

Cyprus

National Greenhouse Gases Inventory Report 1990 – 2012

2014 Submission

under the United Nations Framework Convention
on Climate Change

Department of Environment
Ministry of Agriculture,
Natural Resources and Environment

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Title of report	Cyprus National Greenhouse Gas Inventory Report 1990 – 2012
Contact names	Nicoletta Kythreotou Theodoulos Mesimeris
Organisation	Department of Environment Ministry of Agriculture, Natural Resources and Environment
Address	Department of Environment, 1498 Nicosia, Cyprus
Fax	(+357) 22 774 945
Telephone	(+357) 22 408 900
E-mail	nkythreotou@environment.moa.gov.cy tmesimeris@environment.moa.gov.cy
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Preface

This Inventory Report has been prepared, written and compiled by Ms Nicoletta Kythreotou of the Department of the Environment of the Ministry of Agriculture, Natural Resources and Environment. Contributions by other authors are acknowledged accordingly in the text.

Not being an Annex B party and not operating a Kyoto registry, Cyprus does not generate trade or surrender Kyoto units thus it is not considered relevant to compile SEF tables.

Moreover, this inventory does not include information on activities under Article 3, paragraph 3 (Afforestation, Reforestation, Deforestation) and the elected activity under Article 3, paragraph 4 (Forest Management), on accounting of Kyoto units, on changes in the national system and the national registry and information on the minimisation of adverse impacts of climate change in accordance with Articles 3.14.

Executive Summary

Background information

The first national inventory report for Cyprus was prepared in 2001 and covered the period 1990-1998. The inventory was prepared in the framework of the project “Strategic Plan for the Limitation of Greenhouse Gas Emissions in Cyprus”.

The first Inventory report submitted by Cyprus to the European Commission for the purposes of Decision no. 280/2004/EC, was in 2006 for the period 1990-2004. Cyprus at the time was a non-Annex I party and therefore had no obligation to submit annual inventories to the UNFCCC secretariat.

The first submission of a national inventory report to the UNFCCC secretariat, as an Annex I party was made in April 2013.

Institutional, legal and procedural arrangements

The Ministry of Agriculture, Natural Resources and Environment (MANRE) is the governmental body responsible for the co-ordination of all involved ministries, as well as any relevant public or private organisations, in relation to the implementation of the provisions of the national and European legislation associated with climate change. In this context, the MANRE has the responsibility for the planning, preparation, management, compilation of the national GHG inventory report (Contact person: Nicoletta Kythreotou, Address: Department of Environment, 1498 Nicosia, Cyprus, tel.: +357 22 408947, e-mail: nkythreotou@environment.moa.gov.cy). The organisational structure of the National Inventory System is presented in Figure 1.1. No legal framework is available that defines the roles, responsibilities and the co-operation between the MANRE and contact points of the involved ministries and agencies.

GHG inventory preparation

The compilation of the inventory starts with the collection of the ETS data in June before the submission deadline (year X-1). When the first comments on the inventory are received by the European Commission and the UNFCCC for the submission of the previous year (approximately June), the necessary changes are made to the calculation sheets resulting to the CRFreporter data and notes are taken for the National Inventory Report, by the inventory compiler. Other data is made available from other governmental departments from November before the submission deadline (year X-1). In December the final National inventory report for the air pollutants under Directive 2001/81/EC prepared by the Department of Labour Inspection of the Ministry of Labour and Social Insurance (DLI), is available and communicated to the inventory compiler.

Data reliability checks: data for some activities is available from several sources. In such cases, the data is compared between all sources. In cases where there are differences, these are discussed with the data sets compilers. In several cases the data providers agree that there is a mistake and they correct appropriately the data set.

Quality control/ quality assurance: when the calculations have been completed the excel files used for the data collection and the calculations are sent to Ms Niki Papaki (Environment Technician, tel. +357 22408946, email npapaki@environment.moa.gov.cy) and Mr Giorgos Ioannou (Statistics Officer, tel. +357 22602171, email geioannou@cystat.mof.gov.cy) to check the data collected and the calculations. In case any mistakes are identified, these are corrected accordingly by the inventory compiler.

Compilation of inventory report: the compilation of the report starts when the emissions are finalised and the CRF tables are available. Once the final draft is available, the report is sent to Ms Niki Papaki (Environment Technician, tel. +357 22408946, email npapaki@environment.moa.gov.cy), Mr Giorgos Ioannou (Statistics Officer, tel. +357 22602171,

email geioannou@cystat.mof.gov.cy) and all the data providers for comments. The comments are taken into consideration for the finalisation of the report.

Approval and submission of report: once the report is finalised, it is sent to Dr Theodoulos Mesimeris, Head of climate Action Unit and the Director of the Department of Environment Mr Costas Hadjipanayiotou (chadjipanayiotou@environment.moa.gov.cy, tel. no.+357 22 408900) for the final approval. The inventory accompanied by the inventory report is submitted to the European Commission annually by 15 January.

Inventory preparation team

The calculations, report preparation and overall management of the compilation of the inventory (inventory compiler) is the responsibility of Ms. Nicoletta Kythreotou, Environment Officer at the Department of Environment since 2006. Ms. Kythreotou holds a BSc in Environmental Science and an MSc in Environmental Engineering. Nicoletta has been preparing the Cypriot NIR for the purpose of EU Decision 280/2004/EC since 2006.

The final assessment of the national inventory is performed by Dr Theodoulos Mesimeris, who is a Senior Environment Officer and the head of Climate Action Unit at the Department of Environment. Dr Mesimeris has been an officer at the Department of Environment since 2002 and has been dealing with climate change since then. The academic background of Dr Mesimeris is a MEng in Chemical Engineering, MSc in Environmental Management and PhD in Chemical Engineering.

Dr Mesimeris and Ms. Kythreotou are the contact points of the UNFCCC and the DG Climate Action of the European Commission.

Ms Niki Papaki (BSc Mathematics) is responsible for data collection. A new addition to the team is Ms. Melina Menelaou, who is working for Land Use issues.

Data collection, processing and storage

Data from all the involved parties come in MS Excel spread-sheets. The main database maintained by the inventory compiler is also in the form of MS Excel spread-sheets. The collected data is transferred to the main database of the inventory compiler. No special software is used or applied for processing or storage of the data used in the inventory.

The inventory compiler has one MS Excel spread-sheet containing all the data collected and one MS Excel spread-sheet containing the calculations performed for the estimation of the GHG emissions.

Brief general description of methodologies and data sources used

Emission factors

The estimation of GHG emissions / removals per source / sink category is based on the methods described in the revised 1996 IPCC Guidelines and the 2000 IPCC Good Practice Guidance. The emission factors used derive from the abovementioned methodological sources and special attention was paid in selecting the emission factors that better describe practices in Cyprus. Furthermore, emission factors were obtained from plant specific information contained in EU ETS reports. For estimation of the emissions of the sector Solvents, the implied emission factor per capita from Greece was used, since the IPCC guidelines do not propose a method. Details on the methods applied for the calculation of emissions / removals are given in the chapters that follow.

The key categories analysis (see section 1.5) constitutes the basic tool for methodological choice and for the prioritisation of the necessary improvements. In addition, the results of the various review processes (at national and EU level) represent key input information for the identification of possible improvements. It should be mentioned however, that data availability as well as availability of resources (both human and financial) also have to be considered.

- Data availability could become a significant restrictive parameter when selecting an estimation methodology. The accuracy and the consistency of the emissions estimated depend on the availability of the data needed for the correct application of the selected methodology.
- Availability of resources needs also to be considered as the searching for and the collection of the necessary data in order to apply a detailed methodology for a source category should not affect the completeness and the on-time preparation of an inventory submission.

Activity data

Data collection, processing and check constitute the activity with the longest duration in the annual inventory cycle. The duration of this activity is related to the amount of the necessary data and the number of the entities involved. The on-time and successful completion of this activity has a major effect on the timeliness preparation and submission of the inventory as well as on its accuracy, completeness and consistency.

Data from international organizations and databases are supplementary to the data collected from the above data providers. It should be noted that information and data collected (through questionnaires developed according to the guidelines described in the Commission Decision 2004/156/EC) in the framework of the formulation of the National Allocation Plan (NAP) for the period 2005-2007, according to the Directive 2003/87/EC (and its transposition to the national Law, 110(I)/2011) along with the data from the verified reports from installations under the EU ETS for years 2005-2012 constituted significant source of information and an additional quality control check.

