54	0,9958	0,0003	CO2	2 A 7 a	Industrial Processes_Mineral Products_Otherl_Glass-decarbonizing	GWP (Gg)	83,69	78,82
55	0,9960	0,0003	N2O	3	Solvent and other Product Use	GWP (Gg)	232,50	232,50
56	0,9963	0,0003	N2O	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	109,87	106,50
57	0,9966	0,0003	N2O	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	8,66	2,20
58	0,9968	0,0002	CO2	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	141,81	140,00
59	0,9970	0,0002	N2O	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	9,29	4,20
60	0,9972	0,0002	CO2	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	167,28	177,52
61	0,9974	0,0002	CH4	4 B 9	Agriculture_Manure Management_Poultry	GWP (Gg)	26,12	22,28
62	0,9976	0,0002	CH4	4 A 8	Agriculture_Enteric Fermentation_Swine	GWP (Gg)	80,48	78,58
63	0,9978	0,0002	CO2	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,62	2,51
64	0,9979	0,0002	CH4	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	5,03	1,28
65	0,9981	0,0001	N2O	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	162,77	171,49
66	0,9982	0,0001	N2O	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	8,74	5,43
67	0,9983	0,0001	CH4	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	190,22	199,52
68	0,9985	0,0001	CH4	4 A 3	Agriculture_Enteric Fermentation_Sheep	GWP (Gg)	51,96	56,99
69	0,9986	0,0001	N2O	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	9,42	6,33
70	0,9987	0,0001	CH4	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	4,59	1,36
71	0,9988	0,0001	CO2	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	9,18	6,87
72	0,9989	0,0001	CO2	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	8,83	11,31
73	0,9990	0,0001	PFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	26,26	25,16
74	0,9991	0,0001	CH4	4 A 4	Agriculture_Enteric Fermentation_Goats	GWP (Gg)	3,92	5,89
75	0,9992	0,0001	CH4	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	98,04	102,84
76	0,9992	0,0001	CH4	6 D 2	Waste_Other Waste_Compost production	GWP (Gg)	52,08	52,08
77	0,9993	0,0001	CH4	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,29	3,79
78	0,9993	0,0001	N2O	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,26	3,73
79	0,9994	0,0001	CH4	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,50	0,15
80	0,9994	0,0000	N2O	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	23,09	22,58
81	0,9995	0,0000	CH4	1 A 2 biomass	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,30	1,42
82	0,9995	0,0000	N2O	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	1,19	2,33
83	0,9996	0,0000	CH4	4 B 6	Agriculture_Manure Management_Horses	GWP (Gg)	1,68	2,79
84	0,9996	0,0000	N2O	6 B 2	Waste_Wastewater Handling_Domestic and Commercial Wastewater	GWP (Gg)	16,82	18,34

TABLE A.4: Trend Assessment 1990 to 2000 for the Key Source Analysis 2002

90-2000								
Rankir	Cumulat.T (%)	Trend A	GHG	IPCC 96 / Code	Name	Unit	1990	2000
85	0,9996	0,0000	CH4	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1,00	1,97
86	0,9997	0,0000	N2O	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	2,70	3,68
87	0,9997	0,0000	N2O	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	7,37	6,75
88	0,9997	0,0000	CH4	6 C other	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,69	1,35
89	0,9998	0,0000	N2O	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	6,57	6,19
90	0,9998	0,0000	CH4	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	1,23	0,75
91	0,9998	0,0000	CO2	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	9,32	9,10
92	0,9998	0,0000	CO2	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	42,86	43,77
93	0,9998	0,0000	CH4	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3,38	3,86
94	0,9998	0,0000	CH4	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	3,29	3,05
95	0,9999	0,0000	CH4	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,55	0,23
96	0,9999	0,0000	CH4	1 B 2 a	Energy_Fugitve Emissions from Fuels_Other_Oil	GWP (Gg)	5,31	5,80
97	0,9999	0,0000	CH4	1 A 1 a biomass	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	0,04	0,36
98	0,9999	0,0000	N2O	6 B 1	Waste_Wastewater Handling_Industrial Wastewater	GWP (Gg)	5,05	5,50
99	0,9999	0,0000	N2O	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	3,78	4,18
100	0,9999	0,0000	CH4	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1,57	1,36
101	0,9999	0,0000	CH4	1 A 4 mob-liquid_HG	Energy_Fuel Combustion_Other Sectors-Mobile_Household and gardening	GWP (Gg)	2,21	2,03
102	0,9999	0,0000	CH4	1 B 1	Energy_Fugitve Emissions from Fuels_Solid fuels	GWP (Gg)	0,37	0,17
103	0,9999	0,0000	CH4	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	1,31	1,15
104	0,9999	0,0000	N2O	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	3,00	3,27
105	0,9999	0,0000	CH4	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	0,68	0,56
106	1,0000	0,0000	CH4	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	4,42	4,42
107	1,0000	0,0000	N2O	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	22,94	23,51
108	1,0000	0,0000	N2O	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,15	0,26
109	1,0000	0,0000	N2O	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,15	0,06
110	1,0000	0,0000	CH4	4 B 3	Agriculture_Manure Management_Sheep	GWP (Gg)	1,43	1,57
111	1,0000	0,0000	N2O	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00	0,09
112	1,0000	0,0000	N2O	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,01	0,10
113	1,0000	0,0000	N2O	4 F	Agriculture_Field Burning of Agricultural Residues	GWP (Gg)	2,46	2,46
114	1,0000	0,0000	CH4	2 A 5	Industrial Processes_Mineral Products_Asphalt Roofing	GWP (Gg)	0,76	0,85
115	1,0000	0,0000	CH4	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1,16	1,14
116	1,0000	0,0000	CH4	2 B 5	Industrial Processes_Chemical Industry_Other	GWP (Gg)	0,83	0,92
117	1,0000	0,0000	CH4	4 B 4	Agriculture_Manure Management_Goats	GWP (Gg)	0,11	0,16
118	1,0000	0,0000	N2O	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,17	0,13
119	1,0000	0,0000	CH4	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	0,73	0,73
120	1,0000	0,0000	CO2	2 B 2	Industrial Processes_Chemical Industry_Nitric Acid Production	GWP (Gg)	0,41	0,40
121	1,0000	0,0000	CH4	1 A 3 c liquid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,14	0,12
122	1,0000	0,0000	CH4	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,25	0,23
123	1,0000	0,0000	N2O	1 A 4 mob-gasoline_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	0,20	0,22
124	1,0000	0,0000	CH4	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industrie	GWP (Gg)	0,01	0,02
125	1,0000	0,0000	N2O	1 A 1 c gaseous	Energy_Fuel Combustion_Energy Industries_Manufacture of Solid fuels and Other Energy Industrie	GWP (Gg)	0,01	0,02
126	1,0000	0,0000	CH4	1 A 3 a aviation gasoline	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,04	0,03

TABLE A.4: Trend Assessment 1990 to 2000 for the Key Source Analysis 2002

90-2000								
Rankir	Cumulat.T (%)	**Trend A**	GHG	IPCC 96 / Code	Name	Unit	1990	2000
127	1,0000	0,0000	CH4	6 C gaseous	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00	0,01
128	1,0000	0,0000	CH4	1 A 3 c solid	Energy_Fuel Combustion_Transport_Railways	GWP (Gg)	0,01	0,00
129	1,0000	0,0000	CH4	6 C liquid	Waste_Fuel Combustion_Waste Incineration	GWP (Gg)	0,00	0,01
130	1,0000	0,0000	CH4	1 A 3 a jet kerosene	Energy_Fuel Combustion_Transport_Civil Aviation	GWP (Gg)	0,01	0,02
131	1,0000	0,0000	N2O	6 C	Waste_Diff No Fuel Combustion_Waste Incineration	GWP (Gg)	0,02	0,02
132	1,0000	0,0000	N2O	1 A 3 d gasoline	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,08	0,08
133	1,0000	0,0000	CH4	2 C 5	Industrial Processes_Metal Production_Other	GWP (Gg)	0,05	0,06
134	1,0000	0,0000	CH4	1 A 3 d gas/diesel oil	Energy_Fuel Combustion_Transport_Navigation	GWP (Gg)	0,03	0,03

TABLE A.5: Key Source Categories of the Key Source Analysis 2002 (in order of LA 2000)

1990-2000	TA	LA90	LA2000							
Assessment throug	Ranki	Ranki	Ranki	Cumulat.	GHG	IPCC 96 / Code	Name	Unit	1990	2000
TA+LA90+LA2000	1	8	1	0,1313	CO2	1 A 3 b diesel oil	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	3738,39	10472,56
LA90+LA2000	23	1	2	0,2390	CO2	2 C 1	Industrial Processes_Metal Production_Iron and Steel	GWP (Gg)	8461,04	8590,51
TA+LA90+LA2000	2	7	3	0,3220	CO2	1 A 2 gaseous	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	4004,93	6618,23
TA+LA90+LA2000	12	3	4	0,4007	CO2	1 A 4 stat-liquid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	6721,81	6274,18
TA+LA90+LA2000	3	2	5	0,4773	CO2	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	7910,16	6107,30
TA+LA90+LA2000	4	4	6	0,5384	CO2	1 A 1 a solid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	6379,30	4878,05
TA+LA90+LA2000	6	11	7	0,5942	CO2	1 A 4 stat-gaseous	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2889,26	4450,50
TA+LA90+LA2000	7	5	8	0,6497	CH4	6 A 1	Waste_Solid Waste Disposal on Land_Managed Waste Disposal on Land	GWP (Gg)	5438,46	4423,78
TA+LA90+LA2000	14	6	9	0,6954	CO2	1 A 1 a gaseous	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	4128,47	3646,01
TA+LA90+LA2000	10	10	10	0,7258	CH4	4 A 1	Agriculture_Enteric Fermentation_Cattle	GWP (Gg)	3087,77	2424,26
TA+LA90+LA2000	16	14	11	0,7557	CO2	1 A 1 b liquid	Energy_Fuel Combustion_Energy Industries_Petroleum refining	GWP (Gg)	2018,86	2384,00
TA+LA90+LA2000	9	9	12	0,7851	CO2	2 A 1	Industrial Processes_Mineral Products_Cement Production	GWP (Gg)	3088,07	2342,92
TA+LA90+LA2000	13	12	13	0,8108	CO2	1 A 2 stat-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Stationary	GWP (Gg)	2620,56	2052,70
LA90+LA2000	38	16	14	0,8311	CO2	1 A 4 mob-diesel_AF	Energy_Fuel Combustion_Other Sectors-Mobile_Agriculture and Forestry	GWP (Gg)	1549,86	1622,11
TA+LA90+LA2000	11	15	15	0,8461	CO2	1 A 1 a liquid	Energy_Fuel Combustion_Energy Industries_Public Electricity and Heat Production	GWP (Gg)	1849,78	1189,55
TA+LA90+LA2000	5	13	16	0,8599	CO2	1 A 4 stat-solid	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	2559,00	1107,20
LA90+LA2000	49	18	17	0,8732	CO2	1 A 2 mob-liquid	Energy_Fuel Combustion_Manufacturing Industries and Construction-Mobil	GWP (Gg)	1015,95	1057,64
TA+LA2000	8	86	18	0,8862	HFC	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	3,69	1033,25
LA90+LA2000	26	17	19	0,8985	N2O	4 D	Agriculture_Agricultural Soils	GWP (Gg)	1023,91	987,05
TA+LA90+LA2000	18	21	20	0,9089	CO2	1 A 2 solid	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	608,69	827,63
LA90+LA2000	29	20	21	0,9179	CH4	4 D	Agriculture_Agricultural Soils	GWP (Gg)	745,10	717,66
TA+LA2000	15	29	22	0,9263	SF6	2 F	Industrial Processes_Consumption of Halocarbons and Sulphur Hexafluoride	GWP (Gg)	264,40	669,30
LA90+LA2000	27	25	23	0,9322	CO2	2 B 1	Industrial Processes_Chemical Industry_Ammonia Production	GWP (Gg)	396,00	472,12
TA+LA2000	19	31	24	0,9378	N2O	1 A 3 b gasoline	Energy_Fuel Combustion_Transport_Road Transportation	GWP (Gg)	248,08	443,01
LA90+LA2000	44	24	25	0,9430	CH4	6 D 1	Waste_Other Waste_Sludge spreading	GWP (Gg)	420,00	420,00
TA+LA90+LA2000	22	22	26	0,9480	CO2	3	Solvent and other Product Use	GWP (Gg)	522,65	395,64
TA+LA90+LA2000	20	23	27	0,9522	CO2	2 A 7 b	Industrial Processes_Mineral Products_Other_Magnesit Sinter Plants	GWP (Gg)	485,28	338,54
LA90	34	26	28	0,9560	CO2	2 A 2	Industrial Processes_Mineral Products_Lime Production	GWP (Gg)	317,52	295,55
LA90	25	27	29	0,9591	CH4	4 B 1	Agriculture_Manure Management_Cattle	GWP (Gg)	316,91	252,02
LA90	24	28	33	0,9614	CH4	1 A 4 stat-biomass	Energy_Fuel Combustion_Other Sectors-Stationary	GWP (Gg)	288,74	183,11
TA	21	34	51	0,9620	CO2	1 A 2 other	Energy_Fuel Combustion_Manufacturing Industries and Construction	GWP (Gg)	199,55	50,73
TA	17	30	72	0,9621	SF6	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundrie	GWP (Gg)	253,34	7,65
LA90	0	19	135	0,9621	PFC	2 C 4	Industrial Processes_Metal Production_SF6 Used in Aluminium and Magnesium Foundrie	GWP (Gg)	936,91	0,00

TA = Key Source Trend Assessment 1990-2000
LA90 = Key Source Level Assessment 1990
LA2000 = Key Source Level Assessment 2000

ANNEX II

Extracts from Austrian legislation, which regulate monitoring, reporting and verification of emissions at plant level

Cement production:

BGBl 1993/ 63 Verordnung für Anlagen zur Zementerzeugung

§ 5. Der Betriebsanlageninhaber hat

1. kontinuierliche Messungen der Emissionskonzentrationen an Gesamtstaub, SO_2 und Stickstoffoxiden (berechnet als NO_2) der Ofenanlage entsprechend der Z 1 der Anlage zu dieser Verordnung durchzuführen ...

Zur Durchführung der Messungen gemäß Z 2 und 3 sind Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, heranzuziehen.

§ 6 Die Ergebnisse der Messungen gemäß § 5 sind in einem Messbericht festzuhalten, welcher

1. bei Messungen gemäß § 5 Z 1 die Messwerte in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes und die gemäß § 4 Abs. 1 zu führenden Aufzeichnungen über Grenzwertüberschreitungen,

zu enthalten hat. Der Messbericht ist mindestens fünf Jahre in der Betriebsanlage derart aufzubewahren, dass er den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden kann.

Anlage
(§ 5)

Emissionsmessungen

1. Kontinuierliche Messungen

a) Die Datenaufzeichnung hat durch automatisch registrierende Messgeräte in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat.

b) Registrierende Emissionsmessgeräte sind im Abnahmeversuch und alle drei Jahre durch einen Sachverständigen aus dem im § 5 letzter Satz angeführten Personenkreis zu kalibrieren.

c) Jährlich ist eine Funktionskontrolle an registrierenden Emissionsmessgeräten durch Sachverständige aus dem im § 5 letzter Satz angeführten Personenkreis vorzunehmen.

Foundries:

BGBl 1994/ 447 Verordnung für Gießereien

§ 5 (1) Der Betriebsanlageninhaber hat Einzelmessungen der Emissionskonzentration der im § 3 Abs. 1 angeführten Stoffe entsprechend der Z 1 lit. A bis c der Anlage 2 dieser Verordnung in regelmäßigen, drei Jahre nicht übersteigenden Zeitabständen durchführen zu lassen (wiederkehrende Emissionsmessungen).

(2) Der Betriebsanlageninhaber hat kontinuierliche Messungen der Emissionskonzentrationen ... entsprechend der Z2 der Anlage 2 zu dieser Verordnung durchzuführen.

(3) Zur Durchführung der Messungen gemäß Abs. 1 sowie zur Funktionskontrolle und Kalibrierung von Messgeräten für Messungen gemäß Abs. 2 sind Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, oder akkreditierte Stellen im Rahmen des fachlichen Umfangs ihrer Akkreditierung (§ 11 Abs. 2 des Akkreditierungsgesetzes, BGBl Nr 468/ 1992) heranzuziehen.

§ 6 Die Ergebnisse der Messungen gemäß § 5 sind in einem Messbericht festzuhalten, welcher

1. bei Messungen gemäß § 5 Abs. 1 die Messwerte und die Betriebsbedingungen während der Messungen (Betriebszustand, Verbrauch an Brennstoff, Rohmaterial und Zuschlagstoffen),

2. bei Messungen gemäß § 5 Abs. 2 die Messwerte in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes und die gemäß § 4 Abs. 2 zu führenden Aufzeichnungen über Grenzwertüberschreitungen,

zu enthalten hat. Der Messbericht ist mindestens drei Jahre, bei Messungen gemäß § 5 Abs. 1 jedenfalls bis zur jeweils nächsten Messung, in der Betriebsanlage derart aufzubewahren, dass er den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden kann.

Anlage 2
(§ 5)

Emissionsmessungen

1. Einzelmessungen

a) Einzelmessungen sind für alle im § 3 Abs. 1 angeführten Stoffe bei jenem Betriebzustand durchzuführen, in dem nachweislich die Anlagen vorwiegende betrieben werden. Die Durchführung der Messungen hat nach den Regeln der Technik zu erfolgen.

c) Die Abgasmessungen sind an einer repräsentativen Entnahmestelle im Kanalquerschnitt, die vor Aufnahme der Messungen zu bestimmen ist, vorzunehmen. Es sind innerhalb eines Zeitraumes von drei Stunden drei Messwerte als Halbstundenmittelwerte zu bilden, deren einzelne Ergebnisse zu beurteilen sind.

2. Kontinuierliche Messungen

a) Die Datenaufzeichnung hat durch automatisch registrierende Messgeräte in Form von Halbstundenmittelwerte unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat.

b) Registrierende Emissionsmessgeräte sind im Abnahmeversuch und alle drei Jahre durch einen Sachverständigen aus dem im § 5 Abs. 3 angeführten Personenkreis zu kalibrieren.

c) Jährlich ist eine Funktionskontrolle an registrierenden Emissionsmessgeräten durch Sachverständige aus dem im § 5 Abs. 3 angeführten Personenkreis vorzunehmen.

Glass production:

BGBl 1994/ 498 Verordnung für Anlagen zur Glaserzeugung

§ 5 (2) Zur Kontrolle der Einhaltung der im § 3 festgelegten Emissionsgrenzwerte sind unter Beachtung des § 4 jeweils mindestens drei Messwerte als Halbstundenmittelwerte zu bestimmen.

(4) Die Durchführung der Emissionsmessungen hat nach den Regeln der Technik (z.B. nach den vom Verein deutscher Ingenieure herausgegebenen und beim Österreichischen Normungsinstitut, Heinestraße 38, 1021 Wien, erhältlichen Richtlinien VDI 2268, Blätter 1, 2 und 4, VDI 2462, Blätter 1 bis 5 und 8, und VDI 2456, Blätter 1, 2, 8 und 10) zu erfolgen.

§ 7 (1) Der Betriebsanlageninhaber hat in regelmäßigen, ein Jahr, bei Schmelzeinrichtungen gemäß § 3 Z 5 lit. D drei Jahre, nicht übersteigenden Zeitabständen Messungen zur Kontrolle der Einhaltung der im § 3 festgelegten Emissionsgrenzwerte entsprechend den §§ 4 bis 6 durchführen zu lassen.

(2) Zur Durchführung der Messungen sind Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, oder akkreditierte Stellen im Rahmen des fachlichen Umfangs ihrer Akkreditierung (§ 11 Abs. 2 des Akkreditierungsgesetzes, BGBl Nr 468/ 1992) heranzuziehen.

(3) Die Messwerte für die im § 3 angeführten Stoffe sowie der während der Messung herrschenden Betriebszustände sind zusammen mit den Kriterien, nach denen der Zeitraum für die Messung, der stärksten Emission festgelegt worden ist, in einem Messbericht festzuhalten. Im Messbericht sind auch die verwendeten Messverfahren zu beschreiben. Der Messbericht und sonstige zum Nachweis der Einhaltung der im § 3 festgelegten Emissionsgrenzwerte dienende Unterlagen sind bis zur nächsten Messung in der Betriebsanlage derart aufzubewahren, dass sie den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden können.

Iron and steel production:

BGBl II 1997/ 160 Verordnung für Anlagen zur Erzeugung von Eisen und Stahl

§ 6 (1) Der Betriebsanlageninhaber hat, soweit die Absätze 3 und 4 nicht anderes bestimmen, Einzelmessungen der Emissionskonzentrationen der im § 3 Abs. 1 und im § 4 (mit Ausnahme des § 4 Abs. 3 lit. c) angeführten Stoffe entsprechend der Z 1 lit. a bis c der Anlage zu dieser Verordnung in regelmäßigen, drei Jahre nicht übersteigenden Zeitabständen, durchführen zu lassen (wiederkehrende Emissionsmessungen).

(3) Der Betriebsinhaber hat, soweit Abs. 4 oder 5 nicht anderes bestimmt. Entweder kontinuierliche Messungen der Emissionskonzentrationen ... entsprechend der Z 2 der Anlage zu dieser Verordnung durchzuführen oder kontinuierliche Funktionsprüfungen der rauchgas- und bzw. oder Abluftfilteranlagen von Einrichtungen gemäß § 4 durchzuführen, wenn sich

durch diese Prüfungen mit hinreichender Sicherheit die Einhaltung der vorgeschriebenen Emissionsgrenzwerte für Staub festgestellt werden kann.

§ 6 (6) Zur Durchführung der Messungen gemäß Abs. 1 und 2 sowie zur Funktionskontrolle und Kalibrierung von Messgeräten für Messungen gemäß Abs. 3 sind akkreditierte Stellen im Rahmen des fachlichen Umfangs ihrer Akkreditierung (§ 11 Abs. 2 des Akkreditierungsgesetzes, BGBl Nr 468/ 1992), Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, heranzuziehen.

§ 7 Die Ergebnisse der Messungen gemäß § 6 sind in einem Messbericht festzuhalten, der zu enthalten hat:

1. bei Messungen gemäß § 6 Abs. 1 und 2 die Messwerte und die Betriebsbedingungen während der Messungen (Betriebszustand, Verbrauch Brennstoff, Rohmaterial und Zuschlagstoffen),

2. bei Messungen gemäß § 6 Abs. 3 und 4 die Messwerte in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes,

3. bei Funktionsprüfungen gemäß § 6 Abs. 3 die gemessenen Parameter in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes.

Der Messbericht ist mindestens drei Jahre, bei Messungen gemäß § 6 Abs. 1 und 2 jedenfalls bis zur jeweils nächsten Messung, in der Betriebsanlage derart aufzubewahren, dass er den behördlichen Organen zur Einsicht vorgewiesen werden kann.

Anlage
(§ 6)

Emissionsmessungen

1. Einzelmessungen

a) Einzelmessungen sind für alle im § 3 Abs. 1 und 3 und im § 4 angeführten Stoffe bei jenem Betriebszustand durchzuführen, in dem nachweislich die Anlagen vorwiegend betrieben werden. Die Durchführung der Messungen hat nach den Regeln der Technik zu erfolgen.

2. Kontinuierliche Messungen

a) Die Datenaufzeichnung hat durch ein automatisch registrierendes Messgerät in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90% zu betragen. Als Bezugszeitraum gilt ein Monat.

b) Das registrierende Messgerät ist im Abnahmeversuch und alle drei Jahre durch einen Sachverständigen aus dem im § 6 Abs. 5 angeführten Personenkreis zu kalibrieren.

c) Jährlich ist eine Funktionskontrolle des registrierenden Messgerätes durch einen Sachverständigen aus dem im § 6 Abs. 5 angeführten Personenkreis vorzunehmen.

Sinter plants:

BGBl II 1997/ 163 Verordnung für Anlagen zum Sintern von Eisenerzen

§ 5 (1) Der Betriebanlageninhaber hat Einzelmessungen der Emissionskonzentration der im § 3 Abs. 1 Z 2 lit. a und b und Z 3 angeführten Stoffe entsprechend der Z 1 in der Anlage zu dieser Verordnung in regelmäßigen, drei Jahre nicht übersteigenden Zeitabständen, durchzuführen zu lassen (wiederkehrende Emissionsmessungen).

(2) Der Betriebanlageninhaber hat kontinuierliche Messungen der Emissionskonzentrationen von Staub, Stickstoffoxiden und Schwefeldioxid entsprechend der Z 2 der Anlage dieser Verordnung durchzuführen.