General assessment of the completeness

In the present inventory report, estimates of GHG emissions in Cyprus for the years 1990-2012 are presented. Emissions estimates included in the CRF tables submitted and discussed in the present report, cover the areas of the Republic of Cyprus under the effective control of the Government of the Republic of Cyprus. All major sources are reported including emissions estimates for indirect greenhouse gases and SO₂.

Completeness in the present inventory submission will be further discussed in the relevant chapters. Nevertheless, the main deficiencies are the following:

LULUCF: most important deficiency. Emissions for the LULUCF sector have never been fully reported. Since June 2011 there is a new addition to the inventory team, whose responsibility is to prepare the LULUCF GHG inventory and the accompanying report. Available data has been collected for land uses and land use changes in Cyprus. Further work is however necessary to complete the time series and then to setup the methodologies to estimate the GHG emissions. Extensive work is going to take place during 2014, with support from the JRC. The goal is by the 2015 submission to have a full LULUCF GHG inventory in line with the 2006 IPCC guidelines and the IPCC "Good Practice Guidance for Land Use, Land Use Change and Forestry".

Navigation (1A3d): no data available on consumption of fuel for domestic navigation. Work is in progress to obtain/estimate the data.

Transport of oil (1B2A3), Distribution of oil products (1B2A5) and venting of oil (1B2C1.1): no method is available to estimate the emissions. However, the work is in progress to determine a country specific methodology.

Use of notation keys: there are still some empty cells in the xml. Work is in progress to fill all the cells and use the correct notation keys.

Further details on deficiencies are provided in the appropriate chapter. A national inventory improvement plan is available and implemented.

Description and interpretation of emission trends for aggregated greenhouse gas emissions

The GHG emissions in 2012 were 9240 Gg CO₂ eq. including LULUCF and 9259 Gg CO₂ eq. excluding LULUCF. Between 1990 and 2012, the total national emissions excluding LULUCF increased by 52%.

Carbon dioxide emissions accounted for 76% of total GHG emissions in 2012 without LULUCF and increased by 53% from 1990. Methane emissions accounted for 14% of total GHG emissions in 2012 without LULUCF and increased by 43% since 1990, while nitrous oxide emissions accounted for 6.6% of the total GHG emissions in 2012 without LULUCF and increased by 11% since 1990. Finally, F-gases and SF₆ emissions accounted for 2.8% of total GHG emissions in 2012.

The emissions by gas and sector are presented in Table E1, while the trend of the emissions is also presented in Figure 2.1. The summary tables for each year of the inventory by gas and source as these were generated by CRFReporter v. 6.7.3 are presented in Annex III.

Table E1. Total GHG emissions in Cyprus with and without LULUCF for the period 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ emissions including net CO ₂ from LULUCF	4,485.30	5,625.21	6,883.30	7,774.85	7,754.81	7,473.78	7,038.34
CO ₂ emissions excluding net CO ₂ from LULUCF	4,626.88	5,776.69	7,037.97	7,857.89	7,831.82	7,566.19	7,082.83
CH ₄ emissions including CH ₄ from LULUCF	910.18	1,119.56	1,186.39	1,277.09	1,296.73	1,243.07	1,306.31
CH ₄ emissions excluding CH ₄ from LULUCF	909.91	1,119.30	1,185.95	1,275.12	1,294.73	1,241.37	1,303.68
N ₂ O emissions including N ₂ O from LULUCF	553.40	627.53	655.27	648.76	629.90	630.15	634.88
N ₂ O emissions excluding N ₂ O from LULUCF	551.07	625.23	651.43	631.85	612.63	615.47	612.27
HFCs	NA,NO	2.30	28.69	121.19	249.78	259.12	260.44
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF ₆	NA,NO	NA,NO	0.01	0.07	0.08	0.09	0.09
Total (including LULUCF)	5,948.88	7,374.61	8,753.66	9,821.97	9,931.31	9,606.21	9,240.06
Total (excluding LULUCF)	6,087.85	7,523.53	8,904.04	9,886.13	9,989.04	9,682.23	9,259.30

1. Energy	3,878.69	4,954.29	6,212.36	6,979.26	7,269.28	7,022.30	6,555.77
2. Industrial Processes	759.44	841.28	875.52	1,016.06	835.01	831.40	814.20
3. Solvent and Other Product Use	51.96	55.94	59.80	71.15	77.17	73.36	73.29
4. Agriculture	732.47	842.15	860.94	844.44	824.04	825.29	815.50
5. LULUCF	-138.97	-148.92	-150.38	-64.17	-57.73	-76.02	-19.24
6. Waste	665.30	829.86	895.42	975.23	983.55	929.88	1,000.55
Total (including LULUCF)	5,948.88	7,374.61	8,753.66	9,821.97	9,931.31	9,606.21	9,240.06
Total (excluding LULUCF)	6,087.85	7,523.53	8,904.04	9,886.13	9,989.04	9,682.23	9,259.30

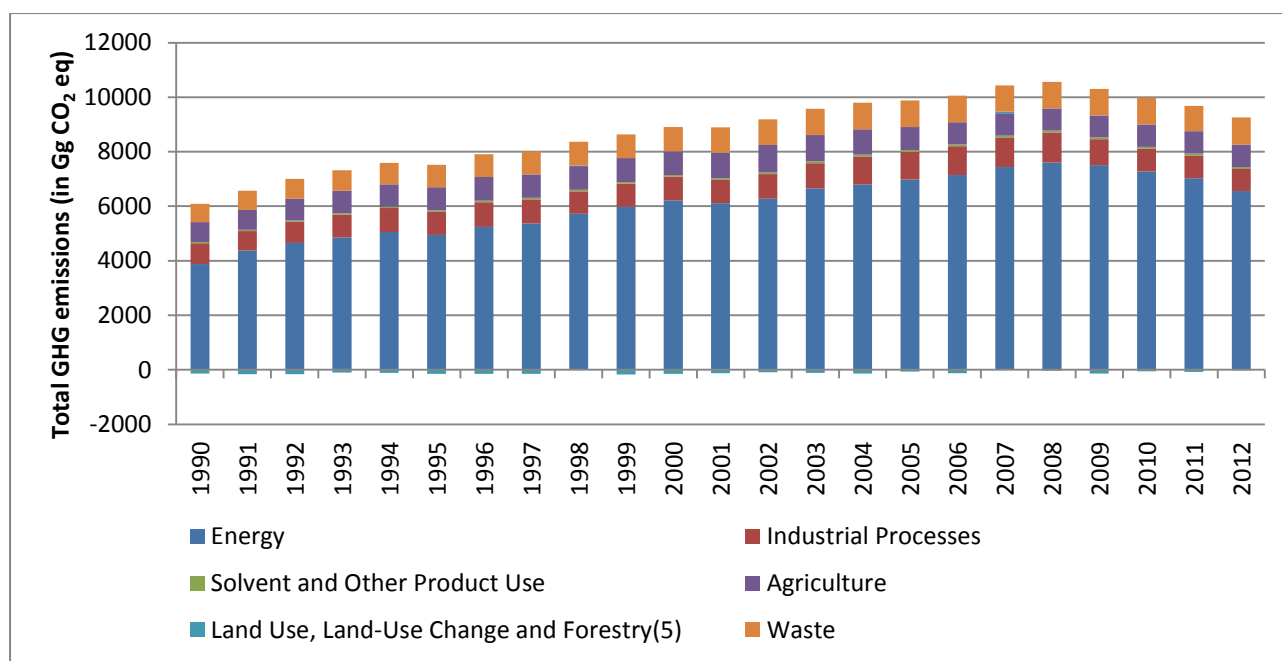


Figure E1. Total national GHG emissions by sector 1990-2012 (including LULUCF)

Energy

The energy sector in Cyprus relies on fossil fuel combustion for meeting the bulk of energy requirements. Final consumption in 2012 amounted to approximately 89 PJ compared to 95 PJ in 2011 (6.6% decrease). 99.99% of the consumption in 2012 was from liquid fuels. In previous years a small percentage also originated from solid fuels. In 2012 only 1 kt lignite was consumed, since the larger consumer (cement production) did not use any solid fuel for the production of energy. In comparison to 1990, total fuel consumption in 2012 including biomass increased by 54%. Natural gas is not available in Cyprus.

After robust growth rates in the 1980s (average annual growth was 6.1%), economic performance in the 1990s was mixed: real GDP growth was 9.7% in 1992, 1.7% in 1993, 6.0% in 1994, 6.0% in 1995, 1.9% in 1996 and 2.3% in 1997. This pattern underlined the economy's vulnerability to swings in tourist arrivals (i.e. to economic and political conditions in Cyprus, Western Europe, and the Middle East) and the need to diversify the economy. Declining competitiveness in tourism and especially in manufacturing are acting as a drag on growth until structural changes are in effect. This is greatly affecting the energy sector.

The emissions from the energy sector in Cyprus increased by 69% during the period 1990-2012. The greatest increase in emissions was between 1990 and 2008 (96%), the emission reached their peak (7601 Gg CO₂ eq.). All the emissions in 2012 are from fuel combustion. The contribution of the emissions from the energy sector to the total without LULUCF in 2012 was 70.8% compared to 63.7% in 1990. The contribution of the main energy sources of emissions to the total energy emissions in 2012 is presented in Figure E2.

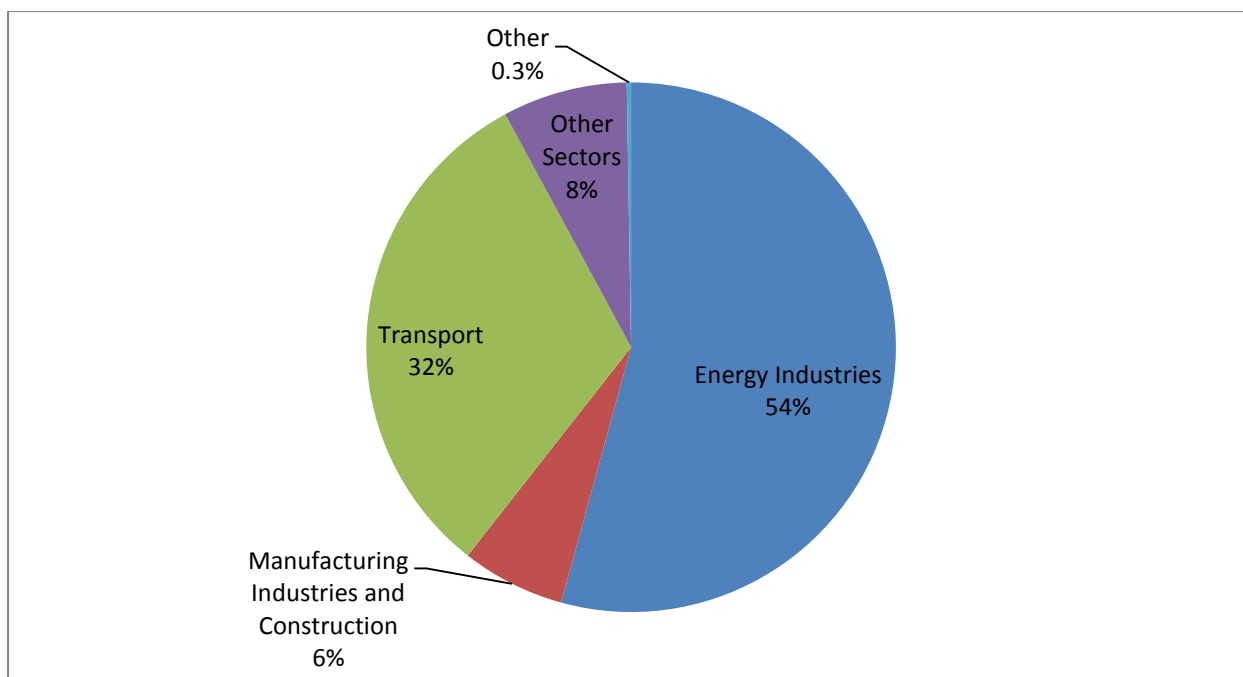


Figure E2. Contribution of the main energy sources of emissions to the total energy emissions in 2012

Industrial processes

In 2012, GHG emissions from Industrial processes accounted for 8.8% of total emissions excluding LULUCF compared to 12.5% in 1990. The emissions have increased by 7% compared to 1990. Emissions from Lime production (2A2) have been recalculated due to revised activity data, while emissions from limestone and dolomite use (2A3) are reported for the first time. Revisions also took place for the estimation of emissions from consumption of f-gases. For this submission it was also decided to use the IPCC 1996 guidelines and GPG to estimate the emissions from cement production, regardless that installation specific data is available from the annual verified reports submitted by the installations included in the ETS, to maintain consistency in the method used for the whole period. 68% of the industrial processes emissions is from mineral production and the remaining 32% from consumption of Halocarbons and SF6.

Solvents and other products use

According to the Revised IPCC 1996 guidelines, “no methods for the calculation of greenhouse gases from solvent and other product use are included in the phase I version of the workbook”. Therefore an alternative country specific methodology is used to estimate the emissions from this sector. GHG emissions from solvent and other product use in 2012 were 73.29 Gg which corresponds to 0.8% of the total GHG emissions of Cyprus, without LULUCF.

Agriculture

Emissions from Agriculture accounted for 8.8% of total emissions in 2012 (without LULUCF), and increased by 11.3% compared to 1990 levels. Agriculture in 1990 contributed 12% to the total emissions of the country without LULUCF. The peak of Agriculture emissions was in 2002 when an increase of 26% compared to 1990 was observed. Since 2002 a reduction in emissions was observed, due to the reduction of N₂O emissions from agricultural soils, because of the reduction in the use of synthetic nitrogen fertilisers. The reduction of the use of fertilisers was caused by the drought that was taking place during the same period that had an extreme in 2008. Further reduction was caused by the recent changes in manure management. Agriculture is responsible for methane and nitrous oxide emissions. In 2012 agriculture has contributed 23.6% to the total methane emissions and 82.8% to the total nitrous oxide emissions. The contribution of the main agricultural sources of emissions to the total agriculture emissions in 2012 is presented in Figure E3.

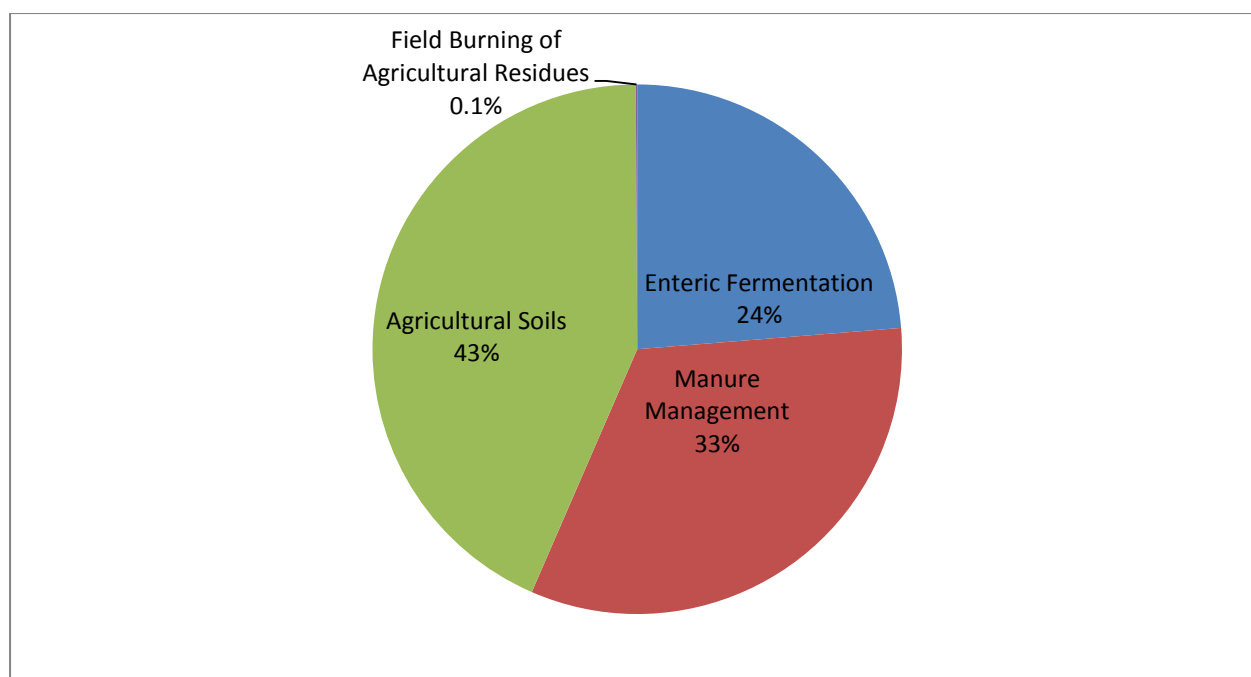


Figure E3. Contribution of the main agricultural sources of emissions to the total agriculture emissions in 2012

Land use, land use change and forestry

LULUCF is the most incomplete sector of the national GHG inventory of Cyprus. The system for the collection of data has not yet completed to collect the necessary activity data for the complete reporting of emissions. Therefore, the only emissions reported for LULUCF by Cyprus are the removals from Forest land remaining forest land (source 5A1) including biomass burning from wildfires (5A1, 5(V)) and emissions from Harvest wood products (under 5G). Some recalculations have taken place due to new data on area of forests and wildfires. The emissions from LULUCF changed from -139 Gg CO₂ eq. to -20 Gg CO₂ in 2012. The reduction in absorption of CO₂ during the recent years has been caused by the increase in wildfires and the area burnt.