(3) Zur Durchführung der Messungen gemäß Abs. 1 sowie zur Funktionskontrolle und Kalibrierung von Messgeräten für Messungen gemäß Abs. 2 sind akkreditierte Stellen im Rahmen des fachlichen Umfangs ihrer Akkreditierung (§ 11 Abs. 2 des Akkreditierungsgesetzes, BGBl Nr 468/ 1992), Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, heranzuziehen.

§ 6 Die Ergebnisse der Messungen gemäß § 5 sind in einem Messbericht festzuhalten, der zu enthalten hat:

1. bei Messungen gemäß § 5 Abs. 1 die Messwerte und die Betriebsbedingungen während der Messungen (Betriebszustand, Verbrauch an Brennstoff und Einsatzmaterial),

2. bei Messungen gemäß § 5 Abs. 2 die Messwerte in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes.

Der Messbericht ist mindestens drei Jahre, bei Messungen gemäß § 5 Abs. 1 jedenfalls bis zur jeweils nächsten Messung, in der Betriebsanlage derart aufzubewahren, dass er den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden kann.

Anlage
(§ 5)

Emissionsmessungen

1. Einzelmessungen

a) Einzelmessungen sind für die im § 3 Abs. 1 Z 2 lit. a und b und Z 3 angeführten Stoffe bei jenem Betriebszustand durchzuführen, in dem nachweislich die Anlagen vorwiegend betrieben werden. Die Durchführung der Messungen hat nach den Regeln der Technik zu erfolgen.

2. Kontinuierliche Messungen

a) Die Datenaufzeichnung hat durch ein automatisch registrierendes Messgerät in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat.

b) Das registrierende Messgerät ist im Abnahmeversuch und alle drei Jahre durch einen Sachverständigen aus dem im § 5 Abs. 3 angeführten Personenkreis zu kalibrieren. Die Kalibrierung hat nach den Regeln der Technik zu erfolgen.

c) Jährlich ist eine Funktionskontrolle des registrierenden Messgerätes durch einen Sachverständigen aus dem im § 5 Abs. 3 angeführten Personenkreis vorzunehmen.

Combustion plants:

BGBl II 1997/ 331 Feuerungsanlagen-Verordnung

Emissionsmessungen

§ 4 (1) Der Betriebsanlageninhaber hat Emissionsmessungen sowie die Bestimmung des Abgasverlustes entsprechend der Anlage 1 zu dieser Verordnung durchzuführen bzw. durchführen zu lassen.

(2) Zur Durchführung der Emissionseinzelmessungen sowie zur Bestimmung des Abgasverlustes ist ein Sachverständiger aus dem im § 2 Abs. 2 zweiter Satz genannten Personenkreis heranzuziehen.

§ 5 (1) Der Betriebsanlageninhaber hat, sofern in dieser Verordnung nicht anderes bestimmt ist,
1. kontinuierliche Messungen der Emissionskonzentrationen, abhängig von der jeweiligen Brennstoffwärmeleistung und dem eingesetzten Brennstoff, entsprechende der folgenden Tabelle durchzuführen

Brennstoff	Staub	CO	SO_2	NO_x	
fest	> 10	> 10	> 30	> 30	MW
flüssig	> 10	> 10	> 50	> 30	MW
gasförmig	-	> 10	-	> 30	MW

Prüfungen

Erstmalige Prüfung

§ 23 (1) Feuerungsanlagen sind anlässlich ihrer Inbetriebnahme einer erstmaligen Prüfung zu unterziehen.

(2) Die erstmalige Prüfung hat in der Erbringung des Nachweises zu bestehen, dass die Feuerungsanlage den Anforderungen dieser Verordnung entspricht.

Wiederkehrende Prüfungen

§ 25 (1) Feuerungsanlagen sind jährlich zu prüfen. Bei dieser jährlichen Prüfung sind die Feuerungsanlagen hinsichtlich jener Anlagenteile, die für die Emissionen oder deren Begrenzung von Bedeutung sind, zu besichtigen und auf etwaige Mängel zu kontrollieren... Weiters sind jährlich die Ergebnisse der gemäß § 5 durchgeführten kontinuierlichen Messungen zu beurteilen.

Prüfbescheinigung

§ 27 Das Ergebnis jeder Prüfung muss in einer Prüfbescheinigung festgehalten sein, die insbesondere festgestellte Mängel sowie Vorschläge zu deren Behebung zu enthalten hat. Die Prüfbescheinigung ist im Original in der Betriebsanlage zumindest fünf Jahre so aufzubewahren, dass sie den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden kann.

Anlage 1
(§§ 4 und 25)

Emissionsmessungen

1. Die Messungen sind

1.3 für gasförmige Emissionen nach den Regeln der Technik, oder nach einem diesen Verfahren gleichwertigen Verfahren durchzuführen.

2. Die Messstellen sind so festzulegen, dass eine repräsentative und messtechnisch einwandfreie Emissionsmessung gewährleistet ist.

3. Einzelmessungen

3.2 Die Einzelmessungen sind an einer repräsentativen Entnahmestelle im Kanalquerschnitt vorzunehmen. Es sind innerhalb eines Zeitraumes von drei Stunden drei messwerte als Halbstundenmittelwerte zu bilden.

4. Kontinuierliche Messungen

4.1 Die Datenaufzeichnung hat durch automatisch registrierende Messgeräte in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat. Die Messergebnisse müssen mit dem einzuhaltenden Grenzwert vergleichbar sein.

4.2 Registrierende Emissionsmessgeräte sind im Abnahmeversuch und mindestens alle drei Jahre durch einen Sachverständigen aus dem im § 2 Abs. 2 zweiter Satz angeführten Personenkreis zu kalibrieren. Die Kalibrierung hat nach den Regeln der Technik (z.B. nach den vom Verein Deutscher Ingenieure herausgegebenen und beim Österreichischen Normungsinstitut, Heinestraße 38, 1021 Wien, erhältlichen Richtlinien VDI 2066, Blatt 4 und Blatt 6, und VDI 3950, Blatt 1E) zu erfolgen.

4.3 Jährlich ist eine Funktionskontrolle an registrierenden Emissionsmessgeräten durch Sachverständige aus dem im § 2 Abs. 2 zweiter Satz angeführten Personenkreis vorzunehmen.

Non-ferrous metal production:

BGBl II 1998/ 1 Verordnung zur Erzeugung von Nichteisenmetallen

§ 6 (1) Der Betriebsanlageninhaber hat Einzelmessungen der Emissionskonzentration der im § 3 Abs. 1 und im § 4 angeführten Stoffe entsprechend der Z 1 lit. a bis c der Anlage zu dieser Verordnung in regelmäßigen, drei Jahre nicht übersteigenden Zeitabständen durchführen zu lassen (wiederkehrende Emissionsmessungen).

(2) Der Betriebsanlageninhaber hat kontinuierliche Messungen ... entsprechend der Z 2 der Anlage zu dieser Verordnung reingasseitig (im Kamin) durchzuführen.

(3) Zur Durchführung der Messungen gemäß Abs. 1 sowie zur Funktionskontrolle und Kalibrierung von Messgeräten für Messungen gemäß Abs. 2 sind akkreditierte Stellen im Rahmen des fachlichen Umfangs ihrer Akkreditierung (§ 11 Abs. 2 des Akkreditierungsgesetzes, BGBl Nr 468/ 1992), Anstalten des Bundes oder eines Bundeslandes, staatlich autorisierte Anstalten, Ziviltechniker oder Gewerbebetreibende, jeweils im Rahmen ihrer Befugnisse, heranzuziehen.

§ 7 Die Ergebnisse der Messungen gemäß § 6 sind in einem Messbericht festzuhalten, der zu enthalten hat:

1, bei Messungen gemäß § 6 Abs. 1 die Messwerte und die Betriebsbedingungen während der Messungen (Betriebszustand, Verbrauch an Brennstoff, Rohmaterial und Zuschlagstoffen),

2. bei Messungen gemäß § 6 Abs. 2 die Messwerte in Form von Aufzeichnungen eines kontinuierlich registrierenden Messgerätes und die gemäß § 5 Abs. 2 zu führenden Aufzeichnungen über Grenzwertüberschreitungen.

Der Messbericht ist mindestens drei Jahre, bei Messungen gemäß § 6 Abs. 1 jedenfalls bis zur jeweils nächsten Messung, in der Betriebsanlage derart aufzubewahren, dass er den behördlichen Organen jederzeit zur Einsicht vorgewiesen werden kann.

Anlage
(§ 6)

Emissionsmessungen

1. Einzelmessungen

a) Einzelmessungen sind für alle im § 3 Abs. 1 und 4 angeführten Stoffe bei jenem Betriebszustand durchzuführen, in dem nachweislich die Anlagen vorwiegend betrieben werden. Die Durchführung der Messungen hat nach den Regeln der Technik zu erfolgen.

2. Kontinuierliche Messungen

a) Die Datenaufzeichnung hat durch ein automatisch registrierendes Messgerät in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle zu erfolgen. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat.

b) Das registrierende Messgerät ist im Abnahmeversuch und alle drei Jahre durch einen Sachverständigen aus dem im § 6 Abs. 3 angeführten Personenkreis zu kalibrieren.

c) Die Wartung des registrierende Messgerätes ist durch einen Sachverständigen aus dem im § 6 Abs. 3 angeführten Personenkreis mindestens einmal jährlich vornehmen zu lassen.

Steam boilers:

BGBl 1988/ 380 idF (BGBl 1993/ 185, BGBl I 1997/ 115, BGBl I 1998/ 158) Luftreinhaltegesetz für Kesselanlagen

Überwachung

§ 7 (1) Die in Betrieb befindlichen Dampfkesselanlagen ... sind einmal jährlich durch einen befugten Sachverständigen auf die Einhaltung der Bestimmungen dieses Bundesgesetzes zu überprüfen. Die Überprüfung umfasst die Besichtigung der Anlage und deren Komponenten, soweit sie für die Emissionen oder deren Begrenzung von Bedeutung sind, verbunden mit der Kontrolle vorhandener Messergebnisse oder Messregistrierungen.

§ 8 (1) Die Behörde hat im Genehmigungsbescheid festzulegen, ob und in welchem Umfange Abnahmemessungen sowie wiederkehrende Emissionsmessungen an der Dampfkesselanlage durchzuführen sind. Emissionsmessungen sind ferner durchzuführen, wenn der befugte Sachverständige anlässlich einer Überprüfung gemäß § 7 Grund zur Annahme hat, dass die einzuhaltenden Emissionsgrenzwerte im Betrieb überschritten werden.

Pflichten des Betreibers

§ 10 (3) Der Betreiber hat der Behörde oder dem hierzu beauftragten Sachverständigen während der Betriebszeit den Zutritt zu der Anlage zu gestatten und Einsicht in alle die Emissionen der Dampfkesselanlage betreffenden Aufzeichnungen zu gewähren, die in einem Dampfkesselanlagenbuch zusammenzufassen sind.

BGBl 1989/ 19 idF (BGBl 1990/ 134, BGBl 1994/ 785, BGBl II 1997/ 324) Luftreinhalteverordnung für Kesselanlagen

Emissionseinzelmessungen

§ 2 a (1) Die Durchführung der Emissionsmessungen hat nach den Regeln der Technik zu erfolgen.

(2) Die in Anlage 7 wiedergegebene ÖNORM M 9415-1, Ausgabe Mai 1991, und die in Anlage 8 wiedergegebene ÖNORM 9415-3, Ausgabe Mai 1991, sind verbindlich anzuwenden.

§ 3 (1) Emissionseinzelmessungen sind für jede Schadstoffkomponente bei jenem feuerungstechnisch stationären Betriebzustand durchzuführen, bei dem nachweislich die Anlage vorwiegend betrieben wird.

(2) Für die Durchführung der Emissionseinzelmessungen ist die in Anlage 9 wiedergegebene ÖNORM M 9415-2, Ausgabe Mai 1991, verbindlich anzuwenden.

Kontinuierliche Emissionsmessungen

§ 4 (3) Kontinuierliche Emissionsmessungen der Massekonzentration einer Emission (§ 8 Abs. 1 LRG-K) haben i der Regel in Halbstundenmittelwerten zu erfolgen.

(5) Die Messstellen sind auf Grund des Gutachtens eines befugten Sachverständigen (§ 7 Abs. 2 LRG-K) von der Behörde derart festzulegen, dass eine repräsentative und messtechnisch einwandfreie Emissionsmessung gewährleistet ist.

§ 5. Für kontinuierliche Emissionsmessungen hat die Datenaufzeichnung zu erfolgen:

1. Durch automatisch registrierende Messgeräte in Form von Halbstundenmittelwerten unter Angabe von Datum, Uhrzeit und Messstelle. Die Verfügbarkeit der Daten hat mindestens 90 % zu betragen. Als Bezugszeitraum gilt ein Monat.

3. Die Auswertung der Messdaten aus registrierenden Messgeräten hat mittels Auswertegeräten zu erfolgen, die dafür geeignet sind und die dem Stand der Technik entsprechen.

5. Registrierende Emissionsmessgeräte und Auswertegeräte sind im Abnahmeversuch und danach alle drei Jahre durch einen Sachverständigen zu kalibrieren. Die Kalibrierung hat nach den geltenden einschlägigen technischen Regelwerken zu erfolgen.

6. Jährlich ist eine Funktionskontrolle an registrierenden Emissionsmessgeräten durch Sachverständige vorzunehmen.

§ 7 (1) Der Betreiber hat während des Betriebes der Anlage an den Messgeräten mindestens einmal wöchentlich zu kontrollieren, ob der Nullpunkt einjustiert ist und die erforderliche Messfunktion gegeben ist.

(2) Die Messgeräte und alle dazuhörenden Komponenten sind mindestens alle drei Monate zu warten. Hierüber hat der Betreiber Aufzeichnungen zu führen.

(3) Der Sachverständige hat im Rahmen der Überwachung die Aufzeichnungen gemäß Abs. 2 zu kontrollieren und in begründeten Fällen die Richtigkeit der Anzeige der Messgeräte zu überprüfen.

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
				(Gg)			
Total Energy	**53 413.83**	**17.93**	**3.51**	**162.94**	**662.60**	**86.58**	**32.53**
A. Fuel Combustion Activities (Sectoral Approach)	**53 318.85**	**12.21**	**3.51**	**162.94**	**662.60**	**82.89**	**32.38**
1. Energy Industries	**12 136.95**	**0.13**	**0.15**	**10.82**	**2.41**	**0.16**	**6.58**
a. Public Electricity and Heat Production	9 713.60	0.13	0.13	7.72	1.83	0.16	3.14
b. Petroleum Refining	2 384.00	0.00	0.01	3.07	0.58	NE	3.44
c. Manufacture of Solid Fuels and Other Energy Industries	39.35	0.00	0.00	0.03	0.00	0.00	0.00
2. Manufacturing Industries and Construction	**10 606.93**	**0.44**	**0.53**	**31.06**	**13.33**	**3.19**	**11.55**
a. Iron and Steel	IE	IE	IE	IE	IE	IE	IE
b. Non-Ferrous Metals	IE	IE	IE	IE	IE	IE	IE
c. Chemicals	IE	IE	IE	IE	IE	IE	IE
d. Pulp, Paper and Print	IE	IE	IE	IE	IE	IE	IE
e. Food Processing, Beverages and Tobacco	IE	IE	IE	IE	IE	IE	IE
f. Other *(please specify)*	10 606.93	0.44	0.53	31.06	13.33	3.19	11.55
Industry (not disaggregated to subsectors)	10 606.93	0.44	0.53	31.06	13.33	3.19	11.55
3. Transport	**16 937.20**	**1.58**	**1.80**	**80.61**	**222.14**	**35.88**	**2.87**
a. Civil Aviation	113.97	0.00	0.00	0.48	0.64	0.07	0.03
b. Road Transportation	16 579.85	1.56	1.77	77.75	218.20	34.87	2.71
c. Railways	180.03	0.01	0.02	1.81	0.53	0.25	0.10
d. Navigation	63.35	0.01	0.01	0.58	2.77	0.69	0.02
e. Other Transportation *(please specify)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SNAP 0803 Inland waterways	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	(Gg)						
4. Other Sectors	**13 637.76**	**10.06**	**1.03**	**40.46**	**424.73**	**43.65**	**11.38**
a. Commercial/Institutional	2 275.58	3.32	0.13	5.22	138.52	10.09	2.06
b. Residential	9 695.36	6.53	0.35	12.39	258.46	24.50	8.95
c. Agriculture/Forestry/Fisheries	1 666.82	0.20	0.55	22.85	27.75	9.06	0.37
5. Other *(please specify)* [1]	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
a. Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	**94.98**	**5.72**	**0.00**	**0.00**	**0.00**	**3.69**	**0.15**
1. Solid Fuels	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
a. Coal Mining	0.00	0.01	NO	NO	NO	NO	
b. Solid Fuel Transformation	IE	IE	IE	IE	IE	IE	IE
c. Other *(please specify)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Oil and Natural Gas	**94.98**	**5.71**	**0.00**	**0.00**	**0.00**	**3.69**	**0.15**
a. Oil	0.00	0.28		NE	NE	3.54	NE
b. Natural Gas	94.98	5.44				0.15	0.15
c. Venting and Flaring	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Venting	IE	IE				IE	IE
Flaring	IE	IE	IE	IE	IE	IE	IE
d. Other *(please specify)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Memo Items: [2]							
International Bunkers	**1 671.82**	**0.01**	**0.01**	**5.83**	**1.27**	**0.50**	**0.53**
Aviation	1 671.82	0.01	0.01	5.83	1.27	0.50	0.53
Marine	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	IE	IE	IE	IE	IE	IE	IE
CO_2 Emissions from Biomass	**12 591.58**						

(1) Include military fuel use under this category

(2) Please do not include in energy totals.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 1 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS [2]				EMISSIONS		
	Consumption		CO_2	CH_4	N_2O		CO_2	CH_4	N_2O
	(TJ)	[1]	(t/TJ)	(kg/TJ)	(kg/TJ)		(Gg)	(Gg)	(Gg)
1.A. Fuel Combustion	**967 185.16**	NCV					**53 318.85**	**12.21**	**3.51**
Liquid Fuels	427 885.69	NCV	74.06	4.67	6.65		31 689.54	2.00	2.84
Solid Fuels	141 708.19	NCV	48.09	6.99	0.79		6 815.39	0.99	0.11
Gaseous Fuels	269 004.55	NCV	54.85	1.26	0.40		14 754.09	0.34	0.11
Biomass	122 012.54	NCV	103.20	72.16	3.57	(3)	12 591.58	8.80	0.44
Other Fuels	6 574.19	NCV	9.10	10.94	1.12		59.83	0.07	0.01
1.A.1. Energy Industries	**171 076.49**	NCV					**12 136.95**	**0.13**	**0.15**
Liquid Fuels	46 674.43	NCV	76.56	0.24	0.60		3 573.55	0.01	0.03
Solid Fuels	49 716.57	NCV	98.12	0.14	1.47		4 878.05	0.01	0.07
Gaseous Fuels	67 006.49	NCV	55.00	1.42	0.20		3 685.36	0.09	0.01
Biomass	7 679.00	NCV	109.87	2.24	3.99	(3)	843.73	0.02	0.03
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
a. Public Electricity and Heat Production	138 846.07	NCV					9 713.60	0.13	0.13
Liquid Fuels	15 159.47	NCV	78.47	0.74	1.16		1 189.55	0.01	0.02
Solid Fuels	49 716.57	NCV	98.12	0.14	1.47		4 878.05	0.01	0.07
Gaseous Fuels	66 291.03	NCV	55.00	1.42	0.20		3 646.01	0.09	0.01
Biomass	7 679.00	NCV	109.87	2.24	3.99	(3)	843.73	0.02	0.03
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
b. Petroleum Refining	31 514.96	NCV					2 384.00	0.00	0.01
Liquid Fuels	31 514.96	NCV	75.65	0.00	0.33		2 384.00	NE	0.01
Solid Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
Biomass	0.00	NCV	0.00	0.00	0.00	(3)	0.00	0.00	0.00
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
c. Manufacture of Solid Fuels and Other Energy Industries	715.45	NCV					39.35	0.00	0.00
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
Solid Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
Gaseous Fuels	715.45	NCV	55.00	1.50	0.10		39.35	0.00	0.00
Biomass	0.00	NCV	0.00	0.00	0.00	(3)	0.00	0.00	0.00
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00

(1) Activity data should be calculated using net calorific values (NCV) as specified by the IPCC Guidelines. If gross calorific values (GCV) were used, please indicate this by replacing "NCV" with "GCV" in this column.

(2) Accurate estimation of CH_4 and N_2O emissions depends on combustion conditions, technology, and emission control policy, as well as fuel characteristics. Therefore, caution should be used when comparing the implied emission factors.

(3) Carbon dioxide emissions from biomass are reported under Memo Items. The content of the cells is not included in the totals.

Note: For the coverage of fuel categories, please refer to the IPCC Guidelines (Volume 1. Reporting Instructions - Common Reporting Framework, section 1.2, p. 1.19). If some derived gases (e.g. gas work gas, coke oven gas, blast gas, oxygen steel furnace gas, etc.) are considered, Parties should provide information on the allocation of these derived gases under the above fuel categories (liquid, soild, gaseous, biomass, other fuels) in the documentation box at the end of sheet 4 of this table.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY

Fuel Combustion Activities - Sectoral Approach

(Sheet 2 of 4)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS [2]				EMISSIONS		
	Consumption		CO_2	CH_4	N_2O		CO_2	CH_4	N_2O
	(TJ)	[1]	(t/TJ)	(kg/TJ)	(kg/TJ)		(Gg)	(Gg)	(Gg)
1.A.2 Manufacturing Industries and Construction	**284 148.40**	NCV					**10 606.93**	**0.44**	**0.53**
Liquid Fuels	42 983.95	NCV	72.36	2.33	8.47		3 110.34	0.10	0.36
Solid Fuels	80 133.27	NCV	10.33	0.43	0.15		827.63	0.03	0.01
Gaseous Fuels	120 771.35	NCV	54.80	1.49	0.10		6 618.23	0.18	0.01
Biomass	33 808.31	NCV	109.82	2.00	4.00	[3]	3 712.74	0.07	0.14
Other Fuels	6 451.52	NCV	7.86	9.44	1.10		50.73	0.06	0.01
a. Iron and Steel	23 852.46	NCV					IE	IE	IE
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	23 852.46	NCV	0.00	0.00	0.00		IE	IE	IE
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	IE	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
b. Non-Ferrous Metals	0.00	NCV					IE	IE	IE
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	IE	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
c. Chemicals	0.00	NCV					IE	IE	IE
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	IE	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
d. Pulp, Paper and Print	0.00	NCV					IE	IE	IE
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	IE	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
e. Food Processing, Beverages and Tobacco	0.00	NCV					IE	IE	IE
Liquid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	IE	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE
f. Other *(please specify)*	260 295.94	NCV					10 606.93	0.44	0.53
Liquid Fuels	42 983.95	NCV	72.36	2.33	8.47		3 110.34	0.10	0.36
Solid Fuels	56 280.80	NCV	14.71	0.61	0.21		827.63	0.03	0.01
Gaseous Fuels	120 771.35	NCV	54.80	1.49	0.10		6 618.23	0.18	0.01
Biomass	33 808.31	NCV	109.82	2.00	4.00	[3]	3 712.74	0.07	0.14
Other Fuels	6 451.52	NCV	7.86	9.44	1.10		50.73	0.06	0.01