Waste

Emissions from the Waste Sector in 2012 contributed 10.8% of the total emissions without LULUCF and increased by 50% since 1990. In 2012, 93.6% of the emissions is from solid waste disposal on land and the remaining 6.4% from wastewater handling.

74.8% of the total methane emissions and 3.8% of the nitrous oxide emissions of the country are from the sector of waste. The emissions from waste have changed considerably between 1990 and 2012 due to changes that are taking place in the waste and wastewater management practices of the country. The amount of solid waste disposed to shallow unmanaged disposal sites decreased from 33% in 1990 to 0% in 2012, therefore all the emissions from solid waste disposal on land is from managed disposal sites. Recycling and composting have been reducing the amount of waste disposal on land since 2010. The emissions from industrial wastewater have increased since there is an increase in the amount of waste treated by anaerobic digestion. Additionally, approximately 78% of the population was served by a sewer and tertiary aerobic treatment systems in 2012. Since the amount of wastewater collected in septic tanks has reduced from 65% in 1990 to 16% in 2012.

Chapter 1: Introduction

1.1. Background information on greenhouse gas inventories, climate change

Naturally occurring greenhouse gases (GHG) include water vapour, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and ozone (O₃). In the last few years, a new category of greenhouse gases has emerged that includes hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF₆). These gases are man-made and are mainly used in a number of industrial activities in replacement of CFCs. Other naturally occurring gases, which do not contribute directly to the greenhouse effect, are carbon monoxide (CO), oxides of nitrogen (NO_x), non-methane volatile organic compounds (NMVOC) and sulphur dioxide (SO₂).

1.1.1. Background information on climate change

International framework

United Nations Framework Convention on Climate Change¹

In response to the emerging evidence that climate change could have a major global impact, the United Nations Framework Convention on Climate Change (henceforth the Convention) was adopted on 9 May 1992 and was opened for signature in Rio de Janeiro in June 1992.

The ultimate objective of the Convention is the stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Convention recognises that the developed countries should take the lead in combating climate change and calls these countries to:

- Adopt policies and measures to mitigate climate change.
- Return, individually or jointly, to 1990 levels of carbon dioxide and other greenhouse gas by the year 2000
- Provide technology transfer and financial resources to help developing countries so as to confront climate change impacts and to develop, ensuring at the same time the environmental protection through the restraint of GHG emissions.

Kyoto Protocol²

Recognising early the need for an effective instrument to provide confidence in addressing the climate change challenge, the Parties at the third meeting of the Conference of the Parties (COP) to the Convention, held in Kyoto (1-11 December 1997), finalised negotiations related to the establishment of such a legal instrument, the Kyoto Protocol on Climate Change (KP). KP provides a foundation upon which future action can be intensified. It establishes, for the first time, legally binding targets for the reduction of greenhouse gas emissions and it also confirms the capacity of the international community to cooperate in action to deal with a major global environmental problem.

KP calls for legally binding commitments of the developed countries to reduce, individually or jointly, emissions of 6 greenhouse gases (CO₂, CH₄, N₂O, HFC, PFC and SF₆) by more than 5% in the period 2008 to 2012, below their 1990 level. The EU and its Member States at the time agreed to an 8% reduction. For the achievement of these targets, the Protocol provides for the use of the following:

- Adoption of national policies and measures,
- Establishment of an emissions trading regime,

¹ More information available at https://unfccc.int/essential_background/convention/items/6036.php

² More information available at https://unfccc.int/essential_background/kyoto_protocol/items/6034.php

- Establishment of the joint implementation mechanism,
- Establishment of a clean development mechanism and
- Protection and promotion of sinks to enhance CO₂ removals.

Detailed rules for the implementation of the Protocol were set out at the 7th Conference of the Parties (in Marrakesh) and are described in the Marrakesh Accords adopted in 2001. The Protocol entered into force on 16 February 2005, after its ratification from 141 Parties including developed countries with a contribution of more than 55% to global CO₂ emissions in 1990.

The Doha Amendment³

At the eighth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol held in Doha, Qatar, in December 2012, parties to the Kyoto Protocol adopted an amendment to the Kyoto Protocol by decision 1/CMP.8 in accordance with Articles 20 and 21 of the Kyoto Protocol.

Pursuant to Article 21, paragraph 7 and Article 20, paragraph 4, the amendment is subject to acceptance by Parties to the Kyoto Protocol. In accordance with Article 20, paragraph 4, the amendment will enter into force for those Parties having accepted it on the ninetieth day after the date of receipt by the Depositary of an instrument of acceptance by at least three fourths of the Parties to the Kyoto Protocol. A total of 144 instruments of acceptance are required for the entry into force of the amendment.

The Doha Amendment and the KP Decision set out the rules related to the second commitment period of the Kyoto Protocol (CP2). The key aspects of CP2 are as follows:

- CP2 will be eight years long, running from 1 January 2013 until 31 December 2020;
- Parties taking on commitments in CP2 (CP2 Parties) are required to reduce their aggregate emissions by 18% below 1990 levels in CP2. The commitments of individual Parties range from a 24% reduction (in the case of Ukraine) to a 0.5% reduction (in the case of Australia). The European Union, as a whole, is required to reduce its emissions by 20%;
- CP2 Parties are required to review their commitments by the end of 2014 with a view to increasing the level of their mitigation ambition;
- Notwithstanding the commitments set out in Annex B to the Kyoto Protocol (as amended), each CP2 Party's commitment in CP2 must be at least as ambitious as its actual annual average emissions between 2008 and 2010;
- CP2 Parties may carry over surplus CP1 AAUs into CP2 without limit but may only use or acquire such AAUs in limited circumstances;
- Access to all of the Kyoto Protocol's market mechanisms remain uninterrupted for CP2 Parties; and
- KP Parties agreed to the implementation of the Doha Amendment pending its formal entry into force, thus ensuring the Kyoto Protocol's operational continuity.

Climate change and Cyprus

The Republic of Cyprus ratified the UNFCCC in 1997 with Law No. 19(III) / 1997 as a non-Annex I party. The Kyoto Protocol was ratified by the Republic of Cyprus in 2003 with Law No. 29(III) / 2003. According to decision 10/CP.17 of COP17, as of 9 January 2013, the status of Cyprus changed from non-Annex I to Annex I party to the UNFCCC. As part of the EU, Cyprus has taken up commitments for the CP2 of the KP.

1.1.2. Background information on greenhouse gas inventories

International framework

Annual inventories of greenhouse and other gases emissions form an essential element of each national environmental policy-making process. They can be used to derive information on emissions trends, with reference to a pre-selected

³ More information available at https://unfccc.int/kyoto_protocol/doha_amendment/items/7362.php

base year, and can assist in monitoring the progress of existing abatement measures for the reduction of greenhouse gases emissions and the fulfilment of the KP target.

According to Article 4 of the Convention, Annex I Parties have the obligation to submit national inventories of GHG emissions and removals. At COP2, the annual submission of inventories was decided (Decision 9 / CP.2), while the use of the "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories"⁴ (henceforth IPCC Guidelines) was adopted with Decision 2/CP.3. In order to enhance the transparency of the GHG inventories submitted and improve comparability across sectors and different countries, the use of Common Reporting Format (CRF) tables for the submission of the emissions / removals estimates per source/ sink category was adopted at COP5 (Decision 3/CP.5).

At the 12th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA), the use of the IPCC "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories"⁵ (henceforth IPCC Good Practice Guidance) for inventories due in 2003 and beyond was decided. The IPCC Good Practice Guidance is considered as an elaboration of the IPCC Guidelines.

New reporting guidelines, together with a structure of the National Inventory Report (NIR) were adopted at COP8 (Decision 18/CP.8) for use in reporting annual inventories due in 2004 and beyond. Overall annual national inventories submissions include the submission of both the Common Reporting Format tables and the National Inventory Report by the 15th of April.

At COP9 the use of the IPCC "Good Practice Guidance for Land Use, Land Use Change and Forestry"⁶ (henceforth LULUCF Good Practice Guidance) for inventories due in 2005 and beyond was adopted (Decision 13/CP.9). Moreover, new Common Reporting Format tables for LULUCF, to be used for a trial period covering inventory submissions due in 2005, were adopted with the same decision.

The Conference of the Parties (COP), by its decision 14/CP.11, adopted the tables of the common reporting format and their notes for reporting on land use, land-use change and forestry (LULUCF) sector, to be used for the purpose of submission of the annual inventory due in and after 2007.

Cyprus

The first national inventory report for Cyprus was prepared in 2001 and covered the period 1990-1998. The inventory was prepared in the framework of the project "Strategic Plan for the Limitation of Greenhouse Gas Emissions in Cyprus".

The first Inventory report submitted by Cyprus to the European Commission for the purposes of Decision no. 280/2004/EC, was in 2006 for the period 1990-2004. Cyprus at the time was a non-Annex I party and therefore had no obligation to submit annual inventories to the UNFCCC secretariat.

The first submission of a national inventory report to the UNFCCC secretariat, as an Annex I party was made in April 2013.

1.1.3. Background information on supplementary information required under article 7, paragraph 1, of the Kyoto protocol

Not applicable.

⁴ Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>

⁵ Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/index.html>

⁶ Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>

1.2. Institutional arrangements

1.2.1. Institutional, legal and procedural arrangements

In article 5, paragraph 1 of the Protocol, it is specified that "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". A national system includes all institutional, legal and procedural arrangements made within an Annex I Party of the Convention for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

The Ministry of Agriculture, Natural Resources and Environment (MANRE) is the governmental body responsible for the co-ordination of all involved ministries, as well as any relevant public or private organisations, in relation to the implementation of the provisions of the national and European legislation associated with climate change. In this context, the MANRE has the responsibility for the planning, preparation, management, compilation of the national GHG inventory report (Contact person: Nicoletta Kythreotou, Address: Department of Environment, 1498 Nicosia, Cyprus, tel.: +357 22 408947, e-mail: nkythreotou@environment.moa.gov.cy). The organisational structure of the National Inventory System is presented in Figure 1.1. No legal framework is available that defines the roles, responsibilities and the co-operation between the MANRE and contact points of the involved ministries and agencies.

1.2.2. Overview of inventory planning, preparation and management

The preparation of the Cypriot GHG emissions inventory is the responsibility of the Climate Action Unit of the Department of Environment of the Ministry of Agriculture, Natural Resources and Environment.

The preparation of the Cypriot GHG emissions inventory is based on the application of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, as elaborated by the IPCC good practice guidance. The compilation of the inventory is completed in three main stages (Figure 1.1).

Stage 1: The first stage consists of data collection and checks for all source / sink categories. The main data sources used are the National Statistical Service, the national energy balance, the government ministries / agencies involved, along with the verified reports from installations under the EU ETS. Quality control of activity data include the comparison of the same or similar data from alternative data sources (e.g. National Statistical Service, EU ETS reports and energy balance) as well as time-series assessment in order to identify changes that cannot be explained. In cases where problems and / or inconsistencies are identified, the agency's representative, responsible for data providing, is called to explain the inconsistency and / or help solving the problem.

Stage 2: Once the reliability of input data is checked and certified, emissions / removals per source / sink category are estimated. Emissions estimates are then transformed to the format required by the CRF Reporter. This stage also includes the evaluation of the emission factors used and the assessment of the consistency of the methodologies applied in relation to the provisions of the IPCC Guidelines, the IPCC Good Practice Guidance and the LULUCF Good Practice Guidance. Quality control checks, when at this stage, are related to time-series assessment as well as to the identification and correction of any errors / gaps while estimating emissions / removals and entering the data in the CRF Reporter.

Stage 3: The last stage involves the compilation of the NIR and its internal check. During this period, the Inventory Team has to revise the report according to the observations and recommendations of the supervisor of the team. On the basis of this interaction process, the final version of the report is compiled. The Director of the Department of Environment approves the inventory and then the MANRE submits the NIR to the UNFCCC secretariat.

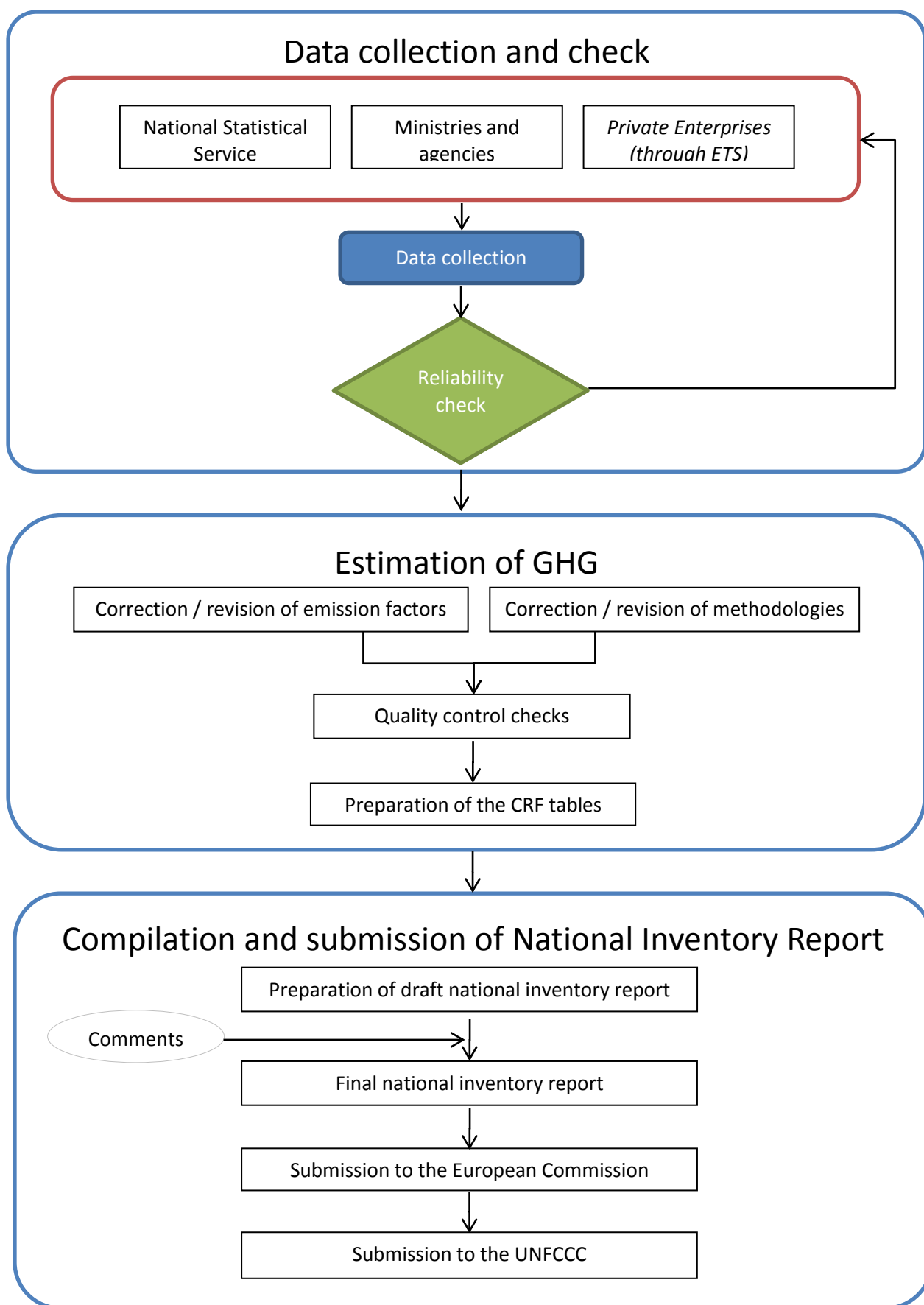


Figure 1.1. GHG emissions inventory preparation process in Cyprus

1.3. Inventory preparation

1.3.1. GHG inventory

The compilation of the inventory starts with the collection of the ETS data in June before the submission deadline (year X-1). When the first comments on the inventory are received by the European Commission and the UNFCCC for the submission of the previous year (approximately June), the necessary changes are made to the calculation sheets resulting to the CRF reporter data and notes are taken for the National Inventory Report, by the inventory compiler. Other data is made available from other governmental departments from November before the submission deadline (year X-1). In December the final National inventory report for the air pollutants under Directive 2001/81/EC prepared by the Department of Labour Inspection of the Ministry of Labour and Social Insurance (DLI), is available and communicated to the inventory compiler.