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 3 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS [2]			EMISSIONS		
	Consumption		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
	(TJ)	[1]	(t/TJ)	(kg/TJ)	(kg/TJ)	(Gg)	(Gg)	(Gg)
1.A.3 Transport	**229 674.44**	NCV				**16 937.20**	**1.58**	**1.80**
Gasoline	84 227.95	NCV	73.86	16.31	16.98	6 221.27	1.37	1.43
Diesel	145 297.36	NCV	73.67	1.31	2.55	10 704.32	0.19	0.37
Natural Gas	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Solid Fuels	26.45	NCV	95.00	6.83	6.83	2.51	0.00	0.00
Biomass	0.00	NCV	0.00	0.00	0.00 [3]	0.00	0.00	0.00
Other Fuels	122.67	NCV	74.19	89.92	2.04	9.10	0.01	0.00
a. Civil Aviation	1 566.81	NCV				113.97	0.00	0.00
Aviation Gasoline	92.82	NCV	73.96	13.59	4.46	6.87	0.00	0.00
Jet Kerosene	1 473.99	NCV	72.66	0.53	0.56	107.11	0.00	0.00
b. Road Transportation	224 820.25	NCV				16 579.85	1.56	1.77
Gasoline	82 661.14	NCV	73.88	16.59	17.29	6 107.30	1.37	1.43
Diesel Oil	142 159.11	NCV	73.67	1.29	2.37	10 472.56	0.18	0.34
Natural Gas	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Biomass	0.00	NCV	0.00	0.00	0.00 [3]	0.00	0.00	0.00
Other Fuels *(please specify)*	0.00	NCV				0.00	0.00	0.00
		NCV	0.00	0.00	0.00			
c. Railways	2 428.31	NCV				180.03	0.01	0.02
Solid Fuels	26.45	NCV	95.00	6.83	6.83	2.51	0.00	0.00
Liquid Fuels	2 401.86	NCV	73.91	2.46	8.31	177.52	0.01	0.02
Other Fuels *(please specify)*	0.00	NCV				0.00	0.00	0.00
		NCV	0.00	0.00	0.00			
d. Navigation	859.06	NCV				63.35	0.01	0.01
Coal	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Residual Oil	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Gas/Diesel Oil	736.39	NCV	73.67	1.71	18.32	54.25	0.00	0.01
Other Fuels *(please specify)*	122.67	NCV				9.10	0.01	0.00
Gasoline	122.67	NCV	74.19	89.92	2.04	9.10	0.01	0.00
		NCV	0.00	0.00	0.00			
e. Other Transportation	0.00	NCV				0.00	0.00	0.00
Liquid Fuels	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Solid Fuels	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 4 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS [2]				EMISSIONS		
	Consumption		CO_2	CH_4	N_2O		CO_2	CH_4	N_2O
	(TJ)	[1]	(t/TJ)	(kg/TJ)	(kg/TJ)		(Gg)	(Gg)	(Gg)
1.A.4 Other Sectors	**276 317.33**	NCV					**13 637.76**	**10.06**	**1.03**
Liquid Fuels	108 400.56	NCV	74.54	2.98	6.01		8 080.06	0.32	0.65
Solid Fuels	11 831.91	NCV	93.58	80.17	2.32		1 107.20	0.95	0.03
Gaseous Fuels	80 918.18	NCV	55.00	0.80	1.00		4 450.50	0.06	0.08
Biomass	75 166.69	NCV	100.48	116.00	3.59	[3]	7 552.84	8.72	0.27
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
a. Commercial/Institutional	67 264.45	NCV					2 275.58	3.32	0.13
Liquid Fuels	12 836.54	NCV	75.07	0.31	0.80		963.62	0.00	0.01
Solid Fuels	1 747.38	NCV	93.10	42.02	2.37		162.69	0.07	0.00
Gaseous Fuels	20 895.93	NCV	55.00	0.80	1.00		1 149.28	0.02	0.02
Biomass	31 784.60	NCV	101.14	101.65	3.00	[3]	3 214.63	3.23	0.10
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
b. Residential	186 434.86	NCV					9 695.36	6.53	0.35
Liquid Fuels	72 954.79	NCV	74.71	1.63	1.20		5 450.56	0.12	0.09
Solid Fuels	10 075.73	NCV	93.65	86.59	2.31		943.57	0.87	0.02
Gaseous Fuels	60 022.25	NCV	55.00	0.80	1.00		3 301.22	0.05	0.06
Biomass	43 382.09	NCV	100.00	126.52	4.02	[3]	4 338.21	5.49	0.17
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
c. Agriculture/Forestry/Fisheries	22 618.02	NCV					1 666.82	0.20	0.55
Liquid Fuels	22 609.22	NCV	73.68	8.82	24.50		1 665.89	0.20	0.55
Solid Fuels	8.80	NCV	106.00	300.00	1.00		0.93	0.00	0.00
Gaseous Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
Biomass	0.00	NCV	0.00	0.00	0.00	[3]	0.00	0.00	0.00
Other Fuels	0.00	NCV	0.00	0.00	0.00		0.00	0.00	0.00
1.A.5 Other (Not elsewhere specified)[4]	**5 968.50**	NCV					**0.00**	**0.00**	**0.00**
Liquid Fuels	301.43	NCV	0.00	0.00	0.00		IE	IE	IE
Solid Fuels	0.00	NCV	0.00	0.00	0.00		NO	NO	NO
Gaseous Fuels	308.53	NCV	0.00	0.00	0.00		IE	IE	IE
Biomass	5 358.54	NCV	90.00	0.00	0.00	[3]	482.27	IE	IE
Other Fuels	0.00	NCV	0.00	0.00	0.00		IE	IE	IE

[4] Include military fuel use under this category.

Documentation Box:
military fuel use is included in 1 A 3 b 1 A 5 includes activity data of waste incineration plants 1 A 5 emissions are reported under category 6 C 1 waste incineration

TABLE 1.A(b) SECTORAL BACKGROUND DATA FOR ENERGY
CO_2 from Fuel Combustion Activities - Reference Approach (IPCC Worksheet 1-1)
(Sheet 1 of 1)

FUEL TYPES			Unit	Production	Imports	Exports	International bunkers	Stock change	Apparent consumption	Conversion factor [1] (TJ/Unit)	[1]	Apparent consumption (TJ)	Carbon emission factor (t C/TJ)	Carbon content (Gg C)	Carbon stored (Gg C)	Net carbon emissions (Gg C)	Fraction of carbon oxidized	Actual CO_2 emissions (Gg CO_2)
Liquid Fossil	Primary Fuels	Crude Oil	TJ	40 970.00	310 590.00	2 592.50		-2 932.50	351 900.00	1.00	NCV	351 900.00	20.00	7 038.00	0.00	7 038.00	0.99	25 547.94
		Orimulsion	TJ	NO	NO	NO			0.00		NCV	0.00		0.00		0.00		0.00
		Natural Gas Liquids	TJ	3 096.00	216.00	0.00		0.00	3 312.00	1.00	NCV	3 312.00	17.20	56.97	0.00	56.97	0.99	206.79
	Secondary Fuels	Gasoline	TJ		28 475.00	15 640.00	0.00	1 955.00	10 880.00	1.00	NCV	10 880.00	18.90	205.63	0.00	205.63	0.99	746.44
		Jet Kerosene	TJ		1 840.40	214.00	23 007.61	214.00	-21 595.21	1.00	NCV	-21 595.21	19.50	-421.11	0.00	-421.11	0.99	-1 528.62
		Other Kerosene	TJ		IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00
		Shale Oil	TJ		NO	NO			0.00		NCV	0.00		0.00		0.00		0.00
		Gas / Diesel Oil	TJ		111 665.20	17 804.80	0.00	2 396.80	91 463.60	1.00	NCV	91 463.60	20.20	1 847.56	0.00	1 847.56	0.99	6 706.66
		Residual Fuel Oil	TJ		10 670.76	6 190.67	0.00	-9 082.36	13 562.45	1.00	NCV	13 562.45	21.10	286.17		286.17	0.99	1 038.79
		LPG	TJ		7 305.22	-781.06		275.67	7 810.61	1.00	NCV	7 810.61	17.20	134.34	0.00	134.34	1.00	492.59
		Ethane	TJ		IE	IE		IE	0.00		NCV	0.00		0.00	0.00	0.00		0.00
		Naphtha	TJ		IE	IE		IE	0.00		NCV	0.00		0.00	0.00	0.00		0.00
		Bitumen	TJ		IE	IE		IE	0.00		NCV	0.00		0.00	0.00	0.00		0.00
		Lubricants	TJ		IE	IE		IE	0.00		NCV	0.00		0.00	0.00	0.00		0.00
		Petroleum Coke	TJ		IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00
		Refinery Feedstocks	TJ		IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00
		Other Oil	TJ		46 339.80	13 178.40		-257.00	33 418.40	1.00	NCV	33 418.40	20.00	668.37	1 116.06	-447.69	0.99	-1 625.12
Liquid Fossil Totals												490 751.86		9 815.93	1 116.06	8 699.87		31 585.47
Solid Fossil	Primary Fuels	Anthracite [2]	TJ	NE	NE	NE		NE	0.00		NCV	0.00		0.00		0.00		0.00
		Coking Coal	TJ	0.00	100 095.16	0.00		-4 593.88	104 689.04	1.00	NCV	104 689.04	25.80	2 700.98	0.74	2 700.24	0.98	9 702.86
		Other Bit. Coal	TJ	NO	NO	NO		NO	0.00		NCV	0.00		0.00		0.00		0.00
		Sub-bit. Coal	TJ	NO	NO	NO		NO	0.00		NCV	0.00		0.00		0.00		0.00
		Lignite	TJ	12 240.20	346.50	9.70		-68.62	12 645.62	1.00	NCV	12 645.62	27.60	349.02	0.00	349.02	0.98	1 254.14
		Oil Shale	TJ	NO	NO	NO		NO	0.00		NCV	0.00		0.00		0.00		0.00
		Peat	TJ	IE	IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00
	Secondary Fuels	BKB & Patent Fuel	TJ		1 833.50	0.00		0.00	1 833.50		NCV	0.00		0.00		0.00		0.00
		Coke Oven/Gas Coke	TJ		26 340.70	29.30		-4 570.80	30 882.20	1.00	NCV	30 882.20	29.50	911.02	1 002.65	-91.62	0.99	-332.58
Solid Fuel Totals												148 216.86		3 961.02	1 003.38	2 957.64		10 624.42
Gaseous Fossil		Natural Gas (Dry)	TJ	64 826.36	222 783.64	0.00		8 309.07	279 300.93	1.00	NCV	279 300.93	15.30	4 273.30	160.71	4 112.60	1.00	15 079.53
Total												**918 269.65**		**18 050.26**	**2 280.15**	**15 770.11**		**57 289.42**
Biomass total												128 013.00		3 807.25	0.00	3 807.25		12 284.72
		Solid Biomass	TJ	130 080.00	4 622.00	6 689.00		0.00	128 013.00	1.00	NCV	128 013.00	29.74	3 807.25	0.00	3 807.25	0.88	12 284.72
		Liquid Biomass	TJ	IE	IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00
		Gas Biomass	TJ	IE	IE	IE		IE	0.00		NCV	0.00		0.00		0.00		0.00

[1] To convert quantities expressed in natural units to energy units, use net calorific values (NCV). If gross calorific values (GCV) are used in this table, please indicate this by replacing "NCV" with "GCV" in this colur

[2] If Anthracite is not separately available, include with Other Bituminous Coa

TABLE 1.A(c) COMPARISON OF CO_2 EMISSIONS FROM FUEL COMBUSTION
(Sheet 1 of 1)

FUEL TYPES	Reference approach		National approach [1]		Difference [2]	
	Energy consumption (PJ)	CO_2 emissions (Gg)	Energy consumption (PJ)	CO_2 emissions (Gg)	Energy consumption (%)	CO_2 emissions (%)
Liquid Fuels (excluding international bunkers)	490.75	31 585.47	427.89	31 689.54	14.69	-0.33
Solid Fuels (excluding international bunkers)	148.22	10 624.42	141.71	6 815.39	4.59	55.89
Gaseous Fuels	279.30	15 079.53	269.00	14 754.09	3.83	2.21
Other [3]	NE	NE	6.57	59.83	-100.00	-100.00
Total [3]	**918.27**	**57 289.42**	**845.17**	**53 318.85**	**8.65**	**7.45**

[1] "National approach" is used to indicate the approach (if different from the Reference approach) followed by the Party to estimate its CO_2 emissions from fuel combustion reported in the national GHG inventory.
[2] Difference of the Reference approach over the National approach (i.e. difference = 100% x ((RA-NA)/NA), where NA = National approach and RA = Reference approach).
[3] Emissions from biomass are not included.

Note: In addition to estimating CO_2 emissions from fuel combustion by sector, Parties should also estimate these emissions using the IPCC Reference approach, as found in the IPCC Guidelines, Worksheet 1-1(Volume 2. Workbook). The Reference approach is to assist in verifying the sectoral data. Parties should also complete the above tables to compare the alternative estimates, and if the emission estimates lie more than 2 percent apart, should explain the source of this difference in the documentation box provided.

Documentation Box:

CORINAIR is used as national method, considering the following items of the official Austrian energy balance (in German): "Energetischer Endverbrauch", "Umwandlungseinsatz" , "Verbrauch des Sektors Energie". Differences between national estimates and reference approach include:

Solid fuels: Energy consumption: National approach doesn't include transformation losses of coking coal to coke oven gas and coke.
CO2 emissions: The national approach doesn't separate between fuel related and non-fuel related CO2-emissions for metal production. All CO2-emissions are included in sector 2C: Metal Production.

Gaseous fuels: Energy consumption: National approach doesn't include losses and non-energy-use.
CO2 emissions: National aproach uses sector specific carbon contents (different from IPCC reference factor).

Liquid fuels: Energy consumption: National approach doesn't include non-energy use and energy losses.
CO2 emissions: Heat values and carbon contents are sector and fuel specific. The energy statistic is mass balanced only.

Other fuels: The national approach considers waste as an additional fuel type (= municipal and industrial waste, sludge). 90 % of CO2 emissions from waste-burning are considered as biogenic.

TABLE 1.A(d) SECTORAL BACKGROUND DATA FOR ENERGY
Feedstocks and Non-Energy Use of Fuels
(Sheet 1 of 1)

FUEL TYPE [1]	ACTIVITY DATA AND RELATED INFORMATION		IMPLIED EMISSION FACTOR	ESTIMATE	Additional information [a]	
	Fuel quantity (TJ)	Fraction of carbon stored	Carbon emission factor (t C/TJ)	of carbon stored in non energy use of fuels (Gg C)	CO_2 not emitted ($Gg\ CO_2$)	Subtracted from energy sector *(specify source category)*
Naphtha [2]	IE		0.00		0.00	NA
Lubricants	IE		0.00		0.00	NA
Bitumen	IE		0.00		0.00	NA
Coal Oils and Tars (from Coking Coal)	28.62	1.00	25.80	0.74	2.71	NA
Natural Gas [2]	10 503.64	1.00	15.30	160.71	589.25	NA
Gas/Diesel Oil [2]	0.00	1.00	0.00	0.00	0.00	NA
LPG [2]	0.00	1.00	0.00	0.00	0.00	NA
Butane [2]	IE		0.00		0.00	NA
Ethane [2]	IE		0.00		0.00	NA
Other *(please specify)*						
Gasoline, Petroleum, other products	55 803.00	1.00	20.00	1 116.06	4 092.22	NA
			0.00		0.00	

[1] Where fuels are used in different industries, please enter in different rows.
[2] Enter these fuels when they are used as feedstocks.

[a] The fuel lines continue from the table to the left.

Note: The table is consistent with the IPCC Guidelines. Parties that take into account the emissions associated with the use and disposal of these feedstocks could continue to use their methodology, and provide explanation notes in the documentation box below.

Documentation box: A fraction of energy carriers is stored in such products as plastics or asphalt. The non-stored fraction of the carbon in the energy carrier or product is oxidized, resulting in carbon dioxide emissions, either during the use of the energy carriers in the industrial production (e.g. fertilizer production), or during the use of the products (e.g. solvents, lubricants), or in both (e.g. monomers). To report associated emissions use the above table, filling an extra "Additional information" table, as shown below.

Associated CO_2 emissions (Gg)	Allocated under *(Specify source category)* [a]

[a] e.g. Industrial Processes, Waste Incineration, etc.

TABLE 1.B.1 SECTORAL BACKGROUND DATA FOR ENERGY
Fugitive Emissions from Solid Fuels
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTOR		EMISSIONS	
	Amount of fuel produced [1]	CH_4	CO_2	CH_4	CO_2
	(Mt)	(kg/t)	(kg/t)	(Gg)	(Gg)
1. B. 1. a. Coal Mining and Handling	1.25			0.01	0.00
i. Underground Mines[2]		0.00	0.00	NO	NO
Mining Activities		0.00	0.00	NO	NO
Post-Mining Activities		0.00	0.00	NO	NO
ii. Surface Mines[2]	1.25	0.01	0.00	0.01	0.00
Mining Activities		0.01	0.00	0.01	NO
Post-Mining Activities		0.00	0.00	NE	NE
1. B. 1. b. Solid Fuel Transformation	1.39	0.00	0.00	IE	IE
1. B. 1. c. Other *(please specify)* [3]				0.00	0.00
		0.00	0.00		

Additional information [a]

Description	Value
Amount of CH_4 drained (recovered) and utilized or flared (Gg)	0.00
Number of active underground mines	0.00
Number of mines with drainage (recovery) systems	0.00

[a] For underground mines.

[1] Use the documentation box to specify whether the fuel amount is based on the run-of-mine (ROM) production or on the saleable production.
[2] Emissions both for Mining Activities and Post-Mining Activities are calculated with the activity data in lines Underground Mines and Surface Mines respectively.
[3] Please click on the button to enter any other solid fuel related activities resulting in fugitive emissions, such as emissions from abandoned mines and waste piles.

Note: There are no clear references to the coverage of 1.B.1.b. and 1.B.1.c. in the IPCC Guidelines. Make sure that the emissions entered here are not reported elsewhere. If they are reported under another source category, indicate this (IE) and make a reference in Table 9 (completeness) and/or in the documentation box.

Documentation box:
1 B 1 b: emissions are included in **2 C 1 Iron and Steel Production**

TABLE 1.B.2 SECTORAL BACKGROUND DATA FOR ENERGY
Fugitive Emissions from Oil and Natural Gas
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			IMPLIED EMISSION FACTORS			EMISSIONS		
	Description [1]	Unit	Value	CO_2 (kg/unit) [2]	CH_4 (kg/unit) [2]	N_2O (kg/unit) [2]	CO_2 (Gg)	CH_4 (Gg)	N_2O (Gg)
1. B. 2. a. Oil [3]							**0.00**	**0.28**	
i. Exploration	(e.g. number of wells drilled)			0.00	0.00		IE	IE	
ii. Production[4]	(e.g. PJ of oil produced)			0.00	0.00		IE	IE	
iii. Transport	(e.g. PJ oil loaded in tankers)			0.00	0.00		IE	IE	
iv. Refining / Storage	Oil refined (SNAP 0401)	Mt	8.28	0.00	33 345.05		NE	0.28	
v. Distribution of oil products	Oil distributed (SNAP 0505)	Mt	7.83	0.00	0.00		IE	IE	
vi. Other				0.00	0.00		NE	NE	
1. B. 2. b. Natural Gas							**94.98**	**5.44**	
Exploration				0.00	0.00				
i. Production [4] / Processing	NG Production (SNAP 0503)	Mm3 G	580.56	124 017.98	0.00		72.00	NE	
ii. Transmission	(e.g. PJ gas consumed)			0.00	0.00		IE	IE	
Distribution	NG Distribution (SNAP 0506)	Mm3 G	7 791.00	2 950.00	697.87		22.98	5.44	
iii. Other Leakage	(e.g. PJ gas consumed)			0.00	0.00		IE	IE	
at industrial plants and power stations				0.00	0.00		IE	IE	
in residential and commercial sectors				0.00	0.00		IE	IE	
1. B. 2. c. Venting [5]							IE	IE	
i. Oil	(e.g. PJ oil produced)			0.00	0.00		IE	IE	
ii. Gas	(e.g. PJ gas produced)			0.00	0.00		IE	IE	
iii. Combined				0.00	0.00		IE	IE	
Flaring							IE	IE	IE
i. Oil	(e.g. PJ gas consumption)			0.00	0.00	0.00	IE	IE	IE
ii. Gas	(e.g. PJ gas consumption)			0.00	0.00	0.00	IE	IE	IE
iii. Combined				0.00	0.00	0.00	IE	IE	IE
1.B.2.d. Other *(please specify)* [6]							**0.00**	**0.00**	**0.00**
				0.00	0.00	0.00			

Additional information

Description	Value	Unit
Pipelines length (km)		km
Number of oil wells		NUMBER
Number of gas wells		NUMBER
Gas throughput [a]		Mm3 GAS
Oil throughput [a]		Mt
Other relevant information *(specify)*		

[a] In the context of oil and gas production, throughput is a measure of the total production, such as barrels per day of oil, or cubic meters of gas per year. Specify the units of the reported value in the unit column. Take into account that these values should be consistent with the activity data reported under the production rows of the main table.

[1] Specify the activity data used and fill in the activity data description column, as given in the examples in brackets. Specify the unit of the activity data in the unit column. Use the document box to specify whether the fuel amount is based on the raw material production or on the saleable production. Note cases where more than one variable is used as activity data.

[2] The unit of the implied emission factor will depend on the units of the activity data used, and is therefore not specified in this column. The unit of the implied emission factor for each activity will be kg/unit of activity data.

[3] Use the category also to cover emissions from combined oil and gas production fields. Natural gas processing and distribution from these fields should be included under 1.B.2.b.ii and 1.B.2.b.iii, respectively.

[4] If using default emission factors these categories will include emissions from production other than venting and flaring.

[5] If using default emission factors, emissions from Venting and Flaring from all oil and gas production should be accounted for here. Parties using the IPCC software could report those emissions together, indicating so in the documentation box.

[6] For example, fugitive CO_2 emissions from production of geothermal power could be reported here.

Documentation box:
1 B 2 a i, 1 B 2 a ii, 1 B 2 a iii, 1 B 2 c : emissions are included in **1 B 2 a iv Oil Refining / Storage**

TABLE 1.C SECTORAL BACKGROUND DATA FOR ENERGY
International Bunkers and Multilateral Operations
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS		
	Consumption (TJ)	CO_2 (t/TJ)	CH_4 (kg/TJ)	N_2O (kg/TJ)	CO_2 (Gg)	CH_4 (Gg)	N_2O (Gg)
Marine Bunkers	**0.00**				NO	NO	NO
Gasoline	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas/Diesel Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residual Fuel Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lubricants	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coal	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other *(please specify)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00			
Aviation Bunkers	**23 007.61**				**1 671.82**	**0.01**	**0.01**
Jet Kerosene	23 007.61	72.66	0.53	0.56	1 671.82	0.01	0.01
Gasoline	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multilateral Operations [(1)]	**0.00**				**IE**	**IE**	**IE**

Additional information

Fuel consumption	Allocation [(a)] (percent)	
	Domestic	International
Marine	100.00	0.00
Aviation	6.38	93.62

[(a)] For calculating the allocation of fuel consumption, use the sums of fuel consumption by domestic navigation and aviation (Table 1.A(a)) and by international bunkers (Table 1.C).

[(1)] Parties may choose to report or not report the activity data and emission factors for multilateral operation consistent with the principle of confidentiality stated in the UNFCCC reporting guidelines on inventories. In any case, Parties should report the emissions from multilateral operations, where available, under the Memo Items section of the Summary tables and in the Sectoral report table for energy.

Note: In accordance with the IPCC Guidelines, international aviation and marine bunker fuel emissions from fuel sold to ships or aircraft engaged in international transport should be excluded from national totals and reported separately for informational purposes only.

Documentation box: Please explain how the consumption of international marine and aviation bunkers fuels was estimated and separated from the domestic consumption.

Kerosene consumption in Austria is divided into national and international traffic by using national LTO-statistics.

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[(1)]		PFCs[(1)]		SF_6		NO_x	CO	NMVOC	SO_2
				P	A	P	A	P	A				
	(Gg)			CO_2 equivalent (Gg)				(Gg)					
Total Industrial Processes	**12 186.59**	**0.14**	**0.58**	**5 090.46**	**1 033.25**	**0.00**	**25.16**	**0.38**	**0.03**	**14.42**	**221.27**	**21.71**	**8.13**
A. Mineral Products	**3 055.83**	**0.04**	**0.00**							**5.05**	**18.56**	**6.28**	**0.18**
1. Cement Production	2 342.92									3.96	7.63	0.22	0.18
2. Lime Production	295.55												
3. Limestone and Dolomite Use	NE												
4. Soda Ash Production and Use	0.00												
5. Asphalt Roofing	NE	0.04									10.93	5.62	
6. Road Paving with Asphalt	NE									NE	NE	0.43	NE
7. Other *(please specify)*	417.37	0.00	0.00							1.09	0.00	0.01	0.00
SNAP 040613 Glass	78.82	NE	NE							1.09	NE	0.01	NE
MgCO3 Sinter Plants	338.54	NE	NE							NE	NE	NE	NE
B. Chemical Industry	**492.46**	**0.10**	**0.58**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.40**	**11.11**	**12.34**	**3.19**
1. Ammonia Production	472.12	0.05								0.00	0.04	0.00	0.00
2. Nitric Acid Production	0.40		0.58							0.00			
3. Adipic Acid Production			NE							NE	NE	NE	
4. Carbide Production	0.00	0.00									NE	NE	NE
5. Other *(please specify)*	19.94	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.40	11.07	12.34	3.19
Chemical Industry	19.94	0.04	0.00	NE	NE	NE	NE	NE	NE	4.40	11.07	12.34	3.19
C. Metal Production	**8 590.51**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.39**	**191.17**	**0.80**	**4.76**
1. Iron and Steel Production	8 590.51	0.00								4.22	168.30	0.37	4.10
2. Ferroalloys Production	NE	NE								NE	NE	NE	NE
3. Aluminium Production	NE	NE					0.00			NE	NE	NE	NE
4. SF_6 Used in Aluminium and Magnesium Foundries									0.00				
5. Other *(please specify)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	22.87	0.43	0.67
SNAP 040207 electric furnace steel plant	0.00	0.00	0.00	NE	NE	NE	NE	NE	NE	0.14	22.41	0.03	0.25
SNAP 040208 rolling mills	0.00	0.00	0.00	NE	NE	NE	NE	NE	NE	0.00	0.00	0.00	0.00
SNAP 040309 Processes in non-ferrous metal industries /	0.00	0.00	0.00	NE	NE	NE	NE	NE	NE	0.03	0.46	0.40	0.41

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines. This only applies in sectors where methods exist for both tiers.