Data reliability checks: data for some activities is available from several sources. In such cases, the data is compared between all sources. In cases where there are differences, these are discussed with the data sets compilers. In several cases the data providers agree that there is a mistake and they correct appropriately the data set.

Quality control/ quality assurance: when the calculations have been completed the excel files used for the data collection and the calculations are sent to Ms Niki Papaki (Environment Technician, tel. +357 22408946, email npapaki@environment.moa.gov.cy) and Mr Giorgos Ioannou (Statistics Officer, tel. +357 22602171, email geoannou@cystat.mof.gov.cy) to check the data collected and the calculations. In case any mistakes are identified, these are corrected accordingly by the inventory compiler.

Compilation of inventory report: the compilation of the report starts when the emissions are finalised and the CRF tables are available. Once the final draft is available, the report is sent to Ms Niki Papaki (Environment Technician, tel. +357 22408946, email npapaki@environment.moa.gov.cy), Mr Giorgos Ioannou (Statistics Officer, tel. +357 22602171, email geoannou@cystat.mof.gov.cy) and all the data providers for comments. The comments are taken into consideration for the finalisation of the report.

Approval and submission of report: once the report is finalised, it is sent to Dr Theodoulos Mesimeris, Head of climate Action Unit and the Director of the Department of Environment Mr Costas Hadjipanayiotou (chadjipanayiotou@environment.moa.gov.cy, tel. no.+357 22 408900) for the final approval. The inventory accompanied by the inventory report is submitted to the European Commission annually by 15 January.

The timetable for the completion of these stages in the annual inventory cycle is presented in Table 1.1.

Table 1.1. Timetable for the preparation and submission of GHG emissions/ removals inventory in Cyprus

Task	Month
Corrections based on EC comments for previous submission	June year x-1
Collection of ETS data	June year x-1
Data collection from other ministries and agencies	November year x-1
Calculations, checks, CRF preparation	December year x-1
NIR preparation, revision, submission to the European Commission	January year x
CRF and NIR revision (if necessary) and final submission to the European Commission	March year x
CRF and NIR revision (if necessary) and submission UNFCCC secretariat	April year x

Inventory preparation team

The calculations, report preparation and overall management of the compilation of the inventory (inventory compiler) is the responsibility of Ms. Nicoletta Kythreotou, Environment Officer at the Department of Environment since 2006. Ms. Kythreotou holds a BSc in Environmental Science and an MSc in Environmental Engineering. Nicoletta has been preparing the Cypriot NIR for the purpose of EU Decision 280/2004/EC since 2006.

The final assessment of the national inventory is performed by Dr Theodoulos Mesimeris, who is a Senior Environment Officer and the head of Climate Action Unit at the Department of Environment. Dr Mesimeris has been an officer at the Department of Environment since 2002 and has been dealing with climate change since then. The academic background of Dr Mesimeris is a MEng in Chemical Engineering, MSc in Environmental Management and PhD in Chemical Engineering.

Dr Mesimeris and Ms. Kythreotou are the contact points of the UNFCCC and the DG Climate Action of the European Commission.

Ms Niki Papaki (BSc Mathematics) is responsible for data collection. A new addition to the team is Ms. Melina Menelaou, who is working for Land Use issues. The contact details of the team described above is presented in Table 1.2.

Table 1.2. Contact details of the inventory compilation team

Person	Position	Telephone no.	Email
Dr Theodoulos Mesimeris	Senior Environment Officer	+357 22 408948	tmesimeris@environment.moa.gov.cy
Ms Nicoletta Kythreotou	Environment Officer	+357 22 408947	nkythreotou@environment.moa.gov.cy
Ms Niki Papaki	Environment Technician	+357 22 408946	npapaki@environment.moa.gov.cy
Ms Melina Menelaou	Environment Technician	+357 22 408959	mmenelaou@environment.moa.gov.cy

1.3.2. Data collection, processing and storage

Data from all the involved parties come in MS Excel spread-sheets. The main database maintained by the inventory compiler is also in the form of MS Excel spread-sheets. The collected data is transferred to the main database of the inventory compiler. No special software is used or applied for processing or storage of the data used in the inventory.

The inventory compiler has one MS Excel spread-sheet containing all the data collected and one MS Excel spread-sheet containing the calculations performed for the estimation of the GHG emissions.

Contact points for data collection

Data from the annual ETS submissions from installations participating in the EU-ETS scheme has been obtained since 2006 from the ETS team, which is also part of the Climate Action Unit of the Department of Environment. Apart from the fuel consumption data is also obtained for CO₂ emissions (combustion and process emissions) and net calorific value (NCV) of fuels consumed.

The energy balance is obtained from the Energy Service of the Ministry of Commerce, Industry and Tourism. The contact point is Dr Christina Karapitta – Zachariadou (tel. no. +357 22409388, ckarapitta@mcit.gov.cy).

The contact point for the energy balance prepared by the National Statistical Service (CYstat) for the submission to EUROSTAT is Ms Nafsika Apostolou (tel. no. +357 22602199, napostolou@cystat.mof.gov.cy). Other contacts at CYstat are: for waste data Mrs Marilena Kythreotou (tel no. +357 22602137, mkythreotou@cystat.mof.gov.cy), for population data Ms Loukia Makri (tel. no. +357 22602150, lmakri@cystat.mof.gov.cy), for industrial production Mr. Charalambos Alkiviadous (tel. 22602189, calkiviadous@cystat.mof.gov.cy) and for agricultural data (cultivated areas and animal population) Mrs Sofia Pelagia (spelagia@cystat.mof.gov.cy).

Labour Inspection is the competent authority for the preparation of air pollutants inventories under Directive 2001/81/EC. The inventory is communicated to the GHG inventory compiler, Dr Chrysanthos Savvides (tel. no. +357 22405672, csavvides@dli.mlsi.gov.cy).

The activity data for the estimation of emissions from F-gases (sectors 2F and 2FP) is obtained by Mr Pavlos Pavlou, part of the Climate Action Unit, Department of Environment (tel. no. +357 22408925, ppavlou@environment.moa.gov.cy).

Other data on municipal solid waste management is obtained from Mr Stergios Palpanis, part of the sector of Waste Management, at the Ministry of Interior (+357 22806454, spalpanis@moi.gov.cy).

Municipal liquid waste production and management data is obtained from Mrs Stella Perikenti part of the Pollution Control Unit, Department of Environment (tel. no. +357 22408942, sperikenti@environment.moa.gov.cy).

Agricultural waste management is obtained from Mr Antis Athanasiades part of the Pollution Control Unit, Department of Environment (tel. no. +357 22408935, aathanasiades@environment.moa.gov.cy).

Industrial liquid waste management data is obtained from Dr Chrystalla Stylianou head of the Pollution Control Unit, Department of Environment (tel. no. +357 22408941, cstylianou@environment.moa.gov.cy).

Cultivated organic soils data is obtained from Mr. Andreas Selearis at the Department of Agriculture (+357 22464038)

Forest cover data is obtained from Dr. Andreas K. Christou, Head of Research, Publicity & Silviculture Sector, Department of Forests (tel. no. +357 22819490, email: achristou@fd.moa.gov.cy).

Details necessary for the implementation of Tier 2 methodology for dairy cattle was obtained from Mr. Georgios Papaioannou (tel. no. +357 22408566).

Lime, cement and ceramics (bricks and tiles) production data was obtained directly from the installations,

1.3.3. Quality assurance / quality control (QA / QC) procedures and extensive review of GHG inventory

See section 1.6.

1.4. Brief general description of methodologies and data sources used

1.4.1. Emission factors

The estimation of GHG emissions / removals per source / sink category is based on the methods described in the revised 1996 IPCC Guidelines and the 2000 IPCC Good Practice Guidance. The emission factors used derive from the abovementioned methodological sources and special attention was paid in selecting the emission factors that better describe practices in Cyprus. Furthermore, emission factors were obtained from plant specific information contained in EU ETS reports. For estimation of the emissions of the sector Solvents, the implied emission factor per capita from Greece was used, since the IPCC guidelines do not propose a method. Details on the methods applied for the calculation of emissions / removals are given the chapters that follow.

The key categories analysis (see section 1.5) constitutes the basic tool for methodological choice and for the prioritisation of the necessary improvements. In addition, the results of the various review processes (at national and EU level) represent key input information for the identification of possible improvements. It should be mentioned however, that data availability as well as availability of resources (both human and financial) also have to be considered.

- Data availability could become a significant restrictive parameter when selecting an estimation methodology. The accuracy and the consistency of the emissions estimated depend on the availability of the data needed for the correct application of the selected methodology.
- Availability of resources needs also to be considered as the searching for and the collection of the necessary data in order to apply a detailed methodology for a source category should not affect the completeness and the on-time preparation of an inventory submission.

1.4.2. Activity data

Data collection, processing and check constitute the activity with the longest duration in the annual inventory cycle. The duration of this activity is related to the amount of the necessary data and the number of the entities involved. The on-time and successful completion of this activity has a major effect on the timeliness preparation and submission of the inventory as well as on its accuracy, completeness and consistency.

Table 1.3 gives an overview of the main data sets used for the estimation of GHG emissions /removals. Data from international organizations and databases are supplementary to the data collected from the above data providers. It should be noted that information and data collected (through questionnaires developed according to the guidelines described in the Commission Decision 2004/156/EC) in the framework of the formulation of the National Allocation Plan (NAP) for the period 2005-2007, according to the Directive 2003/87/EC (and its transposition to the national Law, 110(I)/2011) along with the data from the verified reports from installations under the EU ETS for years 2005-2012 constituted significant source of information and an additional quality control check.

Table 1.3. Data sources and data sets per IPCC sector, source category

Sector	Data	Sources
1A1 Electricity generation	Fuel consumption	ETS verified reports Statistical Service Energy Service DLI
1A2 Manufacturing industry and construction	Fuel consumption	ETS verified reports Statistical Service Energy Service DLI
1A3 Transport	Fuel consumption	Statistical Service Energy Service DLI
1A4 Residential / Commercial / Agriculture	Fuel consumption	Statistical Service Energy Service DLI
1B Fugitive emissions from fuels	Fuel consumption	Statistical Service Energy Service DLI
2 Industrial processes	Industrial production	ETS verified reports Statistical Service DLI
3 Solvents and other products use	NMVOCs emissions Population	DLI Statistical Service
4 Agriculture	Cultivated areas Agricultural production Livestock population Fertilizer use Histosol cultivated area	Statistical Service Department of Agriculture FAOSTAT
5 LULUCF	Area and wood stocks of managed forests Areas affected by wildfires	Department of Forestry
6 Waste	Quantities/composition of solid waste generated Recycling Population Industrial production	Department of Environment Ministry of Interior Statistical Service

1.4.3. Global Warming Potential

Emissions from anthropogenic activities affect the concentration and distribution of greenhouse gases in the atmosphere. These changes can potentially produce a radiative forcing of the Earth's surface and lower atmosphere, by changing either the reflection or absorption of solar radiation or the emissions and absorption of long-wave radiation.

A simple measure of the relative radiative effects of the emissions of various greenhouse gases is the Global Warming Potential (GWP) index. This index is defined as the cumulative radiative forcing between the present and some chosen time-horizon caused by a unit mass of gas emitted now, expressed relative to that for some reference gas. The values for GWP for some of the most common greenhouse gases are given in Table 1.4.

Corresponding values of GWP for other gases (NO_x, CO, NMVOC) are not given by the IPCC (nor by other sources for this purpose), since at present it is impossible to calculate the indirect results of these gases, as the scientific knowledge on their chemical reactions taking place in the atmosphere is not sufficient.

Table 1.4. Global Warming Potential (in t of CO₂ eq.) for the 100-year horizon

Carbon dioxide (CO ₂)	Methane (CH ₄)	Nitrous Oxide (N ₂ O)	Hydrofluorocarbons (HFC)				Sulphur hexafluoride (SF ₆)
			HFC-32	HFC-125	HFC-134a	HFC-143a	
1	21	310	650	2800	1300	3800	23900

1.5. Brief description of key categories

The IPCC Good Practice Guidance defines procedures (in the form of decision trees) for the choice of estimation methods within the context of the IPCC Guidelines. Decision trees formalise the choice of the estimation method most suited to national circumstances considering at the same time the need for accuracy and the available resources (both financial and human). Generally, inventory uncertainty is lower when emissions are estimated using the most rigorous methods, but due to finite resources, this may not be feasible for every source category. Therefore it is good practice to identify those source categories (key source categories) that have the greatest contribution to overall inventory uncertainty in order to make the most efficient use of available resources.

In that context, a key source category is one that is prioritised within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions (level assessment) or/and to the trend of emissions (trend assessment). As far as possible, key source categories should receive special consideration in terms of two important inventory aspects:

1. The use of source category-specific good practice methods is preferable, unless resources are unavailable.
2. The key source categories should receive additional attention with respect to quality assurance (QA) and quality control (QC).

As a result of the adoption of the LULUCF Good Practice Guidance (Decision 13/CP.9) the concept of key sources has been expanded in order to cover LULUCF emissions by sources and removals by sinks. Therefore the term key category is used in order to include both sources and sinks.

The determination of the key categories for the Cypriot inventory system is based on the application of the Tier 1 methodology (see Annex I for presentation of calculations) described in the IPCC Good Practice Guidance, adopting the categorization of sources that is presented in Table 7.1 of the IPCC Good Practice Guidance.

Tier 1 methodology for the identification of key categories assesses the impacts of various source categories on the level and the trend of the national emissions inventory. Key categories are those which, when summed together in descending order of magnitude, add up to over 95% of total emissions (level assessment) or the trend of the inventory in absolute terms.

It should be mentioned that source category uncertainty estimates are not taken into consideration and base year estimates were calculated considering 1990 as base year, except F-gases for which 1993 is the base year.

The summary of the key categories assessment for the Cypriot inventory system (without LULUCF) for the years 1990 and 2012 are presented in Table 1.5 and Table 1.6 respectively.

Table 1.5. Key categories for the Cypriot inventory system without LULUCF, 1990, as identified by the level assessment

IPCC Source category	GHG	Level assessment
1AA1A. Public electricity and heat production	CO2	0.275265
1AA1B. Petroleum refining	CO2	0.014968
1AA2F2. Non-metallic minerals	CO2	0.074163
1AA3B. Road transport	CO2	0.191892
1AA4B. Residential	CO2	0.050386
2A1. Cement Production	CO2	0.114468
4A. Enteric Fermentation	CH4	0.026514
4B. Manure Management	N2O	0.020365
4B. Manure Management	CH4	0.014468
4D1. Direct Soil Emissions	N2O	0.032349
4D3. Indirect emissions	N2O	0.026188
6A. Solid waste disposal on land	CH4	0.088987
6B. Wastewater handling	CH4	0.017582

Table 1.6. Key categories for the Cypriot inventory system without LULUCF, 2012

IPCC Source category	GHG	Level assessment	Trend assessment
1AA1A. Public electricity and heat production	CO2	✓	✓
1AA2F2. Non-metallic minerals	CO2	✓	✓
1AA3B. Road transport	CO2	✓	✓
1AA4B. Residential	CO2	✓	✓
2A1. Cement Production	CO2	✓	✓
2F. Consumption of Halocarbons and SF6	HFCs & SF6	✓	✓
4A. Enteric Fermentation	CH4	✓	✓
4B. Manure Management	N2O	✓	
4D1. Direct Soil Emissions	N2O	✓	✓
4D3. Indirect emissions	N2O	✓	✓
6A. Solid waste disposal on land	CH4	✓	✓
6B. Wastewater handling	CH4		✓

1.6. Information on the QA / QC plan including verification and treatment of confidentiality issues

1.6.1. QA / QC procedures

The development and the implementation of an inventory Quality Assurance / Quality Control (QA/QC) plan represents a key tool for meeting the objectives of National Systems under Article 5 Paragraph 1 of the Protocol as described in Decision 20/CP.7.