(1) The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
				P	A	P	A	P	A				
	(Gg)			CO_2 equivalent (Gg)						(Gg)			
D. Other Production	**47.80**									**0.59**	**0.43**	**2.30**	**0.00**
1. Pulp and Paper										0.59	0.43	0.43	NE
2. Food and Drink[2]	47.80											1.87	
E. Production of Halocarbons and SF_6					**0.00**		**0.00**		**0.00**				
1. By-product Emissions					0.00		0.00		0.00				
Production of HCFC-22					0.00								
Other					0.00		0.00		0.00				
2. Fugitive Emissions					0.00		0.00		0.00				
3. Other *(please specify)*					0.00		0.00		0.00				
F. Consumption of Halocarbons and SF_6				**5 090.46**	**1 033.25**	**NE**	**25.16**	**0.38**	**0.03**				
1. Refrigeration and Air Conditioning Equipment				IE	288.72	IE	0.00	IE	0.00				
2. Foam Blowing				IE	737.60	IE	0.00	IE	0.00				
3. Fire Extinguishers				IE	5.87	IE	0.00	IE	0.00				
4. Aerosols/ Metered Dose Inhalers				IE	0.00	IE	0.00	IE	0.00				
5. Solvents				IE	0.00	IE	0.00	IE	0.00				
6. Semiconductor Manufacture				IE	1.06	IE	25.16	IE	0.01				
7. Electrical Equipment				IE	IE	IE	IE	IE	0.00				
8. Other *(please specify)*				0.00	0.00	0.00	0.00	0.00	0.01				
G. 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**

(2) CO_2 from Food and Drink Production (e.g. gasification of water) can be of biogenic or non-biogenic origin. Only information on CO_2 emissions of non-biogenic origin should be reported.

TABLE 2(I).A-G SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Emissions of CO_2, CH_4 and N_2O
(Sheet 1 of 2)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS[2]					
	Production/Consumption quantity		CO_2	CH_4	N_2O	CO_2		CH_4		N_2O	
	Description [1]	(kt)	(t/t)	(t/t)	(t/t)	(Gg)	[2]	(Gg)	[2]	(Gg)	[2]
A. Mineral Products						**3 055.83**		**0.00**		**0.00**	
1. Cement Production	Cement Produced [kt]	3 580.57	0.65			2 342.92					
2. Lime Production	Lime Produced [kt]	367.50	0.80			295.55					
3. Limestone and Dolomite Use	Limestone and Dolomite used [kt]	NE	0.00			NE					
4. Soda Ash						0.00					
Soda Ash Production	Soda Ash Production	NE	0.00			NE					
Soda Ash Use	Soda Ash Use	NE	0.00			NE					
5. Asphalt Roofing	Roofing Material Production [Mio m2	31.23	0.00			NE		0.04			
6. Road Paving with Asphalt	Asphalt Production [kt]	714.81	0.00			NE					
7. Other *(please specify)*						417.37		0.00		0.00	
Glass Production	Glass Production [kt]	375.35	0.21			78.82					
MgCO3 Sinter Plants	MgCO3 sintered [kt]	307.77	1.10	0.00	0.00	338.54					
			0.00	0.00	0.00						
B. Chemical Industry						**492.06**		**0.10**		**0.58**	
1. Ammonia Production [3]	Ammonia Production [kt]	490.49	0.96	0.00	0.00	472.12		0.05		0.00	
2. Nitric Acid Production	Nitric Acid Production [kt]	512.80			0.00	0.398				0.58	
3. Adipic Acid Production	Adipic Acid Production	NO			0.00					NE	
4. Carbide Production	Carbide Production	NE	0.00	0.00		0.00		0.00			
Silicon Carbide	Silicon Carbide Production	NE	0.00	0.00		NE		NE			
Calcium Carbide	Calcium Carbide Production	NE	0.00	0.00		NE		NE			
5. Other *(please specify)*						19.94		0.04		0.00	
Carbon Black	Carbon Black Production	NE		0.00				NE			
Ethylene	Ethylene Production [kt]	375.00	0.00	0.00	0.00	NE		NE		NE	
Dichloroethylene	Dichloroethylene Production	NE		0.00				NE			
Styrene	Styrene Production [kt]	40.00		0.00				NE			
Methanol	Methanol Production	NE		0.00				NE			
Chemical Industry / Other	Other Chemical Products [kt]	1 066.79	0.02	0.00	0.00	19.94		0.04		0.00	
			0.00	0.00	0.00						

[1] Where the IPCC Guidelines provide options for activity data, e.g. cement or clinker for estimating the emissions from Cement Production, specify the activity data used (as shown in the example in brackets) in order to make the choice of emission factor more transparent and to facilitate comparisons of implied emission factors.

[2] Enter cases in which the final emissions are reduced with the quantities of emission recovery, oxidation, destruction, transformation. Adjusted emissions are reported and the quantitative information on recovery, oxidation, destruction, and transformation should be given in the additional columns provided.

[3] To avoid double counting make offsetting deductions from fuel consumption (e.g. natural gas) in Ammonia Production, first for feedstock use of the fuel, and then to a sequestering use of the feedstock.

TABLE 2(I).A-G SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Emissions of CO_2, CH_4 and N_2O
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS[2]					
	Production/Consumption Quantity		CO_2	CH_4	N_2O	CO_2		CH_4		N_2O	
	Description [1]	(kt)	(t/t)	(t/t)	(t/t)	(Gg)	[2]	(Gg)	[2]	(Gg)	[2]
C. Metal Production [4]						**8 590.51**		**0.00**		**0.00**	
1. Iron and Steel Production			0.00			8 590.51		0.00			
Steel	Steel Production [kt]	5 150.17	1.67			8 590.51					
Pig Iron	Steel Production [kt]	5 150.17	0.00	0.00		IE		NE			
Sinter	Sinter Production [kt]	3 552.15	0.00	0.00		IE		NE			
Coke	Coke Production [kt]	1 385.00	0.00	0.00		IE		NE			
Other *(please specify)*						0.00		0.00			
			0.00	0.00	0.00						
2. Ferroalloys Production	Ferroalloys Production [kt]	NE	0.00	0.00		NE		NE			
3. Aluminium Production	Aluminium production [kt]	NO	0.00	0.00		NE		NE			
4. SF_6 Used in Aluminium and Magnesium Foundries											
5. Other *(please specify)*						0.00		0.00		0.00	
SNAP 040207 electric furnace steel plant	Steel Production [kt]	431.00	0.00	0.00	0.00	0.00		0.00		0.00	
SNAP 040208 rolling mills	Steel Production [kt]	5 150.17	0.00	0.00	0.00	0.00		0.00		0.00	
SNAP 040309 Processes in non-ferrous n	Non-ferrous metal Production	105.91	0.00	0.00	0.00	0.00		0.00		0.00	
			0.00	0.00	0.00						
D. Other Production						**47.80**					
1. Pulp and Paper											
2. Food and Drink	Beer, Spirits Production [kt]	1 347.32	0.04			47.80					
G. Other *(please specify)*						**0.00**		**0.00**		**0.00**	
			0.00	0.00	0.00						

[4] More specific information (e.g. data on virgin and recycled steel production) could be provided in the documentation box

Note: In case of confidentiality of the activity data information, the entries should provide aggregate figures but there should be a note in the documentation box indicating this

Documentation box:

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES - EMISSIONS OF HFCs, PFCs AND SF_6
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ca	Total HFCs[1]	CF_4	C_2F_6	C_3F_8	C_4F_{10}	$c\text{-}C_4F_8$	C_5F_{12}	C_6F_{14}	Total PFCs[1]	SF_6
	(t)[2]																						
Total Actual Emissions of Halocarbons (by chemical) and SF_6	**0.55**	**1.75**	**0.00**	**0.00**	**21.90**	**0.00**	**653.07**	**452.23**	**0.00**	**13.57**	**0.17**	**0.00**	**0.00**		**1.47**	**1.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**28.32**
C. Metal Production															**0.00**	**0.00**	0.00	0.00	0.00	0.00	0.00		**0.32**
Aluminium Production															0.00	0.00	0.00	0.00	0.00	0.00	0.00		
SF_6 Used in Aluminium Foundries																							0.32
SF_6 Used in Magnesium Foundries																							0.00
E. Production of Halocarbons and SF_6	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**
1. By-product Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Production of HCFC-22	0.00																						
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
2. Fugitive Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
3. 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		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
F(a). Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	**0.55**	**1.75**	**0.00**	**0.00**	**21.90**	**0.00**	**653.07**	**452.23**	**0.00**	**13.57**	**0.17**	**0.00**	**0.00**		**1.47**	**1.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**28.00**
1. Refrigeration and Air Conditioning Equipment	0.00	1.75	0.00	0.00	21.90	0.00	134.30	0.79	0.00	13.57	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
2. Foam Blowing	0.00	0.00	0.00	0.00	0.00	0.00	518.76	451.44	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
3. Fire Extinguishers	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
4. Aerosols/Metered Dose Inhalers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
5. Solvents	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
6. Semiconductor Manufacture	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		1.47	1.70	0.00	0.00	0.00	0.00	0.00		13.56
7. Electrical Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		4.08
8. 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		0.00	0.00	0.00	0.00	0.00	0.00	0.00		10.36
research and other use																							10.36
stock or not identifiable							NE																
heat pumps							0.00																
G. 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**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**

[1] Although shaded, the columns with HFCs and PFCs totals on sheet 1 are kept for consistency with sheet 2 of the table.
[2] Note that the units used in this table differ from those used in the rest of the Sectoral report tables, i.e. [t] instead of [Gg].

Note: Where information is confidential the entries should provide aggregate figures but there should be a note indicating this in the relevant documentation boxes of the Sectoral background data tables or as a comment to the corresponding cell.
Gases with GWP not yet agreed upon by the COP, should be reported in Table 9 (Completeness), sheet 2.

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES - EMISSIONS OF HFCs, PFCs AND SF_6
(Sheet 2 of 2)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ca	Total HFCs	CF_4	C_2F_6	C_3F_8	C_4F_{10}	$c\text{-}C_4F_8$	C_5F_{12}	C_6F_{14}	Total PFCs	SF_6
	(t)[2]																						
F(p). Total Potential Emissions of Halocarbons (by chemical) and SF_6 [3]	**31.00**	**24.61**	**0.00**	**0.00**	**292.00**	**0.00**	**2 396.77**	**462.04**	**0.00**	**179.04**	**11.50**	**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**384.29**
Production[4]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Import:	31.00	24.61	0.00	0.00	292.00	0.00	2 396.77	462.04	0.00	179.04	11.50	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		384.29
In bulk	31.00	24.61	0.00	0.00	292.00	0.00	2 396.77	462.04	0.00	179.04	11.50	0.00	0.00		NE	NE	0.00	0.00	0.00	0.00	0.00		384.29
In products [5]	IE	IE	0.00	0.00	IE	0.00	IE	IE	0.00	IE	IE	0.00	0.00		IE	IE	0.00	0.00	0.00	0.00	0.00		IE
Export:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
In bulk	NE	NE	0.00	0.00	NE	0.00	NE	NE	0.00	NE	NE	0.00	0.00		NE	NE	0.00	0.00	0.00	0.00	0.00		NE
In products [5]	NE	NE	0.00	0.00	NE	0.00	NE	NE	0.00	NE	NE	0.00	0.00		NE	NE	0.00	0.00	0.00	0.00	0.00		NE
Destroyed amount	NE	NE	0.00	0.00	NE	0.00	NE	NE	0.00	NE	NE	0.00	0.00		NE	NE	0.00	0.00	0.00	0.00	0.00		NE

	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ca	Total HFCs	CF_4	C_2F_6	C_3F_8	C_4F_{10}	$c\text{-}C_4F_8$	C_5F_{12}	C_6F_{14}	Total PFCs	SF_6
GWP values used	**11700**	**650**	**150**	**1300**	**2800**	**1000**	**1300**	**140**	**300**	**3800**	**2900**	**6300**	**560**		**6500**	**9200**	**7000**	**7000**	**8700**	**7500**	**7400**		**23900**
Total Actual Emissions [6] (Gg CO_2 eq.)	**6.44**	**1.14**	**0.00**	**0.00**	**61.33**	**0.00**	**848.99**	**63.31**	**0.00**	**51.55**	**0.50**	**0.00**	**0.00**	**1 033.25**	**9.53**	**15.63**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**25.16**	**676.95**
C. Metal Production															0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.65
E. Production of Halocarbons and SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F(a). Consumption of Halocarbons and SF_6	6.44	1.14	0.00	0.00	61.33	0.00	848.99	63.31	0.00	51.55	0.50	0.00	0.00	1 033.25	9.53	15.63	0.00	0.00	0.00	0.00	0.00	25.16	669.30
G. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Ratio of Potential/Actual Emissions from Consumption of Halocarbons and SF_6	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ca	Total HFCs	CF_4	C_2F_6	C_3F_8	C_4F_{10}	$c\text{-}C_4F_8$	C_5F_{12}	C_6F_{14}	Total PFCs	SF_6
Actual emissions - F(a) (Gg CO_2 eq.)	6.44	1.14	0.00	0.00	61.33	0.00	848.99	63.31	0.00	51.55	0.50	0.00	0.00	1 033.25	9.53	15.63	0.00	0.00	0.00	0.00	0.00	25.16	669.30
Potential emissions - F(p) (7) (Gg CO_2 eq.)	362.70	15.99	0.00	0.00	817.59	0.00	3 115.80	64.68	0.00	680.34	33.35	0.00	0.00	5 090.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9 184.46
Potential/Actual emissions ratio	56.34	14.09	0.00	0.00	13.33	0.00	3.67	1.02	0.00	13.20	67.32	0.00	0.00	4.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.72

[3] Potential emissions of each chemical of halocarbons and SF6 estimated using Tier 1a or Tier 1b of the IPCC Guidelines (Volume 3. Reference Manual, pp. 2.47-2.50). When potential emissions estimates are available in a disaggregated manner corresponding to the subsectors for actual emissions defined on sheet 1 of this table, these should be reported in an annex to sheet 2, using the format of sheet 1, sector F(a). Use Summary 3 of this common reporting format to indicate whether Tier 1a or Tier 1b was used.

[4] Production refers to production of new chemicals. Recycled substances could be included here, but it should be ensured that double counting of emissions is avoided. Relevant explanations should be provided as a comment to the corresponding cell.

[5] Relevant just for Tier 1b.

[6] Sums of the actual emissions of each chemical of halocarbons and SF6 from the source categories given in sheet 1 of the table multiplied by the corresponding GWP values.

[7] Potential emissions of each chemical of halocarbons and SF6 taken from row F(p) multiplied by the corresponding GWP values.

Note: As stated in the revised UNFCCC guidelines, Parties should report actual emissions of HFCs, PFCs and SF_6, where data are available, providing disaggregated data by chemical and source category in units of mass and in CO_2 equivalents. Parties reporting actual emissions should also report potential emissions for the sources where the concept of potential emissions applies, for reasons of transparency and comparability.

TABLE 2(II). C, E SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Metal Production; Production of Halocarbons and SF_6
(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS[(2)]	EMISSIONS[(2)]	
	Description[(1)]	(t)	(kg/t)	(t)	[(3)]
C. PFCs and SF_6 from Metal Production					
PFCs from Aluminium Production					
CF_4	Aluminium production [kt]	NO	0.00	0.00	
C_2F_6	Aluminium production [kt]	NO	0.00	0.00	
SF_6				0.32	
Aluminium Foundries	cast Aluminium [t]	C	0.00	0.32	
Magnesium Foundries	cast Magnesium [t]	3 600.00	0.00	0.00	
E. Production of Halocarbons and SF_6					
1. By-product Emissions					
Production of HCFC-22					
HFC-23	NO	NO	0.00	0.00	
Other *(specify chemical)*					
			0.00		
2. Fugitive Emissions					
HFCs *(specify chemical)*					
			0.00		
PFCs *(specify chemical)*					
			0.00		
SF_6	NO		0.00	NO	
3. Other *(please specify)*					
			0.00		

[(1)] Specify the activity data used as shown in the examples within brackets. Where applying Tier 1b (for C), Tier 2 (for E) and country specific methods, specify any other relevant activity data used in the documentation box below.

[(2)] Emissions and implied emission factors are after recovery.

[(3)] Enter cases in which the final emissions are reported after subtracting the quantities of emission recovery, oxidation, destruction, transformation. Enter these quantities in the specified column and use the documentation box for further explanations.

Note: Where the activity data are confidential, the entries should provide aggregate figures, but there should be a note in the documentation box indicating this

Documentation box:

TABLE 2(II).F SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Consumption of Halocarbons and SF_6
(Sheet 1 of 2)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA Amount of fluid			IMPLIED EMISSION FACTORS			EMISSIONS		
	Filled in new manufactured products	In operating systems (average annual stocks)	Remained in products at decommissioning [1]	Product manufacturing factor	Product life factor	Disposal loss factor	From manufacturing	From stocks	From disposal
	(t)			(% per annum)			(t)		
1 Refrigeration									
Air Conditioning Equipment									
Domestic Refrigeration *(Specify chemical)* [2]									
HFC-134a	0.00	74.88	NE	NE	1.50	NE	NE	1.12	NE
Commercial Refrigeration									
HFC-134a	4.00	32.00	NE	NE	1.50	NE	NE	0.48	NE
Transport Refrigeration									
HFC-134a	5.00	37.27	2.50	NE	10.00	NE	NO	3.73	NE
Industrial Refrigeration									
HFC-152a	1.24	10.60	NE	NE	7.48	NE	NE	0.79	NE
HFC-32	2.42	6.14	NE	NE	7.59	NE	NE	0.47	NE
HFC-143a	52.78	176.96	NE	NE	7.58	NE	NE	13.41	NE
HFC-125	62.40	270.17	NE	NE	7.54	NE	NE	20.38	NE
HFC-134a	126.40	551.90	NE	NE	7.53	NE	NE	41.58	NE
Stationary Air-Conditioning									
HFC-32	10.12	18.46	NE	NE	6.93	NE	NE	1.28	NE
HFC-143a	0.52	2.08	NE	NE	7.55	NE	NE	0.16	NE
HFC-125	11.44	21.83	NE	NE	6.98	NE	NE	1.52	NE
HFC-134a	32.92	126.76	NE	NE	6.63	NE	NE	8.41	NE
Mobile Air-Conditioning									
HFC-134a	145.93	659.60	NE	NE	11.98	NE	NE	78.99	NE
2 Foam Blowing									
Hard Foam									
HFC-152a	752.40	451.44	NE	NE	100.00	NE	NE	451.44	NE
HFC-134a	752.40	299.15	NE	NE	1.51	NE	NE	4.51	NE
Soft Foam									
HFC-134a	530.40	519.92	NE	NE	98.91	NE	NE	514.25	NE

[1] Parties should use the documentation box to provide information on the amount of the chemical recovered (recovery efficiency) and other relavant information used in the emission estima

[2] Please click on the button to specify the chemical consumed, as given in the example. If needed, new rows could be added for reporting the disagregated chemicals from a source by clicking on the corresponding but

Note: Table 2.(II).F provides for reporting of the activity data and emission factors used to calculate actual emissions from consumption of halocarbons and SF6 using the "bottom-up approach" (based on the total stock of equipr and estimated emission rates from this equipment). Some Parties may prefer to estimate their actual emissions following the alternative "top-down approach" (based on annual sales of equipment and/or gas). These Parties should provide the activity data used in the current format and any other relevant information in the documentation box at the end of Table2(II)Fs2. Data these Parties should provide includes (1) the amount of fluid used to fill new products, (2) the amount of fluid used to service existing products, (3) the amount of fluid originally used to fill retiring products (the total nameplate capacity of retiring products), (4) the product lifetime, and (5) the growth rate of product sales, if this has been used to calculate the amount of fluid originally used to fill retiring products. Alternatively, Parties may provide alternative formats with equivalent information. These formats may be considered for future versions of the common reporting format after the trial period.

TABLE 2(II).F SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Consumption of Halocarbons and SF_6
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA *Amount of fluid*			IMPLIED EMISSION FACTORS			EMISSIONS		
	Filled in new manufactured products	In operating systems (average annual stocks)	Remained in products at decommissioning [(1)]	Product manufacturing factor	Product life factor	Disposal loss factor	From manufacturing	From stocks	From disposal
	(t)			(% per annum)			(t)		
3 Fire Extinguishers									
HFC-227ea	4.00	11.50	NE	NE	1.50	NE	NE	0.17	NE
HFC-23	5.00	31.00	NE	NE	1.50	NE	NE	0.46	NE
4 Aerosols									
Metered Dose Inhalers									
Other									
5 Solvents									
6 Semiconductors									
SF6	14.75	13.56	NE	NE	NE	NE	NE	13.56	NE
C2F6	8.84	NE	NE	NE	NE	NE	NE	1.70	NE
CF4	18.11	NE	NE	NE	NE	NE	NE	1.47	NE
HFC-23	1.15	NE	NE	NE	NE	NE	NE	0.09	NE
7 Electric Equipment									
SF6	4.77	104.60	NE	NE	NE	NE	NE	4.08	NE
8 Other *(please specify)*									
SF6 : research and other use	24.69	265.81	NE	NE	NE	NE	NE	10.36	NE
HFC-134a : stock or not identifiabl	65.60	NE	NE	NE	NE	NE	NE	NE	NE
HFC-134a : heat pumps	5.42	95.29	NE	NE	0.00	NE	NE	0.00	NE

Note: Where the activity data are confidential, the entries should provide aggregate figures, but there should be a note indicating this and explanations in the documentation box.

Documentation box:

TABLE 3 SECTORAL REPORT FOR SOLVENT AND OTHER PRODUCT USE
(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	N_2O	NMVOC
		(Gg)	
Total Solvent and Other Product Use	**395.64**	**0.75**	**126.94**
A. Paint Application	**44.89**	**NE**	**14.40**
B. Degreasing and Dry Cleaning	**IE**	**IE**	**IE**
C. Chemical Products, Manufacture and Processing	**51.37**		**16.48**
D. Other *(please specify)*	299.38	0.75	96.06
Use of N2O for Anaesthesia	NE	0.35	NE
N2O from Fire Extinguishers	NE	NE	NE
N2O from Aerosol Cans	NE	0.40	NE
Other Solvent Use	299.38	NE	96.06

Please account for the quantity of carbon released in the form of NMVOC in both the NMVOC and the CO_2 columns.

Note: The IPCC Guidelines do not provide methodologies for the calculation of emissions of N_2O from Solvent and Other Product Use. If reporting such data, Parties should provide additional information (activity data and emission factors) used to make these estimates in the documentation box to Table 3.A-D.

Austria
2000
submission 2002

TABLE 3.A-D SECTORAL BACKGROUND DATA FOR SOLVENT AND OTHER PRODUCT USE
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS	
	Description	(kt)	CO_2 (t/t)	N_2O (t/t)
A. Paint Application	Solvents used [kt]	16.94	**2.65**	**0.00**
B. Degreasing and Dry Cleaning	Solvents used [kt]	1.75	**0.00**	**0.00**
C. Chemical Products, Manufacture and Processing				
D. Other ***(please specify)*** [(1)]				
Use of N2O for Anaesthesia	Use of N2O for Anaesthesia [kt	0.35	0.00	1.00
N2O from Fire Extinguishers	N2O from Fire Extinguishers	NE	0.00	0.00
N2O from Aerosol Cans	N2O from Aerosol Cans	NA	0.00	0.00
Other Solvent Use	Solvents used [kt]	113.01	2.65	0.00

[(1)] Some probable sources are provided in brackets. Complement the list with other relevant sources. Make sure that the order is the same as in Table 3.

Note: The table follows the format of the IPCC Sectoral Report for Solvent and Other Product Use, although some of the source categories are not relevant to the direct GHG emissions.

Documentation box:
Emissions from "Solvent Use for Degreasing and Dry Cleaning" are included in Category 3 D Other Solvent Use

TABLE 4 SECTORAL REPORT FOR AGRICULTURE
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CH_4	N_2O	NO_x	CO	NMVOC
	(Gg)				
Total Agriculture	**182.03**	**3.19**	**5.96**	**5.84**	**3.07**
A. Enteric Fermentation	**123.65**				
1. Cattle	115.44				
Dairy Cattle	57.13				
Non-Dairy Cattle	58.31				
2. Buffalo	NO				
3. Sheep	2.71				
4. Goats	0.28				
5. Camels and Llamas	NO				
6. Horses	1.47				
7. Mules and Asses	IE				
8. Swine	3.74				
9. Poultry	0.00				
10. Other *(please specify)*	0.00				
B. Manure Management	**24.00**	**NE**			**NE**
1. Cattle	12.00				
Dairy Cattle	5.40				
Non-Dairy Cattle	6.60				
2. Buffalo	NO				
3. Sheep	0.07				
4. Goats	0.01				
5. Camels and Llamas	NO				
6. Horses	0.13				
7. Mules and Asses	IE				
8. Swine	10.73				
9. Poultry	1.06				

TABLE 4 SECTORAL REPORT FOR AGRICULTURE
(Sheet 2 of 2)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CH_4	N_2O	NO_x	CO	NMVOC
	(Gg)				
B. Manure Management (continued)					
10. Anaerobic Lagoons		NE			NE
11. Liquid Systems		NE			NE
12. Solid Storage and Dry Lot		NE			NE
13. Other *(please specify)*		0.00			0.00
C. Rice Cultivation	NO				NO
1. Irrigated	NO				NO
2. Rainfed	NO				NO
3. Deep Water	NO				NO
4. Other *(please specify)*	NO				0.00
D. Agricultural Soils [1]	**34.17**	**3.18**	**5.94**		**2.44**
1. Direct Soil Emissions	IE	IE			IE
2. Animal Production	IE	IE			IE
3. Indirect Emissions	IE	IE			IE
4. Other *(please specify)*	0.00	0.00			0.00
E. Prescribed Burning of Savannas	**NO**	**NO**	**NO**	**NO**	**NO**
F. Field Burning of Agricultural Residues	**0.21**	**0.01**	**0.02**	**5.84**	**0.62**
1 . Cereals	0.05	0.00	0.01	1.50	0.16
2. Pulse	NO	NO	NO	NO	NO
3 . Tuber and Root	NO	NO	NO	NO	NO
4 . Sugar Cane	NO	NO	NO	NO	NO
5 . Other *(please specify)*	0.16	0.00	0.02	4.34	0.46
Vine	0.16	0.00	0.02	4.34	0.46
G. Other *(please specify)*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

[1] See footnote 4 to Summary 1.A of this common reporting format. Parties which choose to report CO_2 emissions and removals from agricultural soils under 4.D. Agricultural Soils category of the sector Agriculture should indicate the amount [Gg] of these emissions or removals in the documentation box to Table 4.D. Additional information (activity data, implied emissions factors) should also be provided using the relevant documentation box to Table 4.D. This table is not modified for reporting the CO_2 emissions and removals for the sake of consistency with the IPCC tables (i.e. IPCC Sectoral Report for Agriculture).

Note: The IPCC Guidelines do not provide methodologies for the calculation of CH_4 emissions, CH_4 and N_2O removals from agricultural soils, or CO_2 emissions from savanna burning or agricultural residues burning. If you have reported such data, you should provide additional information (activity data and emission factors) used to make these estimates using the relevant documentation boxes of the Sectoral background data tables.

TABLE 4.A SECTORAL BACKGROUND DATA FOR AGRICULTURE
Enteric Fermentation
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA[1] AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTORS
	Population size [2] (1000 head)	Average daily feed intake (MJ/day)	CH_4 conversion (%)	CH_4 (kg CH_4/head/yr)
1. Cattle	2 155	NE	NE	53.56
Dairy Cattle[3]	621	NE	NE	92.00
Non-Dairy Cattle	1 534	NE	NE	38.00
2. Buffalo	NO	NO	NO	0.00
3. Sheep	339	NE	NE	8.00
4. Goats	56	NE	NE	5.00
5. Camels and Llamas	NO	NO	NO	0.00
6. Horses	82	NE	NE	18.00
7. Mules and Asses	IE	IE	IE	0.00
8. Swine	2 495	NE	NE	1.50
9. Poultry	11 787	NE	NE	0.00
10. Other *(please specify)*				
				0.00

Additional information (for Tier 2)[a]

Disaggregated list of animals [b]		Dairy Cattle	Non-Dairy Cattle	Other *(specify)*	
Indicators:					
Weight	(kg)	NE	NE		
Feeding situation [c]		NE	NE		
Milk yield	(kg/day)	13.64	NE		
Work	(hrs/day)	NE	NE		
Pregnant	(%)	NE	NE		
Digestibility of feed	(%)	NE	NE		

[a] Compare to Tables A-1 and A-2 of the IPCC Guidelines (Volume 3. Reference Manual, pp. 4.31-4.34). These data are relevant if Parties do not have data on average feed intake.

[b] Disaggregate to the split actually used. Add columns to the table if necessary.

[c] Specify feeding situation as pasture, stall fed, confined, open range, etc.

(1) In the documentation boxes to all Sectoral background data tables for Agriculture, Parties should provide information on whether the activity data is one year or a 3-year average.

(2) Parties are encouraged to provide detailed livestock population data by animal type and region in a separate table below the documentation box. This consistent set of animal population statistics should be used to estimate CH_4 emissions from enteric fermentation, CH_4 and N_2O from manure management, N_2O direct emissions from soil and N_2O emissions associated with manure production, as well as emissions from the use of manure as fuel, and sewage-related emissions reported in the waste sector.

(3) Including data on dairy heifers, if available.

Documentation box:
Population statistics are on a yearly basis Horses include asses Simple Methodology used, Backgrounddata on Milk yield for Dairy cattle only for comparison

TABLE 4.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH_4 Emissions from Manure Management
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION							IMPLIED EMISSION FACTORS
	Population size [1]	Allocation by climate region [2]			Typical animal mass	VS[3] daily excretion	CH_4 producing potential (Bo)[3]	CH_4
		Cool	Temperate	Warm				
	(1000 head)	(%)			(kg)	(kg dm/head/yr)	(CH_4 m^3/kg VS)	(kg CH_4/head/yr)
1. Cattle	2 155	100.0	0.0	0.0	NE	NE	NE	5.57
Dairy Cattle[4]	621	100.0	0.0	0.0	NE	NE	NE	8.70
Non-Dairy Cattle	1 534	100.0	0.0	0.0	NE	NE	NE	4.30
2. Buffalo	NO	NO	NO	NO	NO	NO	NO	0.00
3. Sheep	339	100.0	0.0	0.0	NE	NE	NE	0.22
4. Goats	56	100.0	0.0	0.0	NE	NE	NE	0.14
5. Camels and Llamas	NO	NO	NO	NO	NO	NO	NO	0.00
6. Horses	82	100.0	0.0	0.0	NE	NE	NE	1.63
7. Mules and Asses	IE	IE	IE	IE	IE	IE	IE	0.00
8. Swine	2 495	100.0	0.0	0.0	NE	NE	NE	4.30
9. Poultry	11 787	100.0	0.0	0.0	NE	NE	NE	0.09

[1] See footnote 1 to Table 4.A of this common reporting format.

[2] Climate regions are defined in terms of annual average temperature as follows: Cool=less than 15°C; Temperate=15°C to 25°C inclusive; and Warm=greater than 25°C (see Table 4.2 of the IPCC Guidelines (Volume 3, Reference Manual, p. 4.8)).

[3] VS=Volatile Solids; Bo=maximum methane producing capacity for manure IIPCC Guidelines (Volume 3, Reference Manual, p.4.23 and p. 4.15.

[4] Including data on diary heifers, if available.

Documentation Box:

Population statistics are on a yearly basis
Horses include asses
The simple methodology is used. No background data available.

Additional information (for Tier 2)

Animal category[a]	Indicator	Climate region	Animal waste management system					
			Anaerobic lagoon	Liquid system	Daily spread	Solid storage and dry lot	Pasture range paddock	Other
Dairy Cattle	Allocation(%)	Cool						
		Temperate						
		Warm						
	MCF[b]	Cool						
		Temperate						
		Warm						
Non-Dairy Cattle	Allocation(%)	Cool						
		Temperate						
		Warm						
	MCF[b]	Cool						
		Temperate						
		Warm						
Swine	Allocation(%)	Cool						
		Temperate						
		Warm						
	MCF[b]	Cool						
		Temperate						
		Warm						

[a] Copy the above table as many times as necessary.

[b] MCF = Methane Conversion Factor (IPCC Guidelines, (Volume 3. Reference Manual, p. 4.9)). In the case of use of other climate region categorization, please replace the entries in the cells with the climate regions for which the MCFs are specified.

TABLE 4.B(b) SECTORAL BACKGROUND DATA FOR AGRICULTURE
N_2O Emissions from Manure Management
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION								IMPLIED EMISSION FACTORS	
	Population size [1]	Nitrogen excretion	Nitrogen excretion per animal waste management system (kg N/yr)						Emission factor per animal waste management system	
	(1000s)	(kg N/head/yr)	Anaerobic lagoon	Liquid system	Daily spread	Solid storage and dry lot	Pasture range and paddock	Other	(kg N_2O-N/kg N)	
Non-Dairy Cattle	1 534	NE	NO	NE	NE	NE	NE	NE	Anaerobic lagoon	0.000
Dairy Cattle	621	NE	NO	NE	NE	NE	NE	NE	Liquid system	0.000
Sheep	339	NE	NO	NE	NE	NE	NE	NE	Solid storage and dry lot	0.000
Swine	2 495	NE	NO	NE	NE	NE	NE	NE	Other	0.000
Poultry	11 787	NE	NO	NE	NE	NE	NE	NE		
Other *(please specify)*										
Total per AWMS [2]			**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		

[1] See footnote 1 to Table 4.A of this common reporting format
[2] AWMS - Animal Waste Management System

Documentation box:
Population statistics are on a yearly basis N2O Manure Management: Not included in national system.

TABLE 4.C SECTORAL BACKGROUND DATA FOR AGRICULTURE

Rice Cultivation
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR [1]	EMISSIONS
		Harvested area [2] (10^{-9} m^2/yr)	Organic amendments added[3]: type	Organic amendments added[3]: (t/ha)	CH_4 (g/m^2)	CH_4 (Gg)
1. Irrigated						NO
Continuously Flooded		NO			0.00	NO
Intermittently Flooded	Single Aeration	NO			0.00	NO
	Multiple Aeration	NO			0.00	NO
2. Rainfed						NO
Flood Prone		NO			0.00	NO
Drought Prone		NO			0.00	NO
3. Deep Water						NO
Water Depth 50-100 cm		NO			0.00	NO
Water Depth > 100 cm		NO			0.00	NO
4. Other *(please specify)*						NO
		NO			0.00	NO
Upland Rice[4]		NO				
Total [4]		0.00				

[1] The implied emission factor takes account of all relevant corrections for continuously flooded fields without organic amendment plus the correction for the organi amendments, if used, as well as of the effect of different soil characteristics, if taken into account, on methane emissions.

[2] Harvested area is the cultivated area multiplied by the number of cropping seasons per yea

[3] Specify dry weight or wet weight for organic amendments

[4] These rows are included to allow comparison with the international statistics. Upland rice emissions are assumed to be zero and are ignored in the emission calculation

Documentation box:
When dissagregating by more than one region within a country, provide additional information in the documentation box.
Where available, provide activity data and scaling factors by soil type and rice cultivar.

There is no rice cultivation in Austria

TABLE 4.D SECTORAL BACKGROUND DATA FOR AGRICULTURE

Agricultural Soils[1]

(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION		IMPLIED EMISSION FACTORS		EMISSIONS
	Description	Value	Unit		(Gg N_2O)
Direct Soil Emissions	**N input to soils (kg N/yr)**				IE
Synthetic Fertilizers	Use of synthetic fertilizers (kg N/yr)	NE	(kg N2O-N/kg N)[2]	0.000	IE
Animal Wastes Applied to Soils	Nitrogen input from manure applied to soils (kg N/yr)	NE	(kg N2O-N/kg N)[2]	0.000	IE
N-fixing Crops	Dry pulses and soybeans produced (kg dry biomass/yr)	NE	(kg N2O-N/kg dry biomass)[2]	0.000	IE
Crop Residue	Dry production of other crops (kg dry biomass/yr)	NE	(kg N2O-N/kg dry biomass)[2]	0.000	IE
Cultivation of Histosols	Area of cultivated organic soils (ha)	NE	(kg N2O-N/ha)[2]	0.000	IE
Animal Production	**N excretion on pasture range and paddock (kg N/yr)**	**NE**	**(kg N2O-N/kg N)[2]**	**0.000**	**IE**
Indirect Emissions					IE
Atmospheric Deposition	Volatized N (NH_3 and NOx) from fertilizers and animal wastes (kg N/yr)	NE	(kg N2O-N/kg N)[2]	0.000	IE
Nitrogen Leaching and Run-off	N from fertilizers and animal wastes that is lost through leaching and run off (kg N/yr)	NE	(kg N2O-N/kg N)[2]	0.000	IE
Other *(please specify)*					**0.00**
				0.000	

Additional information

Fraction [a]	Description	Value
$Frac_{BURN}$	Fraction of crop residue burned	
$Frac_{FUEL}$	Fraction of livestock N excretion in excrements burned for fuel	
$Frac_{GASF}$	Fraction of synthetic fertilizer N applied to soils that volatilizes as NH_3 and NOx	
$Frac_{GASM}$	Fraction of livestock N excretion that volatilizes as NH_3 and NOx	
$Frac_{GRAZ}$	Fraction of livestock N excreted and deposited onto soil during grazing	
$Frac_{LEACH}$	Fraction of N input to soils that is lost through leaching and runoff	
$Frac_{NCRBF}$	Fraction of N in non-N-fixing crop	
$Frac_{NCRO}$	Fraction of N in N-fixing crop	
$Frac_{R}$	Fraction or crop residue removed from the field as crop	

[a] Use the fractions as specified in the IPCC Guidelines (Volume 3. Reference Manual, pp. 4.92 - 4.113).

[1] See footnote 4 to Summary 1.A. of this common reporting format. Parties which choose to report CC_2 emissions and removals from agricultural soils under 4.D. Agricultural Soils category should indicate the amount [Gg] of these emissions or removals and relevant additional information (activity data, implied emissions factors) in the documentation box.
[2] To convert from N_2O-N to N_2O emissions, multiply by 44/28.

Documentation box:
Only totals estimated

TABLE 4.E SECTORAL BACKGROUND DATA FOR AGRICULTURE
Prescribed Burning of Savannas
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION					IMPLIED EMISSION FACTORS		EMISSIONS	
	Area of savanna burned (k ha/yr)	Average aboveground biomass density (t dm/ha)	Fraction of savanna burned	Biomass burned (Gg dm)	Nitrogen fraction in biomass	(kg/t dm)		(Gg)	
						CH_4	N_2O	CH_4	N_2O
(specify ecological zone)								NO	NO
	NO					0.00	0.00	NO	NO

Additional information

	Living	Dead
Fraction of aboveground biomass		
Fraction oxidized		
Carbon fraction		

Documentation box:
No occurrance of savannas in Austria

TABLE 4.F SECTORAL BACKGROUND DATA FOR AGRICULTURE
Field Burning of Agricultural Residues
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION						IMPLIED EMISSION FACTORS		EMISSIONS	
	Crop production	Residue/ Crop ratio	Dry matter fraction	Fraction burned in fields	Biomass burned	Nitrogen fraction in biomass of residues	CH_4	N_2O	CH_4	N_2O
	(t)				(Gg dm)		(kg/t dm)	(kg/t dm)	(Gg)	(Gg)
1. Cereals									**0.05**	**0.00**
Wheat	NA	NA	NA	NA	30.00	NA	1.78	0.12	0.05	0.00
NA	NA	NA	NA	NA	IE	NA	0.00	0.00	IE	IE
Maize	NA	NA	NA	NA	IE	NA	0.00	0.00	IE	IE
Oats	NA	NA	NA	NA	IE	NA	0.00	0.00	IE	IE
Rye	NA	NA	NA	NA	IE	NA	0.00	0.00	IE	IE
Rice	NO	NO	NO	NO	NO	NO	0.00	0.00	NO	NO
Other *(please specify)*									0.00	0.00
							0.00	0.00		
2. Pulse [1]									**NO**	**NO**
Dry bean	NO	NO	NO	NO	NO	NO	0.00	0.00	NO	NO
Peas	NO	NO	NO	NO	NO	NO	0.00	0.00	NO	NO
Soybeans	NO	NO	NO	NO	NO	NO	0.00	0.00	NO	NO
Other *(please specify)*									0.00	0.00
							0.00	0.00		
3 Tuber and Root									**NO**	**NO**
Potatoes	NO	NO	NO	NO	NO	NO	0.00	0.00	NO	NO
Other *(please specify)*									0.00	0.00
							0.00	0.00		
4 Sugar Cane	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**0.00**	**0.00**	**NO**	**NO**
5 Other *(please specify)*									**0.16**	**0.00**
Vine	NE	NE	NE	NE	87.28	NE	1.80	0.05	0.16	0.00

[1] To be used in Table 4.D of this common reporting format.

Documentation Box:
Wheat includes cereals total

TABLE 5 SECTORAL REPORT FOR LAND-USE CHANGE AND FORESTRY
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions/ removals	CH_4	N_2O	NO_x	CO
	(Gg)						
Total Land-Use Change and Forestry	**22 174.94**	**-29 808.30**	**-7 633.36**	**0.00**	**0.00**	**0.00**	**0.00**
A. Changes in Forest and Other Woody Biomass Stocks	**22 174.94**	**-29 808.30**	**-7 633.36**				
1. Tropical Forests	NO	NO	0.00				
2. Temperate Forests	22 174.94	-29 808.30	-7 633.36				
3. Boreal Forests	NO	NO	0.00				
4. Grasslands/Tundra	NE	NE	0.00				
5. Other *(please specify)*	0.00	0.00	0.00				
Harvested Wood [(1)]	NE	NE	0.00				
			0.00				
B. Forest and Grassland Conversion [(2)]	IE			NE	NE	NE	NE
1. Tropical Forests	NO			NO	NO	NO	NO
2. Temperate Forests	IE			NE	NE	NE	NE
3. Boreal Forests	NO			NO	NO	NO	NO
4. Grasslands/Tundra	NE			NE	NE	NE	NE
5. Other *(please specify)*	0.00			0.00	0.00	0.00	0.00
C. Abandonment of Managed Lands	IE	IE	IE				
1. Tropical Forests	NO	NO	0.00				
2. Temperate Forests	IE	IE	0.00				
3. Boreal Forests	NO	NO	0.00				
4. Grasslands/Tundra	NE	NE	0.00				
5. Other *(please specify)*	0.00	0.00	0.00				
			0.00				
D. CO_2 Emissions and Removals from Soil	NE	NE	NE				
Cultivation of Mineral Soils	NE	NE	0.00				
Cultivation of Organic Soils	NE	NE	0.00				
Liming of Agricultural Soils	NE	NE	0.00				
Forest Soils	NE	NE	0.00				
Other *(please specify)* [(3)]	0.00	0.00	0.00				
			0.00				
E. Other *(please specify)*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
			0.00				

(1) Following the IPCC Guidelines, the harvested wood should be reported under Changes in Forest and Other Woody Biomass Stocks (Volume 3. Reference Manual, p.5.17).
(2) Include only the emissions of CO_2 from Forest and Grassland Conversion. Associated removals should be reported under section D.
(3) Include emissions from soils not reported under sections A, B and C.

Note: See footnote 4 to Summary 1.A of this common reporting format.

TABLE 5.A SECTORAL BACKGROUND DATA FOR LAND-USE CHANGE AND FORESTRY
Changes in Forest and Other Woody Biomass Stocks
(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES			ACTIVITY DATA		IMPLIED EMISSION FACTORS	ESTIMATES
			Area of forest/biomass stocks (kha)	Average annual growth rate (t dm/ha)	Implied carbon uptake factor (t C/ha)	Carbon uptake increment (Gg C)
Tropical	Plantations	*Acacia spp.*	NO		0.00	0.00
		Eucalyptus spp.	NO		0.00	0.00
		Tectona grandis	NO		0.00	0.00
		Pinus spp	NO		0.00	0.00
		Pinus caribaea	NO		0.00	0.00
		Mixed Hardwoods	NO		0.00	0.00
		Mixed Fast-Growing Hardwoods	NO		0.00	0.00
		Mixed Softwoods	NO		0.00	0.00
	Other Forests	Moist	NO		0.00	0.00
		Seasonal	NO		0.00	0.00
		Dry	NO		0.00	0.00
	Other *(specify)*		NO		0.00	0.00
			NO		0.00	
Temperate	Plantations		2.00	NE	0.00	NE
			NO		0.00	0.00
	Commercial	Evergreen	2 534.11	4.91	2.41	6 095.19
		Deciduous	817.89	5.15	2.49	2 034.34
	Other *(specify)*		NE		0.00	NE
			NO		0.00	0.00
Boreal			NO		0.00	0.00
			Number of trees (1000s of trees)	Annual growth rate (kt dm/1000 trees)	Carbon uptake factor (t C/tree)	Carbon uptake increment (Gg C)
Non-Forest Trees *(specify type)*						0.00
			NE		0.00	NE
Total annual growth increment (Gg C)						8 129.54
$Gg\ CO_2$						29 808.30

	Amount of biomass removed (kt dm)	Carbon emission factor (t C/t dm)	Carbon release (Gg C)
Total biomass removed in Commercial Harvest	12 388.62	0.49	6 047.71
Traditional Fuelwood Consumed	IE	0.00	IE
Total Other Wood Use	NE	0.00	NE
Total Biomass Consumption from Stocks[(1)] (Gg C)			6 047.71
Other Changes in Carbon Stocks [(2)] (Gg C)			NE
$Gg\ CO_2$			22 174.94

Net annual carbon uptake (+) or release (-) (Gg C)	2 081.82
Net CO_2 emissions (-) or removals (+) ($Gg\ CO_2$)	7 633.36

[(1)] Make sure that the quantity of biomass burned off-site is subtracted from this total

[(2)] The net annual carbon uptake/release is determined by comparing the annual biomass growth versus annual harvest, including the decay of forest products and slash left during harvest. The IPCC Guidelines recommend default assumption that all carbon removed in wood and other biomass from forests is oxidized in the year of removal. The emissions from decay could be included under Other Changes in Carbon Stocks.

Note: Sectoral background data tables on Land-Use Change and Forestry should be filled in only by Parties using the IPCC default methodology. Parties that use country specific methods and models should report information on them in a transparent manner, also providing suggestions for a possible sectoral background data table suitable for their calculation method.

Documentation box:

Figures for "Total annual growth increment" include above and belowground biomass and also growth increment resulting from conversion of managed lands to forests (see Table 5.C)

The basis for the estimated figures for "Total biomass removed in Commercial Harvest" are at-site-measured data by the Austrian forest inventory. These data include all possible reasons for biomass losses in the forests. Therefore the figures for "Total biomass removed in Commercial Harvest" include also for instance traditional fuelwood consumption, biomass losses by forest fires (in the 90-ies at areas <135 ha per year) and biomass losses due to other damages

Figures for "Total biomass removed in Commercial Harvest" include the above- and belowground biomass of harvested trees)
Figures for "Total Biomass Consumption from Stocks" include also biomass losses due to forest conversion (see Table 5.B)
Since 1996 no forest inventory was carried out in Austria. Therefore the mean of the inventory results for the period 1992/96 is used for the years after 1996. A data revision for these years will take place when the new data of the presently running forest inventory will be available which will be in 2003.

TABLE 5.B SECTORAL BACKGROUND DATA FOR LAND-USE CHANGE AND FORESTRY

Forest and Grassland Conversion

(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA AND OTHER RELATED INFORMATION							IMPLIED EMISSION FACTORS					EMISSIONS				
		On and off site burning				Decay of above-ground biomass[1]			Burning				Decay	Burning				Decay
		Area converted annually	Annual net loss of biomass	Quantity of biomass burned		Average area converted	Average annual net loss of biomass	Average quantity of biomass left to decay	On site			Off site		On site			Off site	
				On site	Off site				CO_2	CH_4	N_2O	CO_2	CO_2	CO_2	CH_4	N_2O	CO_2	CO_2
Vegetation types		(kha)	(kt dm)	(kt dm)	(kt dm)	(kha)	(t dm/ha)	(kt dm)	(t/ha)					(Gg)				
Tropical	Wet/Very Moist	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Moist, short dry season	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Moist, long dry season	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dry	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Montane Moist	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Montane Dry	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tropical Savanna/Grasslands		NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Temperate	Coniferous	NO				IE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Broadleaf	NO				IE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mixed Broadleaf/ Coniferous	NO				IE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasslands		NO				NE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boreal	Mixed Broadleaf/ Coniferous	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Coniferous	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Forest-tundra	NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasslands/Tundra		NO				NO			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other *(please specify)*		NO				NE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		NO				NE			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total														**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

[1] Activity data are for default 10-year average. Specify the average decay time which is appropriate for the local conditions, if other than 10 years

Emissions/Removals	On site	Off site
Immediate carbon release from burning	0.00	0.00
Total On site and Off site (Gg C)	0.00	
Delayed emissions from decay (Gg C)	0.00	
Total annual carbon release (Gg C)	0.00	
Total annual CO_2 emissions (Gg CO_2)	0.00	

Additional information

Fractions	On site	Off site
Fraction of biomass burned (average)	NA	NA
Fraction which oxidizes during burning (average)	NA	NA
Carbon fraction of aboveground biomass (average)	NA	NA
Fraction left to decay (average)	NA	NA
Nitrogen-carbon ratio	NA	NA

Note: Sectoral background data tables on Land-Use Change and Forestry should be filled in only by Parties using the IPCC default methodology. Parties that use country specific methods and models should report information on them in a transparent manner, also providing suggestions for a possible sectoral background data table suitable for their calculation method.

Documentation box:
Figures for biomass losses due to forest conversion are included in the figures of Table 5.A

TABLE 5.C SECTORAL BACKGROUND DATA FOR LAND-USE CHANGE AND FORESTRY
Abandonment of Managed Lands
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA AND OTHER RELATED INFORMATION						IMPLIED EMISSION FACTORS		ESTIMATES	
		Total area abandoned and regrowing [1]		Annual rate of aboveground biomass growth		Carbon fraction of aboveground biomass		Rate of aboveground biomass carbon uptake		Annual carbon uptake in aboveground biomass	
Original natural ecosystems		first 20 years (kha)	>20 years (kha)	first 20 years (t dm/ha)	>20 years (t dm/ha)	first 20 years	>20 years	first 20 years (t C/ha/yr)	>20 years (t C/ha/yr)	first 20 years (Gg C/yr)	>20 years (Gg C/yr)
Tropical	Wet/Very Moist	NO						0.00	0.00	0.00	0.00
	Moist, short dry season	NO						0.00	0.00	0.00	0.00
	Moist, long dry season	NO						0.00	0.00	0.00	0.00
	Dry	NO						0.00	0.00	0.00	0.00
	Montane Moist	NO						0.00	0.00	0.00	0.00
	Montane Dry	NO						0.00	0.00	0.00	0.00
Tropical Savanna/Grasslands		NO						0.00	0.00	0.00	0.00
Temperate	Mixed Broadleaf/Coniferous	IE						0.00	0.00	IE	IE
	Coniferous	IE						0.00	0.00	IE	IE
	Broadleaf	IE						0.00	0.00	IE	IE
Grasslands		NE						0.00	0.00	NE	NE
Boreal	Mixed Broadleaf/Coniferous	NO						0.00	0.00	0.00	0.00
	Coniferous	NO						0.00	0.00	0.00	0.00
	Forest-tundra	NO						0.00	0.00	0.00	0.00
Grasslands/Tundra		NO						0.00	0.00	0.00	0.00
Other *(please specify)*		NO						0.00	0.00	0.00	0.00
		NO						0.00	0.00	0.00	0.00

Total annual carbon uptake (Gg C)	0.00
Total annual CO_2 removal (Gg CO_2)	0.00

[1] If lands are regenerating to grassland, then the default assumption is that no significant changes in above-ground biomass occur.

Note: Sectoral background data tables on Land-use Change and Forestry should be filled in only by Parties using the IPCC default methodology. Parties that use country specific methods and models should report information on them in a transparent manner, also providing suggestions for a possible sectoral background data table suitable for their calculation method.

Documentation box:
Figures for biomass growth increment resulting from conversion of managed lands to forests are included in the figures of Table 5.A

TABLE 5.D SECTORAL BACKGROUND DATA FOR LAND-USE CHANGE AND FORESTRY
CO_2 Emissions and Removals from Soil
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	ESTIMATES
	Land area (Mha)	Average annual rate of soil carbon uptake/removal (Mg C/ha/yr)	Net change in soil carbon in mineral soils (Tg C over 20 yr)
Cultivation of Mineral Soils [1]	**NE**		**0.00**
High Activity Soils	NE	0.00	NE
Low Activity Soils	NE	0.00	NE
Sandy	NE	0.00	NE
Volcanic	NE	0.00	NE
Wetland (Aquic)	NE	0.00	NE
Other *(please specify)*			0.00
		0.00	
	Land area (ha)	Annual loss rate (Mg C/ha/yr)	Carbon emissions from organic soils (Mg C/yr)
Cultivation of Organic Soils			**0.00**
Cool Temperate			**0.00**
Upland Crops	NO	0.00	0.00
Pasture/Forest	NO	0.00	0.00
Warm Temperate			**0.00**
Upland Crops	NE	0.00	NE
Pasture/Forest	NE	0.00	NE
Tropical			**0.00**
Upland Crops	NO	0.00	0.00
Pasture/Forest	NO	0.00	0.00
	Total annual amount of lime (Mg)	Carbon conversion factor	Carbon emissions from liming (Mg C)
Liming of Agricultural Soils			**0.00**
Limestone $Ca(CO_3)$	NE	0.00	NE
Dolomite $CaMg(CO_3)_2$	NE	0.00	NE

Total annual net carbon emissions from agriculturally impacted soils (Gg C)	0.00
Total annual net CO_2 emissions from agriculturally impacted soils (Gg CO_2)	0.00

Additional information

Year	Climate [a]	land-use/ management system [a]	Soil type: High activity soils	Low activity soils	Sandy	Volcanic	Wetland (Aquic)	Organic soil
			percent distribution (%)					
20 years prior			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
inventory year			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE
			NE	NE	NE	NE	NE	NE

[a] These should represent the major types of land management systems per climate regions presented in the country as well as ecosystem types which were either converted to agriculture (e.g., forest, savanna, grassland) or have been derived from previous agricultural land-use (e.g., abandoned lands, reforested lands). Systems should also reflect differences in soil carbon stocks that can be related to differences in management (IPCC Guidelines (Volume 2. Workbook, Table 5-9, p. 5.26, and Appendix (pp. 5-31 - 5.38)).

[1] The information to be reported under Culitvation of Mineral Soils aggregates data per soil type over all land-use/management systems. This refers to land area data and to the emission estimates and implied emissions factors according

Note: Sectoral background data tables on Land-Use Change and Forestry should be filled in only by Parties using the IPCC default methodology. Parties that use country specific methods and models should repo information on them in a transparent manner, also providing suggestions for a possible sectoral background data table suitable for their calculation method.

Documentation Box:

TABLE 6 SECTORAL REPORT FOR WASTE
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
	(Gg)						
Total Waste	**105.98**	**247.60**	**0.09**	**0.24**	**16.77**	**0.41**	**0.09**
A. Solid Waste Disposal on Land	**0.00**	**210.66**		**0.00**	**16.68**	**0.20**	
1. Managed Waste Disposal on Land	0.00	210.66		0.00	16.68	0.20	
2. Unmanaged Waste Disposal Sites	NO	NO		NO	NO	NO	
3. Other *(please specify)*	0.00	0.00		0.00	0.00	0.00	
B. Wastewater Handling		**14.40**	**0.08**	**0.00**	**0.00**	**0.00**	
1. Industrial Wastewater		4.90	0.02	0.00	0.00	0.00	
2. Domestic and Commercial Wastewater		9.50	0.06	0.00	0.00	0.00	
3. Other *(please specify)*		0.00	0.00	0.00	0.00	0.00	
C. Waste Incineration	**105.98**	**0.07**	**0.01**	**0.24**	**0.09**	**0.21**	**0.09**
D. Other *(please specify)*	**0.00**	**22.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Sludge spreading	0.00	20.00	0.00	0.00	0.00	0.00	0.00
Compost production	0.00	2.48	0.00	0.00	0.00	0.00	0.00

[1] Note that CO_2 from Waste Disposal and Incineration source categories should only be included if it stems from non-biological or inorganic waste sources.

TABLE 6.A SECTORAL BACKGROUND DATA FOR WASTE
Solid Waste Disposal
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION				IMPLIED EMISSION FACTOR		EMISSIONS[1]	
	Annual MSW at the SWDS (Gg)	MCF	DOC degraded (Gg)	CH_4 recovery [2] (Gg)	CH_4 (t /t MSW)	CO_2 (t /t MSW)	CH_4 (Gg)	CO_2 [3] (Gg)
1 Managed Waste Disposal on Land	3 639.50	NE	290.40	52.66	0.06	0.00	210.66	0.00
2 Unmanaged Waste Disposal Sites	NO	NO	NO	NO	0.00	0.00	NO	NO
- deep (>5 m)	NO	NO	NO	NO	0.00	0.00	NO	NO
- shallow (<5 m)	NO	NO	NO	NO	0.00	0.00	NO	NO
3 Other *(please specify)*							0.00	0.00
					0.00	0.00		

Additional information

Description	Value
Total population (1000s)[a]	8 107.00
Urban population (1000s)[a]	5 224.00
Waste generation rate (kg/capita/day)	1.05
Fraction of MSW disposed to SWDS	0.29
Fraction of DOC in MSW	0.45
Fraction of wastes incinerated	0.15
Fraction of wastes recycled	0.34
CH4 oxidation factor (b)	0.20
CH_4 fraction in landfill gas	0.55
Number of SWDS recovering CH_4	48.00
CH_4 generation rate constant (k)[c]	NA
Time lag considered (yr)[c]	NA
Composition of landfilled waste (%)	
Paper and paperboard	8.18
Food and garden waste	23.42
Plastics	7.32
Glass	2.81
Textiles	4.82
Other *(specify)*	51.04
other - inert	2.41
other - organic	0.00

[a] Specify whether total or urban population is used and the rationale for doing so.
[b] See IPCC Guidelines (Volume 3. Reference Manual, p. 6.9).
[c] For Parties using Tier 2 methods.

TABLE 6.C SECTORAL BACKGROUND DATA FOR WASTE
Waste Incineration
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA Amount of incinerated wastes (Gg)	IMPLIED EMISSION FACTOR			EMISSIONS		
		CO_2 (kg/t waste)	CH_4 (kg/t waste)	N_2O (kg/t waste)	CO_2 [3] (Gg)	CH_4 (Gg)	N_2O (Gg)
Waste Incineration *(please specify)*	777.77				105.98	0.07	0.01
(biogenic) [3]		0.00	0.00	0.00			
(plastics and other non-biogenic waste) [3]		0.00	0.00	0.00			
Incineration of corpses [Number]	9 384.00	0.18	0.00	0.00	1.64	0.00	0.00
municipal solid waste [Gg]	533.07	177.59	0.12	0.02	94.67	0.07	0.01
hazardous waste [Gg]	86.10	0.00	0.00	0.00	IE	IE	IE
waste water sludge [Gg]	68.32	0.00	0.00	0.00	IE	IE	IE
waste oil [Gg]	3.00	3 224.00	0.00	0.02	9.67	0.00	0.00
		0.00	0.00	0.00			

MSW - Municipal Solid Waste, SWDS - Solid Waste Disposal Site, MCF - Methane Correction Factor, DOC - Degradable Organic Carbon

(IPCC Guidelines (Volume 3. Reference Manual, section 6.2.4)). MSW includes household waste, yard/garden waste, commercial/market waste and organic industrial solid waste. MSW should not include inorganic industrial waste such as construction or demolition materials.

[1] Actual emissions (after recovery).

[2] CH_4 recovered and flared or utilized.

[3] Under Waste Disposal, CO_2 emissions should be reported only when the disposed wastes are combusted at the disposal site which might constitute a management practic
CO_2 emissions from non-biogenic wastes are included in the totals, while the CO_2 emissions from biogenic wastes are not included in the totals.

Documentation box:
All relevant information used in calculation should be provided in the additional information box and in the documentation box. Parties that use country specific models should note this with a brief rationale in the documentation box and fill the relevant cells only.
Emissions of **hazardous waste** and **waster water sludge** are reported under **incineration of municipal solid waste**

TABLE 6.B SECTORAL BACKGROUND DATA FOR WASTE
Wastewater Handling
(Sheet 1 of 1)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND RELATED INFORMATION[1]				IMPLIED EMISSION FACTOR			EMISSIONS[2]		
	Total organic product		CH_4 recovered and/or flared		CH_4		N_2O[3]	CH_4		N_2O[3]
	Wastewater	Sludge	Wastewater	Sludge	Wastewater	Sludge		Wastewater	Sludge	
	(Gg DC[1]/yr)		(Gg)		(kg/kg DC)	(kg/kg DC)	(kg/kg DC)	(Gg)	(Gg)	(Gg)
Industrial Wastewater	NA	NA	NA	NA	0.00	0.00	NA	4.90	IE	0.02
Domestic and Commercial Wastewater	NA	NA	NA	NA	0.00	0.00	NA	9.50	IE	0.00
Other *(please specify)*								0.00	0.00	0.00
					0.00	0.00				

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR	EMISSIONS
	Population[4] (1000s)	Protein consumption (protein in kg/person/yr)	N fraction (kg N/kg protein)	N_2O (kg N_2O-N/kg sewage N produced)	N_2O (Gg)
N_2O from human sewage[3]	8 107	38.69	0.16	0.00	0.06

[1] DC - degradable organic component. DC indicators are COD (Chemical Oxygen Demand) for industrial wastewater and BOD (Biochemical Oxygen Demand) for Domestic/Commerc wastewater/sludge (IPCC Guidelines (Volume 3. Reference Manual, pp. 6.14, 6.18)).

[2] Actual emissions (after recovery)

[3] Parties using other methods for estimation of N_2O emissions from human sewage or wastewater treatment should provide corresponding information on methods, activity da and emission factors used in the documentation box. Use the table to provide aggregate data.

[4] Specify whether total or urban population is used in the calculations and the rationale for doing so. Provide explanation in the documentation box.

Additional information

	Domestic	Industrial
Total wastewater (m^3):	NE	NE
Treated wastewater (%):	NE	NE

Wastewater streams:	Wastewater output (m^3)	DC ($kgCOD/m^3$)
Industrial wastewater	NE	NE
Iron and steel	NE	NE
Non-ferrous	NE	NE
Fertilizers	NE	NE
Food and beverage	NE	NE
Paper and pulp	NE	NE
Organic chemicals	NE	NE
Other *(specify)*	NE	NE
	DC (kg BOD/1000 person/yr)	
Domestic and Commercial	NE	
Other	NE	

Handling systems:	Industrial wastewater treated (%)	Ind. sludge treated (%)	Domestic wastewater treated (%)	Domestic sludge treated (%)
Aerobic	NE	NE	NE	NE
Anaerobic	NE	NE	NE	NE
Other *(specify)*	NE	NE	NE	NE

Documentation box:
N2O from human sewage: 10 g N / person / day is released into wastewater. 75 % of wastewater is treated in sewage plants. 10 % of N is denitrified. 1 % of denitrified N reacts to N2O.
IE: CH4-Emissions from sludge are reported under emissions from wastewater.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 1 of 3)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
					P	A	P	A	P	A				
	(Gg)				CO_2 equivalent (Gg)				(Gg)					
Total National Emissions and Removals	**66 102.04**	**-7 633.36**	**447.70**	**8.11**	**5 090.46**	**1 033.25**	**0.00**	**25.16**	**0.38**	**0.03**	**183.57**	**906.49**	**238.70**	**40.75**
1. Energy	**53 413.83**		**17.93**	**3.51**							**162.94**	**662.60**	**86.58**	**32.53**
A. Fuel Combustion — Reference Approach[2]	57 289.42													
Sectoral Approach[2]	53 318.85		12.21	3.51							162.94	662.60	82.89	32.38
1. Energy Industries	12 136.95		0.13	0.15							10.82	2.41	0.16	6.58
2. Manufacturing Industries and Construction	10 606.93		0.44	0.53							31.06	13.33	3.19	11.55
3. Transport	16 937.20		1.58	1.80							80.61	222.14	35.88	2.87
4. Other Sectors	13 637.76		10.06	1.03							40.46	424.73	43.65	11.38
5. Other	0.00		0.00	0.00							0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	94.98		5.72	0.00							0.00	0.00	3.69	0.15
1. Solid Fuels	0.00		0.01	0.00							0.00	0.00	0.00	0.00
2. Oil and Natural Gas	94.98		5.71	0.00							0.00	0.00	3.69	0.15
2. Industrial Processes	**12 186.59**		**0.14**	**0.58**	**5 090.46**	**1 033.25**	**0.00**	**25.16**	**0.38**	**0.03**	**14.42**	**221.27**	**21.71**	**8.13**
A. Mineral Products	3 055.83		0.04	0.00							5.05	18.56	6.28	0.18
B. Chemical Industry	492.46		0.10	0.58	0.00	0.00	0.00	0.00	0.00	0.00	4.40	11.11	12.34	3.19
C. Metal Production	8 590.51		0.00	0.00				0.00		0.00	4.39	191.17	0.80	4.76
D. Other Production[3]	47.80										0.59	0.43	2.30	0.00
E. Production of Halocarbons and SF_6						0.00		0.00		0.00				
F. Consumption of Halocarbons and SF_6					5 090.46	1 033.25	NE	25.16	0.38	0.03				
G. 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

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach. Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] Other Production includes Pulp and Paper and Food and Drink Production.

Note: The numbering of footnotes to all tables containing more than one sheet continue to the next sheet. Common footnotes are given only once at the first point of reference.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs [1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
					P	A	P	A	P	A				
	(Gg)				CO_2 equivalent (Gg)						(Gg)			
3. Solvent and Other Product Use	**395.64**			**0.75**							**0.00**	**0.00**	**126.94**	0.00
4. Agriculture	**0.00**	**0.00**	**182.03**	**3.19**							5.96	5.84	3.07	0.01
A. Enteric Fermentation			123.65											
B. Manure Management			24.00	NE									NE	
C. Rice Cultivation			NO										NO	
D. Agricultural Soils	(4) 0.00	(4) 0.00	34.17	3.18							5.94		2.44	
E. Prescribed Burning of Savannas			NO	NO							NO	NO	NO	
F. Field Burning of Agricultural Residues			0.21	0.01							0.02	5.84	0.62	0.01
G. Other			0.00	0.00							0.00	0.00	0.00	0.00
5. Land-Use Change and Forestry	(5) **0.00**	(5) **-7 633.36**	**0.00**	**0.00**							**0.00**	**0.00**	**0.00**	**0.00**
A. Changes in Forest and Other Woody Biomass Stocks	(5) 0.00	(5) -7 633.36												
B. Forest and Grassland Conversion	IE		NE	NE							NE	NE	NE	
C. Abandonment of Managed Lands	(5) IE	(5) IE												
D. CO_2 Emissions and Removals from Soil	(5) NE	(5) NE												
E. Other	(5) 0.00	(5) 0.00	0.00	0.00							0.00	0.00	0.00	0.00
6. Waste	**105.98**		**247.60**	**0.09**							**0.24**	**16.77**	**0.41**	**0.09**
A. Solid Waste Disposal on Land	(6) 0.00		210.66									16.68	0.20	
B. Wastewater Handling			14.40	0.08							0.00	0.00	0.00	
C. Waste Incineration	(6) 105.98		0.07	0.01							0.24	0.09	0.21	0.09
D. Other	0.00		22.48	0.00							0.00	0.00	0.00	0.00
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**	**0.00**

(4) According to the IPCC Guidelines (Volume 3. Reference Manual, pp. 4.2, 4.87), CO_2 emissions from agricultural soils are to be included under Land-Use Change and Forestry (LUCF). At the same time, the Summary Report 7A (Volume 1. Reporting Instructions, Tables.27) allows for reporting CO_2 emissions or removals from agricultural soils, either in the Agriculture sector, under D. Agricultural Soils or in the Land-Use Change and Forestry sector under D. Emissions and Removals from Soil. Parties may choose either way to report emissions or removals from this source in the common reporting format, but the way they have chosen to report should be clearly indicated, by inserting explanatory comments to the corresponding cells of Summary 1.A and Summary 1.B. Double-counting of these emissions or removals should be avoided. Parties should include these emissions or removals consistently in Table8(a) (Recalculation - Recalculated data) and Table10 (Emission trends).

(5) Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

(6) Note that CO_2 from Waste Disposal and Incineration source categories should only be included if it stems from non-biogenic or inorganic waste streams.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs		PFCs		SF_6		NO_x	CO	NMVOC	SO_2
					P	A	P	A	P	A				
	(Gg)				CO_2 equivalent (Gg)						(Gg)			
Memo Items: [7]														
International Bunkers	**1 671.82**		**0.01**	**0.01**							**5.83**	**1.27**	**0.50**	**0.53**
Aviation	1 671.82		0.01	0.01							5.83	1.27	0.50	0.53
Marine	NO		NO	NO							NO	NO	NO	NO
Multilateral Operations	**IE**		**IE**	**IE**							**IE**	**IE**	**IE**	**IE**
CO_2 Emissions from Biomass	**12 591.58**													

[7] Memo Items are not included in the national totals.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
					P	A	P	A	P	A				
	(Gg)				CO_2 equivalent (Gg)				(Gg)					
Total National Emissions and Removals	**66 102.04**	**-7 633.36**	**447.70**	**8.11**	**5 090.46**	**1 033.25**	**0.00**	**25.16**	**0.38**	**0.03**	**183.57**	**906.49**	**238.70**	**40.75**
1. Energy	**53 413.83**		**17.93**	**3.51**							**162.94**	**662.60**	**86.58**	**32.53**
A. Fuel Combustion – Reference Approach[2]	57 289.42													
Sectoral Approach[2]	53 318.85		12.21	3.51							162.94	662.60	82.89	32.38
B. Fugitive Emissions from Fuels	94.98		5.72	0.00							0.00	0.00	3.69	0.15
2. Industrial Processes	**12 186.59**		**0.14**	**0.58**	**5 090.46**	**1 033.25**	**0.00**	**25.16**	**0.38**	**0.03**	**14.42**	**221.27**	**21.71**	**8.13**
3. Solvent and Other Product Use	**395.64**			**0.75**							**0.00**	**0.00**	**126.94**	**0.00**
4. Agriculture [3]	**0.00**	**0.00**	**182.03**	**3.19**							**5.96**	**5.84**	**3.07**	**0.01**
5. Land-Use Change and Forestry	[4] **0.00**	[4] **-7 633.36**	**0.00**	**0.00**							**0.00**	**0.00**	**0.00**	**0.00**
6. Waste	**105.98**		**247.60**	**0.09**							**0.24**	**16.77**	**0.41**	**0.09**
7. Other	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Memo Items:														
International Bunkers	**1 671.82**		**0.01**	**0.01**							**5.83**	**1.27**	**0.50**	**0.53**
Aviation	1 671.82		0.01	0.01							5.83	1.27	0.50	0.53
Marine	NO		NO	NO							NO	NO	NO	NO
Multilateral Operations	**IE**		**IE**	**IE**							**IE**	**IE**	**IE**	**IE**
CO_2 Emissions from Biomass	**12 591.58**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

(1) The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

(2) For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c) Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

(3) See footnote 4 to Summary 1.A.

(4) Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**58 468.69**	**9 401.74**	**2 515.09**	**1 033.25**	**25.16**	**676.95**	**72 120.88**
1. Energy	**53 413.83**	**376.46**	**1 087.07**				**54 877.36**
A. Fuel Combustion (Sectoral Approach)	53 318.85	256.31	1 087.07				54 662.23
1. Energy Industries	12 136.95	2.74	45.00				12 184.69
2. Manufacturing Industries and Construction	10 606.93	9.32	164.36				10 780.61
3. Transport	16 937.20	33.09	558.50				17 528.79
4. Other Sectors	13 637.76	211.16	319.22				14 168.14
5. Other	0.00	0.00	0.00				0.00
B. Fugitive Emissions from Fuels	94.98	120.15	0.00				215.13
1. Solid Fuels	0.00	0.17	0.00				0.17
2. Oil and Natural Gas	94.98	119.98	0.00				214.96
2. Industrial Processes	**12 186.59**	**2.98**	**179.63**	**1 033.25**	**25.16**	**676.95**	**14 104.56**
A. Mineral Products	3 055.83	0.85	0.00				3 056.68
B. Chemical Industry	492.46	2.07	179.63	0.00	0.00	0.00	674.16
C. Metal Production	8 590.51	0.06	0.00		0.00	7.65	8 598.21
D. Other Production	47.80						47.80
E. Production of Halocarbons and SF_6				0.00	0.00	0.00	0.00
F. Consumption of Halocarbons and SF_6				1 033.25	25.16	669.30	1 727.71
G. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Solvent and Other Product Use	**395.64**		**232.50**				**628.14**
4. Agriculture	**0.00**	**3 822.72**	**989.51**				**4 812.24**
A. Enteric Fermentation		2 596.56					2 596.56
B. Manure Management		504.08	0.00				504.08
C. Rice Cultivation		0.00					0.00
D. Agricultural Soils[(2)]		717.66	987.05				1 704.72
E. Prescribed Burning of Savannas		0.00	0.00				0.00
F. Field Burning of Agricultural Residues		4.42	2.46				6.88
G. Other		0.00	0.00				0.00
5. Land-Use Change and Forestry[(1)]	**-7 633.36**	**0.00**	**0.00**				**-7 633.36**
6. Waste	**105.98**	**5 199.59**	**26.37**				5 331.94
A. Solid Waste Disposal on Land	0.00	4 423.78					4 423.78
B. Wastewater Handling		302.36	23.84				326.19
C. Waste Incineration	105.98	1.37	2.54				109.89
D. Other	0.00	472.08	0.00				472.08
7. Other *(please specify)*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
							0.00
Memo Items:							
International Bunkers	**1 671.82**	**0.26**	**4.03**				**1 676.10**
Aviation	1 671.82	0.26	4.03				1 676.10
Marine	NO	NO	NO				0.00
Multilateral Operations	**IE**	**IE**	**IE**				**0.00**
CO_2 Emissions from Biomass	**12 591.58**						**12 591.58**

[(1)] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).
[(2)] See footnote 4 to Summary 1.A of this common reporting format.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	22 174.94	-29 808.30	-7 633.36			-7 633.36
B. Forest and Grassland Conversion	IE		IE	NE	NE	0.00
C. Abandonment of Managed Lands	IE	IE	IE			0.00
D. CO_2 Emissions and Removals from Soil	NE	NE	NE			0.00
E. Other	0.00	0.00	0.00	0.00	0.00	0.00
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	22 174.94	-29 808.30	-7 633.36	0.00	0.00	-7 633.36

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry[(a)]	79 754.24
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry[(a)]	72 120.88

[(a)] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied [(1)]	Emission factor [(2)]	Method applied [(1)]	Emission factor [(2)]	Method applied [(1)]	Emission factor [(2)]	Method applied [(1)]	Emission factor [(2)]	Method applied [(1)]	Emission factor [(2)]	Method applied [(1)]	Emission factor [(2)]
1. Energy												
A. Fuel Combustion												
1. Energy Industries	C	CS	C	CS	C	CS						
2. Manufacturing Industries and Construction	C	CS	C	CS	C	CS						
3. Transport	M	CS	M	CS	M	CS						
4. Other Sectors	CS	CS	CS	CS	CS	CS						
5. Other												
B. Fugitive Emissions from Fuels												
1. Solid Fuels			C	CS								
2. Oil and Natural Gas	C, CS	CS, PS	C	CS	C	CS						
2. Industrial Processes												
A. Mineral Products	C, CS	CS	C	CS								
B. Chemical Industry	C	PS	C	PS	C	PS						
C. Metal Production	C	CS, PS	C	CS								
D. Other Production	C	CS										
E. Production of Halocarbons and SF_6												
F. Consumption of Halocarbons and SF_6							CS	CS	CS	CS	CS	CS
G. Other												

(1) Use the following notation keys to specify the method applied: D (IPCC default), RA (Reference Approach), T1 (IPCC Tier 1), T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively), T2 (IPCC Tier 2) T3 (IPCC Tier 3), C (CORINAIR), CS (Country Specific), M (Model). If using more than one method, enumerate the relevant methods. Explanations of any modifications to the default IPCC methods, as well as information on the proper use of methods per source category where more than one method is indicated, and explanations on the country specific methods, should be provided in the documentation box of the relevant Sectoral background data table.

(2) Use the following notation keys to specify the emission factor used: D (IPCC default), C (CORINAIR), CS (Country Specific), PS (Plant Specific), M (Model). Where a mix of emission factors has been used use different notations in one and the same cells with further explanation in the documentation box of the relevant Sectoral background data table.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied (1)	Emission factor (2)	Method applied (1)	Emission factor (2)	Method applied (1)	Emission factor (2)	Method applied (1)	Emission factor (2)	Method applied (1)	Emission factor (2)	Method applied (1)	Emission factor (2)
3. Solvent and Other Product Use	**C, CS**	**CS**			**CS**	**CS**						
4. Agriculture												
A. Enteric Fermentation			C	D, CS								
B. Manure Management			C	CS								
C. Rice Cultivation												
D. Agricultural Soils			CS	CS	CS	CS						
E. Prescribed Burning of Savannas												
F. Field Burning of Agricultural Residues			CS	CS	CS	CS						
G. Other												
5. Land-Use Change and Forestry												
A. Changes in Forest and Other Woody Biomass Stocks	D	CS										
B. Forest and Grassland Conversion												
C. Abandonment of Managed Lands												
D. CO_2 Emissions and Removals from Soil												
E. Other												
6. Waste												
A. Solid Waste Disposal on Land			CS	CS								
B. Wastewater Handling			C	CS	T1	D, CS						
C. Waste Incineration	C	CS	C	CS	C	CS						
D. Other			C, CS	CS								
7. Other *(please specify)*												

TABLE 7 OVERVIEW TABLE[1] FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 8A)
(Sheet 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		NO_x		CO		NMVOC		SO_2	
	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality
Total National Emissions and Removals																				
1 Energy																				
A. Fuel Combustion Activities																				
Reference Approach	ALL	H																		
Sectoral Approach	ALL	H	ALL	L	ALL	M							ALL	L	ALL	L	ALL	L	ALL	M
1. Energy Industries	ALL	H	ALL	L	ALL	L							ALL	M	ALL	M	ALL	L	ALL	H
2. Manufacturing Industries and Construction	ALL	H	ALL	L	ALL	L							ALL	L	ALL	L	ALL	L	ALL	H
3. Transport	ALL	H	ALL	M	ALL	M							ALL	M	ALL	M	ALL	M	ALL	H
4. Other Sectors	ALL	H	ALL	L	ALL	L							ALL	L	ALL	L	ALL	L	ALL	M
5. Other	NO	NO	NO	NO	NO	NO							NO	NO	NO	NO	NO	NO	NO	NO
B. Fugitive Emissions from Fuels																				
1. Solid Fuels	ALL	H	PART	L	PART	L														
2. Oil and Natural Gas	ALL	L	ALL	L	PART	L							PART	L	PART	L	PART	L	PART	L
2 Industrial Processes																				
A. Mineral Products	PART	M	PART	L	PART	M							PART	M	PART	H	PART	M	PART	H
B. Chemical Industry	PART	M	PART	L	PART	M	NE	NE	NE	NE			PART	M	PART	H	PART	M	PART	H
C. Metal Production	PART	M	PART	L	NE	NE			NO	NO	ALL	M	PART	M	PART	H	PART	M	PART	H
D. Other Production	ALL	M											ALL	M	ALL	H	ALL	M	NE	NE
E. Production of Halocarbons and SF_6							NO	NO	NO	NO	NO	NO								

[1] This table is intended to be used by Parties to summarize their own assessment of completeness (e.g. partial, full estimate, not estimated) and quality (high, medium, low) of major source/sin inventory estimates. The latter could be understood as a quality assessment of the uncertainty of the estimates. This table might change once the IPCC completes its work on managing uncertainties of GHG inventories. The title of the table was kept for consistency with the current table in the IPCC Guidelines.

Note: To fill in the table use the notation key as given in the IPCC Guidelines (Volume 1. Reporting Instructions, Tables. 37)

TABLE 7 OVERVIEW TABLE FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 8A)
(Sheet 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		NO_x		CO		NMVOC		SO_2	
	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality
2 Industrial Processes (continued)																				
F. Consumption of Halocarbons and SF_6																				
Potential [(2)]							PART	M	PART	M	PART	M								
Actual [(3)]							PART	M	PART	M	PART	M								
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Solvent and Other Product Use	**ALL**	**L**			**ALL**	**L**							**NO**	**NO**	**NO**	**NO**	**ALL**	**L**	**NO**	**NO**
4 Agriculture																				
A. Enteric Fermentation			ALL	L, M																
B. Manure Management			ALL	L	NE	NE											NE	NE		
C. Rice Cultivation			NO	NO													NO	NO		
D. Agricultural Soils	NE	NE	ALL	L	ALL	L											ALL	L		
E. Prescribed Burning of Savannas			NO	NO	NO	NO							NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues			ALL	L	ALL	L							ALL	L	ALL	L	ALL	L	ALL	L
G. Other			NO	NO	NO	NO							NO	NO	NO	NO	NO	NO	NO	NO
5 Land-Use Change and Forestry	**PART**	**H**	**NE**	**NE**	**NE**	**NE**														
A. Changes in Forest and Other Woody Biomass Stocks	PART	H																		
B. Forest and Grassland Conversion	PART	H	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE		

(2) Potential emissions based on Tier 1 approach of the IPCC Guidelines.
(3) Actual emissions based on Tier 2 approach of the IPCC Guidelines.

TABLE 7 OVERVIEW TABLE FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 8A)
(Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		NO_x		CO		NMVOC		SO_2	
	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality
5 Land-Use Change and Forestry (continued)																				
C. Abandonment of Managed Lands	IE	IE																		
D. CO_2 Emissions and Removals from Soil	NE	NE																		
E. Other	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
6 Waste																				
A. Solid Waste Disposal on Land	NE	NE	ALL	L											ALL	M	ALL	L		
B. Wastewater Handling			ALL	L	ALL	L							NE	NE	NE	NE	NE	NE		
C. Waste Incineration	ALL	L	PART	M	PART	L							PART	M	PART	M	PART	L	PART	H
D. Other	NE	NE	ALL	M	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
7 Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:																				
International Bunkers	**ALL**	**H**	**ALL**	**L**	**ALL**	**L**							**ALL**	**L**	**ALL**	**L**	**ALL**	**L**	**ALL**	**H**
Aviation	ALL	H	ALL	L	ALL	L							ALL	L	ALL	L	ALL	L	ALL	H
Marine	NO	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**	**IE**
CO_2 Emissions from Biomass	**ALL**	**L**																		

TABLE 8(a) RECALCULATION - RECALCULATED DATA

Recalculated year: 2000

(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2			CH_4			N_2O		
		Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]
		CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)
Total National Emissions and Removals			**66 102.04**	**0.00**		**9 401.74**	**0.00**		**2 515.09**	**0.00**
1. Energy			**53 413.83**	**0.00**		**376.46**	**0.00**		**1 087.07**	**0.00**
1.A.	Fuel Combustion Activities		53 318.85	0.00		256.31	0.00		1 087.07	0.00
1.A.1.	Energy Industries		12 136.95	0.00		2.74	0.00		45.00	0.00
1.A.2.	Manufacturing Industries and Construction		10 606.93	0.00		9.32	0.00		164.36	0.00
1.A.3.	Transport		16 937.20	0.00		33.09	0.00		558.50	0.00
1.A.4.	Other Sectors		13 637.76	0.00		211.16	0.00		319.22	0.00
1.A.5.	Other		IE	0.00		IE	0.00		IE	0.00
1.B.	Fugitive Emissions from Fuels		94.98	0.00		120.15	0.00		IE	0.00
1.B.1.	Solid fuel		IE	0.00		0.17	0.00		IE	0.00
1.B.2.	Oil and Natural Gas		94.98	0.00		119.98	0.00		IE	0.00
2. Industrial Processes			**12 186.59**	**0.00**		**2.98**	**0.00**		**179.63**	**0.00**
2.A.	Mineral Products		3 055.83	0.00		0.85	0.00		NE	0.00
2.B.	Chemical Industry		492.46	0.00		2.07	0.00		179.63	0.00
2.C.	Metal Production		8 590.51	0.00		0.06	0.00		0.00	0.00
2.D.	Other Production		47.80	0.00						
2.G.	Other		NE	0.00		NE	0.00		NE	0.00
3. Solvent and Other Product Use			**395.64**	**0.00**					**232.50**	**0.00**
4. Agriculture			**0.00**	**0.00**		**3 822.72**	**0.00**		**989.51**	**0.00**
4.A.	Enteric Fermentation		NE			2 596.56	0.00			
4.B.	Manure Management		NE			504.08	0.00		NE	0.00
4.C.	Rice Cultivation		NO			NO	0.00			
4.D.	Agricultural Soils [2]		NE	0.00		717.66	0.00		987.05	0.00
4.E.	Prescribed Burning of Savannas		NO			NO	0.00		NO	0.00
4.F.	Field Burning of Agricultural Residues		0.00			4.42	0.00		2.46	0.00
4.G.	Other		NE			NE	0.00		NE	0.00
5. Land-Use Change and Forestry (net)			**-7 633.36**	**0.00**		**NE**	**0.00**		**NE**	**0.00**
5.A.	Changes in Forest and Other Woody Biomass Stocks		-7 633.36	0.00						
5.B.	Forest and Grassland Conversion		IE	0.00		NE	0.00		NE	0.00
5.C.	Abandonment of Managed Lands		IE	0.00						
5.D.	CO_2 Emissions and Removals from Soil		NE	0.00						
5.E.	Other		NE	0.00		NE	0.00		NE	0.00

[1] Estimate the percentage change due to recalculation with respect to the previous submission (Percentage change = 100% x [(LS-PS)/PS], where LS = Latest submission and PS = Previous submission.
All cases of recalculation of the estimate of the source/sink category, should be addressed and explained in Table 8(b) of this common reporting format.

[2] See footnote 4 to Summary 1.A of this common reporting format.

TABLE 8(a) RECALCULATION - RECALCULATED DATA
Recalculated year: 2000
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2			CH_4			N_2O		
	Previous submission	Latest submission	Difference(1)	Previous submission	Latest submission	Difference(1)	Previous submission	Latest submission	Difference(1)
	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)
6. Waste		**105.98**	**0.00**		**5 199.59**	**0.00**		**26.37**	**0.00**
6.A. Solid Waste Disposal on Land		0.00	0.00		4 423.78	0.00			
6.B. Wastewater Handling					302.36	0.00		23.84	0.00
6.C. Waste Incineration		105.98	0.00		1.37	0.00		2.54	0.00
6.D. Other		0.00	0.00		472.08	0.00		0.00	0.00
7. Other *(please specify)*		**NE**	**0.00**		**NE**	**0.00**		**NE**	**0.00**
			0.00			0.00			0.00
Memo Items:									
International Bunkers		**1 671.82**	**0.00**		**0.26**	**0.00**		**4.03**	**0.00**
Multilateral Operations		**IE**	**0.00**		**IE**	**0.00**		**IE**	**0.00**
CO_2 Emissions from Biomass		**13 048.11**	**0.00**						

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFCs			PFCs			SF_6		
	Previous submission	Latest submission	Difference(1)	Previous submission	Latest submission	Difference(1)	Previous submission	Latest submission	Difference(1)
	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)
Total Actual Emissions		**1 033.25**	**0.00**		**25.16**	**0.00**		**676.95**	**0.00**
2.C.3. Aluminium Production					NE	0.00		NE	0.00
2.E. Production of Halocarbons and SF_6		NE	0.00		NE	0.00		NE	0.00
2.F. Consumption of Halocarbons and SF_6		1 033.25	0.00		25.16	0.00		676.95	0.00
Other		NE	0.00		NE	0.00		NE	0.00
Potential Emissions from Consumption of HFCs/PFCs and SF_6		**5 090.46**			**NE**			**9 184.46**	

	Previous submission	Latest submission	Difference(1)
	CO_2 equivalent (Gg)		(%)
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry(3)	0.00	72 120.88	0.00
Total CO_2 Equivalent Emissions without Land-Use Change and Forestry(3)	0.00	79 754.24	0.00

(3) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

TABLE 8(b) RECALCULATION - EXPLANATORY INFORMATION
(Sheet 1 of 1)

Austria
2000
submission 2002

Specify the sector and source/sink category[1] where changes in estimates have occurred:		GHG	RECALCULATION DUE TO			
			CHANGES IN:			Addition/removal/ replacement of source/sink categories
			Methods [2]	Emission factors [2]	Activity data [2]	
1A	Fuel Combustion	CO_2, CH_4, N_2O	New method: For inventory year 1999 energy data is taken from the IEA-Questionnaires which are provided by STATISTIC AUSTRIA. Old method: Energy data is taken from from the national energy balance system provided by STATISTIC AUSTRIA.		Revision of national energy data for inventory year 1999 which causes changes in all subcategories.	
1A1a	Public Electricity and Heat Production	CO_2, CH_4, N_2O			Updated emission declaration from plants >= 50 MW for the inventory year 1999	
1A1b	Petroleum refining	CO_2				1990-1999: Emissions allocated in this category replace the emissions from combustion in petroleum refining industry which were reported under category 1B2 Oil and Natural Gasin the previous submissions.
1A1b	Petroleum refining	N_2O				1990-1999: Addition of N_2O-emissions from combustion in petroleum refining industry
1A2	Manufacturing Industries and Construction	CO_2, CH_4, N_2O	A new study estimates emissions from off-road mobile sources with a more detailled bottom up approach.	New study provides more accurate emissions factors.	Bottom up activity data from new study.	1990-1999: Additional emissions from industrial off-road mobile sources which were reported under category 1A3b Road Transportation and 1A3e Other in the previous submission.
1A3a	Civil Aviation	CO_2, CH_4, N_2O			1998 correction of activity data to reach consistency with the national energy balance.	
1A3b	Road Transportation	CO_2, CH_4, N_2O		New study provides more accurate emissions factors.	Less activity than in previous submission caused by increasing off-road activities by keeping the total fuel consumption consistent with the energy balance. Updated total Gasoline and Diesel Oil consumption enhance consistency to national fuel sales statistics.	
1A3c	Railways	CO_2, CH_4, N_2O			updated activity data for 1996-1998 taken from new off-road study.	
1A3d	Navigation	CO_2, CH_4, N_2O	A new study estimates emissions from off-road mobile sources with a more detailled bottom up approach.	New study provides more accurate emissions factors.	Bottom up activity data from new study.	
1A3e	Transport-Other	CO_2, CH_4, N_2O				Emissions from off-road mobile sources are shifted to categories 1A2 and 1A4.
1A4a	Commercial / Institutional	CO_2, CH_4, N_2O			1998: coking coal consumption was partly shifted to 1A3c according to the new off-road study.	
1A4b	Residential	CO_2, CH_4, N_2O	A new study estimates emissions from off-road mobile sources with a more detailled bottom up approach.	New study provides more accurate emissions factors for mobile sources	Mobile Sources: Bottom up activity data from new study.	
1A4c	Agriculture / Forestry / Fishing	CO_2, CH_4, N_2O	A new study estimates emissions from off-road mobile sources with a more detailled bottom up approach.	New study provides more accurate emissions factors for mobile sources	Mobile Sources: Bottom up activity data from new study.	
1B2	FUGITIVE EMISSIONS FROM FUELS-Oil and natural gas	CO_2				See remarks category 1A1b
1B2	FUGITIVE EMISSIONS FROM FUELS-Oil and natural gas	CH_4				1990-1999: Estimation of CH_4-emissions which were "NE" in previous submission
2A2	Lime Production	CO_2	1980-1999: Change from national method to IPCC-Tier1		1999: Previous estimate of activity data is replaced by data from national statistics	
4D	Agricultural Soils	CH_4, N_2O			1998,1999: Previous estimate of activity data is replaced by data from a new farm structure survey.	
4F5	FIELD BURNING OF AGRICULTURAL WASTES-Other	CH_4				1990-1999: Emissions allocated in this category replace the emissions from Open burning of agricultural wastes which were reported under category 6C2 waste incineration in the previous submission.
6B	WASTEWATER HANDLING	N_2O				1990-1999: Estimation of N_2O-emissions which were "NE" in previous submission
6C2	WASTE INCINERATION	CH_4				See remarks category 4F5
Memo Items	International Bunkers-Aviation	CO_2, CH_4, N_2O			1998 correction of activity data to reach consistency with the energy balance.	

[1] Enter the identification code of the source/sink category (e.g. 1.B.1) in the first column and the name of the category (e.g. Fugitive Emissions from Solid Fuels) in the second column of the table (see Table 8(a)) .

[2] Explain changes in methods, emission factors and activity data that have resulted in recalculation of the estimate of the source/sink as indicated in Table 8(a). Include relevant changes in the assumptions and coefficients under the "Methods" column.

Documentation box: Use the documentation box to report the justifications of the changes as to improvements in the accuracy, completeness and consistency of the inventory.
Detailed explanations to recalculations are given in the relating chapters of Austria's NIR 2002.

TABLE 9 COMPLETENESS
(Sheet 1 of 2)

Sources and sinks not reported (NE)[1]

GHG	Sector[2]	Source/sink category [2]		Explanation
CO_2				
	5 A 2 c	5 A 2 c Plantations		The Austrian area of temperate forest plantations is very small (<2000 ha). Therefore the C stock changes at these plantations are negligible.
	5 A 2 d	5 A 2 d Other		There are not sufficient data which would allow to estimate accurately the emissions and removals from other wooded land like vineyards, orchards, parks, forest nurseries and christmas tree cultures.
	5 A 2 d	5 A 2 d Harvested Wood		Estimates on this sector will be made in the near future.
	5 A 4	5 A 4 Emissions and removals from grasslands		There are not sufficient data which would allow to estimate accurately the emissions and removals from grasslands. However, it is assumed that figures for this category are of minor relevance for the Austrian GHG balance.
	5 B 4	5 B 4 Emissions from grassland conversion		There are not sufficient data which would allow to estimate accurately the emissions from grassland conversion.
	5 B 5	5 B 5 Other		There are not sufficient data which would allow to estimate accurately the emissions from conversion of other wooded land like vineyards, orchards, parks, forest nurseries and christmas tree cultures.
	5 C 4	5 C 4 Removals by abondonment of managed land and regrowth by grasslands		There are not sufficient data which would allow to estimate accurately the removals from abandonment of managed land and regrowth by grasslands (biomass). However, it is assumed that figures for this category are of minor relevance for the Austrian GHG balance.
	5 D	5 D CO2 emissions and removals from soil		Up to now there were no reassessments of the soil inventories in Austria. Therefore it is not possible to give estimates on the C stock changes in the soils which are based on measured data. It is planned to carry out such reassessments in the near future which will allow to provide figures for this sector.
	5 E	5 E Other		There are not sufficient data which would allow estimates for this sector.
CH_4				
N_2O				
	4 B	Manure Management		No emissions are included in the national system. Calculation is under progress and emissions are going to be reported / recalculated with submission 2003
HFCs				
PFCs				
SF_6				

Sources and sinks reported elsewhere (IE)[3]

GHG	Source/sink category	Allocation as per IPCC Guidelines	Allocation used by the Party	Explanation
CO_2				
	b) Iron and Steel	1 A 2 a Iron and Steel	2 C 1 Iron and Steel Production	The emission declaration of the iron and steel industry includes emissions of all activities of the this sector which are allocated under SNAP 040202. The standard transformation of SNAP to IPCC allocates the emissions to sector 2 C 1
	c) Coke Oven	1 B 1 a Solid Fuel Transformation	2 C 1 Iron and Steel Production	see explanation b)
	d) Multilateral Operations	Memo Item: Multilateral Operations	1 A 4 Other Sectors	No explicit information in the national energy statistics about multilateral operations. Since the emissions of this sector are very low they are included in the residential/commercial sector.
	e) Combustion in Industry	1 A 2 b,c,d,e	1 A 2 f Other	No consistent information in the national energy statistics about detailed industrial sectors.
	f) Waste Incineration Plants	Energy Related Activity Data not allocatable to sector 6 C 1	Emissions: 6 C 1 Waste Incineration Activity data: 1 A 5 Fuel Combustion-Other	Since the CRF does not allow to report energy consumption in category 6C it is included in category 1A5. Emissions from waste incineration are correctly reported under category 6 C 1 except CO2 emissions of biomass which are reported under categoy 1 A 5 - Biomass.
	g) Oil Exploration, Production, Transport, Distribution	1 B 2 a i, ii, iii, v	1 B 2 a iv Oil Refining / Storage	Total emissions of oil exploration ,production ,transport and distribution are reported by the *Association of Oil Refineries*
	h) Transmission, Other Leakage	1 B 2 b ii, iii	1 B 2 b ii Natural Gas Distribution	Total emissions of gas transmission , lekages and distribution are reported by the energy statistics as "natural gas leakages".

	i) Venting and Flaring	1 B 2 c	1 A 1 b Petroleum Refining	The emission declaration of the refinery includes all emissions from the plant.
	l) Solvent Use - Degreasing and Dry Cleaning	3 B Solvent Use - Degreasing and Dry Cleaning	3 D Solvent Use - Other	The top down approach which was used to estimate total emissions from solvent use is not able to disaggregate the emissions to this sector.
	q) CO2 emissions of Changes in Forest and Other Woody Biomass Stocks	5 A CO2 emissions of Changes in Forest and Other Woody Biomass Stocks	5 A CO2 Removals of Changes in Forest and Other Woody Biomass Stocks	The national method provides only total CO2 emissions/removals.
	r) Incineration of industrial waste and waste water sludge	6 C Waste Incineration - by waste type	6 C Waste Incineration - municipal solid waste	It is not possible to disaggregate the emission declarations of waste incineration plants to specific waste types.
	Biomass increment by abandonment of managed land and regrowth by forests	5 C 2 Abandonment of managed lands and regrowth by temperate forests	5 A 2 a,b Total biomass increment in Commercial Harvest	The basis for the estimated figures for "Total annual growth increment in Commercial Harvest" are at-site-measured data by the Austrian forest inventory. These data include all possible reasons for biomass increments in the forests. Therefore the figures for "Total biomass increment in Commercial Harvest" include also the biomass increments due to abandonment of managed land and regrowth by forests
	Biomass losses by forest conversion	5 B 2 a,b Biomass losses by forest conversion	5 A 2 a,b Total biomass removed in Commercial Harvest	The basis for the estimated figures for "Total biomass removed in Commercial Harvest" are at-site-measured data by the Austrian forest inventory. These data include all possible reasons for biomass losses in the forests. Therefore the figures for "Total biomass removed in Commercial Harvest" include also the biomass losses due to forest conversion
	Traditional Fuelwood Consumed	5 A 2 a,b Traditional Fuelwood Consumed	5 A 2 a,b Total biomass removed in Commercial Harvest	The basis for the estimated figures for "Total biomass removed in Commercial Harvest" are at-site-measured data by the Austrian forest inventory. These data include all possible reasons for biomass losses in the forests. Therefore the figures for "Total biomass removed in Commercial Harvest" include also for instance traditional fuelwood consumption, biomass losses by forest fires (in the 90-ies at areas <135 ha per year) and biomass losses due to other damages
CH_4				
	b) Iron and Steel	1 A 2 a Iron and Steel	2 C 1 Iron and Steel Production	
	c) Coke Oven	1 B 1 a Solid Fuel Transformation	2 C 1 Iron and Steel Production	
	d) Multilateral Operations	Memo Item: Multilateral Operations	1 A 4 Other Sectors	
	e) Combustion in Industry By Sectors	1 A 2 b,c,d,e	1 A 2 f Other	
	f) Waste Incineration Plants	Energy Related Activity Data not allocatable to sector 6 C 1	Emissions: 6 C 1 Waste Incineration Activity data: 1 A 5 Fuel Combustion-Other	
	g) Oil Exploration, Production, Transport, Distribution	1 B 2 a i, ii, iii, v	1 B 2 a iv Oil Refining / Storage	
	h) Transmission, Other Leakage	1 B 2 b ii, iii	1 B 2 b ii Natural Gas Distribution	
	i) Venting and Flaring	1 B 2 c	1 A 1 b Petroleum Refining	
	m) Enteric Fermentation - Mules and Asses	4 A 7 Enteric Fermentation - Mules and Asses	4 A 6 Enteric Fermentation - Horses	In the national statistics mules, asses and horses are published together.
	n) Manure Managment - Mules and Asses	4 B 7 Manure Managment - Mules and Asses	4 B 6 Manure Managment - Horses	see explanation m)
	o) Agricultural Soils - Sub Categories	4 D 1 to 4 D 4	4 D Agricultural Soils	The national methodology produces only total emissions for this emission source.
	r) Incineration of industrial waste and waste water sludge	6 C Waste Incineration - by waste type	6 C Waste Incineration - municipal solid waste	
N_2O				
	a) Petroleum Refining	1 A 1 b Petroleum Refining	1 B 2 a Fugitive Emissions from Fuels - Oil	
	b) Iron and Steel	1 A 2 a Iron and Steel	2 C 1 Iron and Steel Production	
	c) Coke Oven	1 B 1 a Solid Fuel Transformation	2 C 1 Iron and Steel Production	
	d) Multilateral Operations	Memo Item: Multilateral Operations	1 A 4 Other Sectors	
	e) Combustion in Industry	1 A 2 b,c,d,e	1 A 2 f Other	
	f) Waste Incineration Plants	Energy Related Activity Data not allocatable to sector 6 C 1	Emissions: 6 C 1 Waste Incineration Activity data: 1 A 5 Fuel Combustion-Other	
	i) Venting and Flaring	1 B 2 c	1 A 1 b Petroleum Refining	
	l) Solvent Use - Degreasing and Dry Cleaning	3 B Solvent Use - Degreasing and Dry Cleaning	3 D Solvent Use - Other	

TABLE 9 COMPLETENESS
(Sheet 1 of 2)

	o) Agricultural Soils - Sub Categories	4 D 1 to 4 D 4	4 D Agricultural Soils	
	r) Incineration of industrial waste and waste water sludge	6 C Waste Incineration - by waste type	6 C Waste Incineration - municipal solid waste	
HFCs				
HFCs	j) Consumption of HFCs - Potential Emissions By Sectors	2 F 1 to 2 F 8	2 F Consumption of Halocarbons and SF6	No detailed information about potential emissions of HFCs.
HFCs	k) Potential Emissions of HFCs - Import in Products	2 F(p) Import in Products	2 F(p) Import in Bulk	No detailed information about import of HFCs in bulk.
PFCs				
PFCs	j) Consumption of PFCs - Potential Emissions By Sectors	2 F 1 to 2 F 8	2 F Consumption of Halocarbons and SF6	
PFCs	k) Potential Emissions of PFCs - Import in Products	2 F(p) Import in Products	2 F(p) Import in Bulk	
SF_6				
	j) Consumption of SF6 - Potential Emissions By Sectors	2 F 1 to 2 F 8	2 F Consumption of Halocarbons and SF6	
	k) Potential Emissions of SF6 - Import in Products	2 F(p) Import in Products	2 F(p) Import in Bulk	

(1) Please, clearly indicate sources and sinks which are considered in the IPCC Guidelines but are not considered in the submitted inventory. Explain the reason for excluding these sources and sinks, in order to avoid arbitrary interpretations. An entry should be made for each source/sink category for which the indicator "NE" is entered in the sectoral tables.
(2) Indicate omitted source/sink following the IPCC source/sink category structure (e.g. sector: Waste, source category: Wastewater Handling).
(3) Please clearly indicate sources and sinks in the submitted inventory that are allocated to a sector other than that indicated by the IPCC Guidelines. Show the sector indicated in the IPCC Guidelines and the sector to which the source or sink is allocated in the submitted inventory. Explain the reason for reporting these sources and sinks in a different sector. An entry should be made for each source/sink for which the indicator "IE" is used in the sectoral tables.

TABLE 9 COMPLETENESS
(Sheet 2 of 2)

Additional GHG emissions reported[4]						
GHG	Source category	Emissions (Gg)	Estimated GWP value (100-year horizon)	Emissions CO_2 equivalent (Gg)	Reference to the data source of GWP value	Explanation

[4] Parties are encouraged to provide information on emissions of greenhouse gases whose GWP values have not yet been agreed upon by the COP. Please include such gases in this table if they are considered in the submitted inventory. Provide additional information on the estimation methods used.

TABLE 10 EMISSIONS TRENDS (CO_2)
(Sheet 1 of 5)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
1. Energy	**48 817.59**	**48 817.59**	**53 326.49**	**48 579.68**	**48 805.01**	**49 425.59**	**51 151.85**	**53 043.01**	**53 486.59**	**52 895.89**	**53 436.28**	**53 413.83**
A. Fuel Combustion (Sectoral Approach)	48 697.63	48 697.63	53 196.49	48 441.03	48 673.34	49 277.86	51 002.76	52 948.50	53 343.44	52 730.83	53 242.00	53 318.85
1. Energy Industries	14 395.48	14 395.48	15 537.41	12 045.10	11 320.42	11 657.27	13 125.32	13 995.87	14 356.69	13 487.74	12 917.73	12 136.95
2. Manufacturing Industries and Construction	8 449.69	8 449.69	7 871.38	8 017.21	7 883.13	7 722.51	8 546.34	9 788.26	10 053.06	10 689.86	9 997.46	10 606.93
3. Transport	11 944.01	11 944.01	13 396.24	13 377.46	13 699.78	14 601.51	13 790.84	13 785.07	14 185.12	15 154.81	15 995.76	16 937.20
4. Other Sectors	13 908.45	13 908.45	16 391.47	15 001.26	15 770.01	15 296.57	15 540.27	15 379.30	14 748.57	13 398.42	14 331.05	13 637.76
5. Other	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
B. Fugitive Emissions from Fuels	119.97	119.97	129.99	138.65	131.67	147.73	149.09	94.51	143.14	165.07	194.27	94.98
1. Solid Fuels	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Oil and Natural Gas	119.97	119.97	129.99	138.65	131.67	147.73	149.09	94.51	143.14	165.07	194.27	94.98
2. Industrial Processes	**12 918.68**	**12 918.68**	**12 370.96**	**11 296.52**	**11 457.70**	**12 092.92**	**12 356.99**	**11 847.27**	**12 998.92**	**12 062.56**	**12 104.41**	**12 186.59**
A. Mineral Products	3 974.56	3 974.56	3 837.99	3 899.58	3 728.86	3 863.85	3 232.09	3 229.23	3 370.08	3 109.53	3 108.15	3 055.83
B. Chemical Industry	423.84	423.84	433.63	394.85	428.03	406.05	488.64	484.09	475.03	520.59	492.46	492.46
C. Metal Production	8 461.04	8 461.04	8 040.82	6 948.63	7 254.29	7 771.03	8 585.41	8 084.35	9 107.32	8 384.63	8 456.00	8 590.51
D. Other Production	59.24	59.24	58.51	53.46	46.52	51.99	50.85	49.61	46.49	47.80	47.80	47.80
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
3. Solvent and Other Product Use	**522.65**	**522.65**	**436.44**	**381.45**	**360.87**	**361.41**	**380.64**	**379.09**	**405.46**	**395.64**	**395.64**	**395.64**
4. Agriculture	**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. Enteric Fermentation	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
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	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
F. Field Burning of Agricultural Residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
5. Land-Use Change and Forestry[(3)]	**-9 214.81**	**-9 214.81**	**-13 503.89**	**-8 656.47**	**-8 982.36**	**-7 861.58**	**-7 254.00**	**-5 385.22**	**-7 633.36**	**-7 633.36**	**-7 633.36**	**-7 633.36**
A. Changes in Forest and Other Woody Biomass Stocks	-9 214.81	-9 214.81	-13 503.89	-8 656.47	-8 982.36	-7 861.58	-7 254.00	-5 385.22	-7 633.36	-7 633.36	-7 633.36	-7 633.36
B. Forest and Grassland Conversion	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
D. CO_2 Emissions and Removals from Soil	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
6. Waste	**38.17**	**38.17**	**40.00**	**91.66**	**93.38**	**115.12**	**125.92**	**116.25**	**120.61**	**109.61**	**88.18**	**105.98**
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
B. Waste-water Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. Waste Incineration	38.17	38.17	40.00	91.66	93.38	115.12	125.92	116.25	120.61	109.61	88.18	105.98
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
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**
Total Emissions/Removals with LUCF[(4)]	**53 082.29**	**53 082.29**	**52 670.00**	**51 692.84**	**51 734.61**	**54 133.46**	**56 761.41**	**60 000.42**	**59 378.22**	**57 830.34**	**58 391.15**	**58 468.69**
Total Emissions without LUCF[(4)]	**62 297.10**	**62 297.10**	**66 173.89**	**60 349.31**	**60 716.97**	**61 995.04**	**64 015.41**	**65 385.63**	**67 011.58**	**65 463.70**	**66 024.51**	**66 102.04**
Memo Items:												
International Bunkers	**941.25**	**941.25**	**1 100.88**	**1 172.40**	**1 142.53**	**1 201.38**	**1 331.54**	**1 470.52**	**1 521.93**	**1 628.33**	**1 543.22**	**1 671.82**
Aviation	941.25	941.25	1 100.88	1 172.40	1 142.53	1 201.38	1 331.54	1 470.52	1 521.93	1 628.33	1 543.22	1 671.82
Marine	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**
CO_2 Emissions from Biomass	**13 334.68**	**13 334.68**	**12 656.61**	**12 703.08**	**12 910.12**	**13 339.21**	**14 614.46**	**14 804.30**	**14 423.89**	**13 829.90**	**13 884.17**	**13 048.11**

(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.

TABLE 10 EMISSIONS TRENDS (CH_4)
(Sheet 2 of 5)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year [1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Total Emissions	**538.01**	**538.01**	**527.54**	**514.93**	**508.82**	**500.52**	**489.93**	**481.82**	**470.07**	**459.15**	**454.16**	**447.70**
1. Energy	**25.07**	**25.07**	**23.24**	**21.03**	**22.57**	**21.64**	**23.19**	**22.76**	**20.05**	**19.66**	**19.16**	**17.93**
A. Fuel Combustion (Sectoral Approach)	20.55	20.55	18.47	16.32	17.63	16.56	17.68	16.90	14.38	13.85	13.24	12.21
1. Energy Industries	0.15	0.15	0.17	0.12	0.12	0.10	0.10	0.11	0.13	0.13	0.13	0.13
2. Manufacturing Industries and Construction	0.53	0.53	0.51	0.53	0.53	0.34	0.37	0.43	0.45	0.44	0.44	0.44
3. Transport	3.18	3.18	3.33	2.99	2.75	2.57	2.36	2.11	1.92	1.85	1.70	1.58
4. Other Sectors	16.69	16.69	14.46	12.68	14.24	13.55	14.86	14.24	11.88	11.43	10.97	10.06
5. Other	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
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
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
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
2. Industrial Processes	**0.14**	**0.14**	**0.14**	**0.14**	**0.15**	**0.15**	**0.16**	**0.16**	**0.18**	**0.20**	**0.14**	**0.14**
A. Mineral Products	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
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	0.10
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
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
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
3. Solvent and Other Product Use	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
4. Agriculture	**217.58**	**217.58**	**214.09**	**206.66**	**204.93**	**202.99**	**196.70**	**193.71**	**192.28**	**191.74**	**187.28**	**182.03**
A. Enteric Fermentation	154.42	154.42	151.25	144.33	141.71	140.56	135.17	132.70	131.21	130.65	127.93	123.65
B. Manure Management	27.47	27.47	27.07	26.49	27.31	26.92	26.43	25.87	25.89	26.27	24.90	24.00
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	35.48	35.48	35.56	35.63	35.71	35.30	34.89	34.93	34.97	34.60	34.24	34.17
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
G. Other	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**
A. Changes in Forest and Other Woody Biomass Stocks	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
C. Abandonment of Managed Lands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. CO_2 Emissions and Removals from Soil	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
6. Waste	**295.21**	**295.21**	**290.06**	**287.11**	**281.17**	**275.74**	**269.89**	**265.19**	**257.56**	**247.55**	**247.57**	**247.60**
A. Solid Waste Disposal on Land	258.97	258.97	253.67	250.51	244.44	238.94	233.05	228.34	220.68	210.66	210.66	210.66
B. Waste-water Handling	13.73	13.73	13.88	14.06	14.19	14.26	14.29	14.31	14.34	14.35	14.37	14.40
C. Waste Incineration	0.03	0.03	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07
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
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**
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**
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
Marine	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
CO_2 Emissions from Biomass												

TABLE 10 EMISSIONS TRENDS (N_2O)
(Sheet 3 of 5)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Total Emissions	**7.44**	**7.44**	**7.74**	**7.81**	**8.02**	**8.23**	**8.28**	**8.26**	**8.23**	**8.26**	**8.21**	**8.11**
1. Energy	**2.71**	**2.71**	**2.99**	**3.10**	**3.27**	**3.52**	**3.63**	**3.60**	**3.57**	**3.62**	**3.59**	**3.51**
A. Fuel Combustion (Sectoral Approach)	2.71	2.71	2.99	3.10	3.27	3.52	3.63	3.60	3.57	3.62	3.59	3.51
1. Energy Industries	0.15	0.15	0.17	0.13	0.12	0.13	0.15	0.14	0.13	0.16	0.16	0.15
2. Manufacturing Industries and Construction	0.46	0.46	0.47	0.48	0.46	0.54	0.55	0.57	0.59	0.56	0.54	0.53
3. Transport	0.99	0.99	1.24	1.40	1.56	1.74	1.78	1.76	1.74	1.83	1.82	1.80
4. Other Sectors	1.12	1.12	1.12	1.09	1.13	1.11	1.15	1.13	1.11	1.07	1.07	1.03
5. Other	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
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
1. Solid Fuels	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Oil and Natural Gas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Industrial Processes	**0.60**	**0.60**	**0.60**	**0.55**	**0.58**	**0.57**	**0.55**	**0.56**	**0.55**	**0.57**	**0.58**	**0.58**
A. Mineral Products	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Chemical Industry	0.60	0.60	0.60	0.55	0.58	0.57	0.55	0.56	0.55	0.57	0.58	0.58
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
D. Other Production	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
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
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**
4. Agriculture	**3.31**	**3.31**	**3.32**	**3.33**	**3.34**	**3.30**	**3.27**	**3.27**	**3.27**	**3.24**	**3.21**	**3.19**
A. Enteric Fermentation	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
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	3.30	3.30	3.31	3.32	3.33	3.30	3.26	3.26	3.26	3.23	3.20	3.18
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
G. Other	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**
A. Changes in Forest and Other Woody Biomass Stocks	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
C. Abandonment of Managed Lands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. CO_2 Emissions and Removals from Soil	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
6. Waste	**0.07**	**0.07**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.09**	**0.08**	**0.09**
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
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
C. Waste Incineration	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
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
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**
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**
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
Marine	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**
CO_2 Emissions from Biomass												

TABLE 10 EMISSION TRENDS (HFCs, PFCs and SF_6)
(Sheet 4 of 5)

Austria
2000
submission 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Emissions of HFCs[5] - CO_2 equivalent (Gg)	**546.07**	**3.69**	**5.85**	**8.54**	**12.15**	**16.89**	**546.07**	**624.83**	**718.02**	**815.61**	**870.46**	**######**
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
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
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
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
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
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
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
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
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
HFC-143a	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0025	0.0056	0.0081	0.0095	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
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
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
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**
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
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
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
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
c-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
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
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
Emissions of SF_6[5] - CO_2 equivalent (Gg)	**1 174.74**	**517.74**	**682.90**	**725.40**	**822.60**	**1 032.81**	**1 174.74**	**1 246.13**	**1 148.06**	**954.90**	**729.90**	**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

Chemical	GWP
HFCs	
HFC-23	11700
HFC-32	650
HFC-41	150
HFC-43-10mee	1300
HFC-125	2800
HFC-134	1000
HFC-134a	1300
HFC-152a	140
HFC-143	300
HFC-143a	3800
HFC-227ea	2900
HFC-236fa	6300
HFC-245ca	560
PFCs	
CF_4	6500
C_2F_6	9200
C_3F_8	7000
C_4F_{10}	7000
c-C_4F_8	8700
C_5F_{12}	7500
C_6F_{14}	7400
SF_6	23900

(5) Enter information on the actual emissions. Where estimates are only available for the potential emissions, specify this in a comment to the corresponding cell. Only in this row the emissions are expressed as CO_2 equivalent emissions in order to facilitate data flow among spreadsheets.

TABLE 10 EMISSION TRENDS (SUMMARY)
(Sheet 5 of 5)

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)											
Net CO_2 emissions/removals	53 082.29	53 082.29	52 670.00	51 692.84	51 734.61	54 133.46	56 761.41	60 000.42	59 378.22	57 830.34	58 391.15	58 468.69
CO_2 emissions (without LUCF)[6]	62 297.10	62 297.10	66 173.89	60 349.31	60 716.97	61 995.04	64 015.41	65 385.63	67 011.58	65 463.70	66 024.51	66 102.04
CH_4	11 298.20	11 298.20	11 078.31	10 813.53	10 685.29	10 511.00	10 288.62	10 118.22	9 871.54	9 642.13	9 537.29	9 401.74
N_2O	2 307.66	2 307.66	2 398.87	2 419.85	2 485.05	2 550.03	2 565.83	2 560.93	2 551.86	2 561.18	2 543.89	2 515.09
HFCs	546.07	3.69	5.85	8.54	12.15	16.89	546.07	624.83	718.02	815.61	870.46	1 033.25
PFCs	15.62	963.17	974.33	576.19	48.13	53.63	15.62	14.79	18.26	20.85	25.32	25.16
SF_6	1 174.74	517.74	682.90	725.40	822.60	1 032.81	1 174.74	1 246.13	1 148.06	954.90	729.90	676.95
Total (with net CO_2 emissions/removals)	**68 424.59**	**68 172.75**	**67 810.26**	**66 236.34**	**65 787.83**	**68 297.81**	**71 352.30**	**74 565.32**	**73 685.98**	**71 825.02**	**72 098.01**	**72 120.88**
Total (without CO_2 from LUCF)[6]	**77 639.41**	**77 387.56**	**81 314.15**	**74 892.81**	**74 770.19**	**76 159.38**	**78 606.29**	**79 950.53**	**81 319.33**	**79 458.38**	**79 731.37**	**79 754.24**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)											
1. Energy	50 184.17	50 184.17	54 740.72	49 981.72	50 292.00	50 971.98	52 763.07	54 635.41	55 014.88	54 429.61	54 950.37	54 877.36
2. Industrial Processes	14 843.74	14 591.89	14 224.49	12 779.39	12 523.41	13 375.34	14 266.33	13 910.01	15 058.41	14 035.01	13 912.71	14 104.56
3. Solvent and Other Product Use	755.15	755.15	668.94	613.95	593.37	593.91	613.14	611.59	637.96	628.14	628.14	628.14
4. Agriculture	5 595.59	5 595.59	5 525.00	5 371.77	5 338.35	5 286.91	5 144.24	5 081.98	5 052.44	5 030.72	4 926.75	4 812.24
5. Land-Use Change and Forestry[7]	-9 214.81	-9 214.81	-13 503.89	-8 656.47	-8 982.36	-7 861.58	-7 254.00	-5 385.22	-7 633.36	-7 633.36	-7 633.36	-7 633.36
6. Waste	6 260.76	6 260.76	6 154.99	6 145.98	6 023.06	5 931.24	5 819.51	5 711.54	5 555.64	5 334.90	5 313.40	5 331.94
7. 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

[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.
[7] Net emissions.

TABLE 11 CHECK LIST OF REPORTED INVENTORY INFORMATION[1]

Party: Austria **Year:** 2000

Contact info:						
Focal point for national GHG inventories:	Mr. Manfred Ritter					
Address:	Spittelauer Lände 5, A-1090 Vienna, Austria					
Telephone:	++43+1-31304-5582	Fax:	++43+1-31304-5400	E-mail:	ritterm@ubavie.gv.at	
Main institution preparing the inventory:	Federal Environment Agency Ltd.					

General info:			
Date of submission:			
Base years:	1990	PFCs, HFCs, SF_6:	1995
Year covered in the submission:	2000		
Gases covered:	CO2, CH4, N2O, PFCs, HFCs, SF6, NOX, CO, NMVOC, SO2		
Omissions in geographic coverage:			

Tables:	Energy	Ind. Processes	Solvent Use	LUCF	Agriculture	Waste
Sectoral report tables:	☑	☑	☑	☑	☑	☑
Sectoral background data tables:	☑	☑	☑	☑	☑	☑
Summary 1 (IPCC Summary tables):	IPCC Table 7A:		☑	IPCC Table 7B:		☑
Summary 2 (CO_2 equivalent emissions):			☑			
Summary 3 (Methods/Emission factors):			☑			
Uncertainty:	IPCC Table 8A:		☐	National information:		☐
Recalculation tables:			☑			
Completeness table:			☑			
Trend table:			☑			

CO_2	Worksheet 1-1	Percentage of difference	Explanation of differences
Comparison of CO_2 from fuel combustion:	☑	7.45	☑

Recalculation:	Energy	Ind.Processes	Solvent Use	LUCF	Agriculture	Waste
CO_2	☐	☐	☐	☐	☐	☐
CH_4	☐	☐	☐	☐	☐	☐
N_2O	☐	☐	☐	☐	☐	☐
HFCs, PFCs, SF_6		☐				
Explanations:	☐	☐	☐	☐	☐	☐
Recalculation tables for all recalculated years			☐			
Full CRF for the recalculated base year			☐			

HFCs, PFCs, SF_6:	HFCs		PFCs		SF_6	
Disaggregation by species:	☑		☑			
Production of Halocarbons/SF_6:	☑		☑		☑	
Consumption of Halocarbons/SF_6:	Actual	Potential	Actual	Potential	Actual	Potential
	☑	☑	☑	☑	☑	☑
Potential/Actual emission ratio:	4.93		0.00		13.72	

Reference to National Inventory Report and/or national inventory web site:	Umweltbundesamt, OLI 2001 http://www.ubavie.gv.at

CRF - Common Reporting Format.
LUCF - Land-Use Change and Forestry.

[1] For each omission, give an explanation for the reasons by inserting a comment to the corresponding cell.