With the Protocol's application, the pressure upon national GHG emissions inventories increases and therefore quality management is essential in order to comply with the requirements of (a) producing transparent, consistent, comparable, complete and accurate emissions estimates, (b) establishing a reliable central archiving system concerning all necessary information for GHG emissions inventories development and (c) compiling national reports according to the provisions of the adopted decisions.

In this framework, a QA/QC system is being implemented since the May 2007. The Ministry of Agriculture, Natural Resources and Environment is responsible for the implementation of the QA/QC system. The system has the following objectives:

- Compliance with the IPCC guidelines and the UNFCCC reporting guidelines while estimating and reporting emissions/removals.
- Continuous improvement of GHG emissions/removals estimates.
- Timely submission of necessary information in compliance with relevant requirements defined in international conventions, protocols and agreements

The accomplishment of the above-mentioned objectives can only be ensured by the implementation, from all the members of the Inventory Team (see Figure 1.2 for the flow chart of activities concerning emissions inventory), of the QA/QC procedures included in the plan for the following:

- Data collection and processing.
- Applying methods consistent with IPCC Good Practice Guidance and LULUCF Good Practice Guidance for calculating / recalculating emissions or removals.
- Making quantitative estimates of inventory uncertainty.
- Archiving information and record keeping.
- Compiling national inventory reports.

The QA/QC system developed covers the following processes (see Table 1.7 for the list of procedures within each process and Figure 1.3 for the relationship between the processes and the activities of the inventory team):

- QA/QC system management: comprises of all activities that are necessary for the management and control of the inventory agency in order to ensure the accomplishment of the abovementioned quality objectives.
- Quality control: directly related to the estimation of emissions. The process includes activities related to (a) data inquiry, collection and documentation, (b) methodological choice in accordance with IPCC Good Practice Guidance, (c) quality control checks for data from secondary sources and (d) record keeping.
- Archiving inventory information: comprises of activities related to central archiving of inventory information and the compilation of the national inventory report.
- Quality assurance: comprises of activities related to the different levels of review processes including the review of input data from experts, if necessary, and comments from the public
- Estimation of uncertainties: defines procedures for estimating and documenting uncertainty estimates per source / sink category and for the whole inventory.
- Inventory improvement: related to the preparation and the justification of any recalculations made.

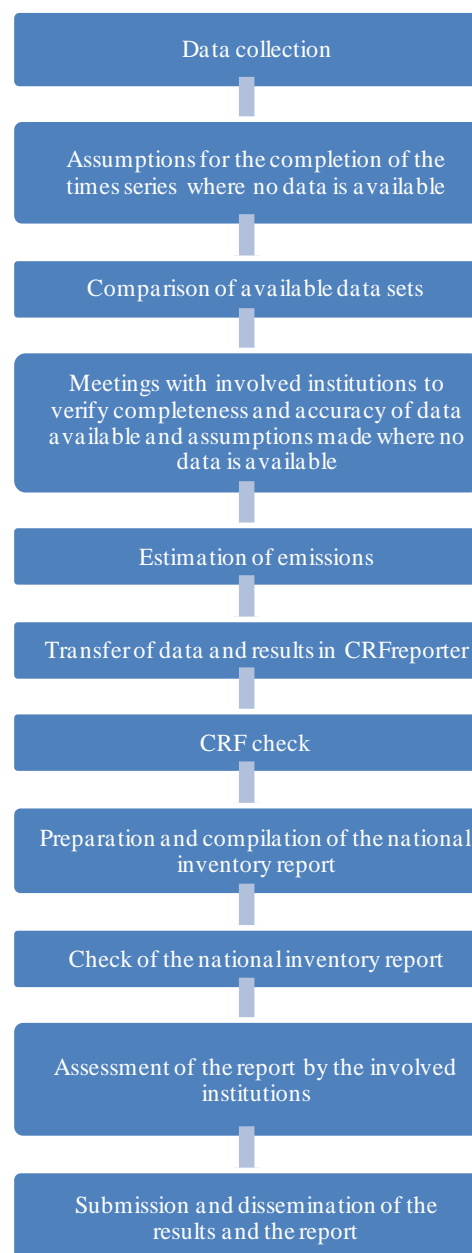


Figure 1.2. Flow chart activities concerning the GHG emissions inventory preparation

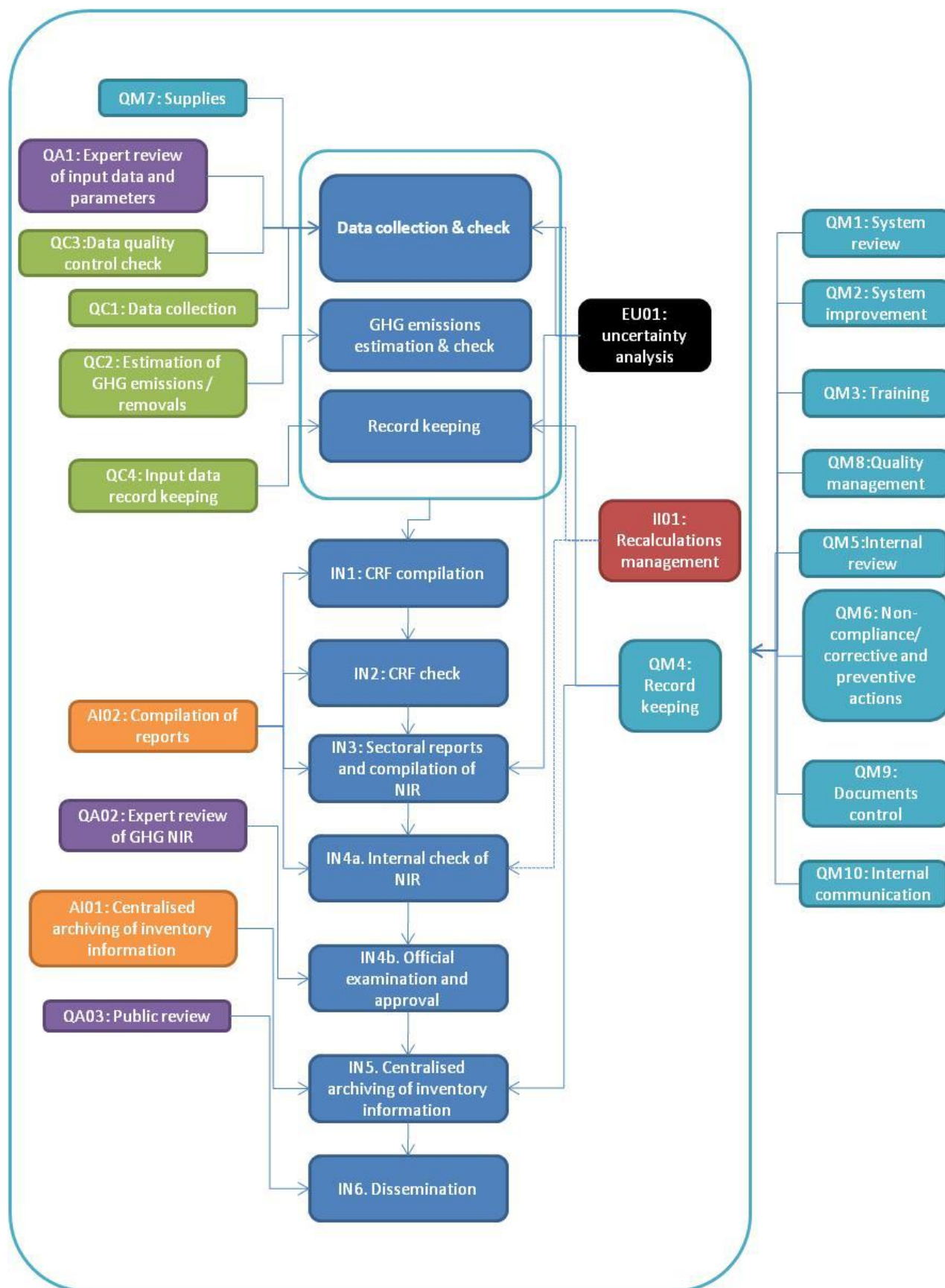


Figure 1.3. QA/QC processes and procedures and inventory related activities

Table 1.7. Quality assurance / quality control procedures for the Cypriot GHG emissions inventory

Process	Procedure code	Procedure
Quality management	QM 01	System review
	QM 02	System improvement
	QM 03	Training
	QM 04	Record keeping
	QM 05	Internal reviews
	QM 06	Non-compliance – corrective and preventive actions
	QM 07	Supplies
	QM 08	Quality management system
	QM 09	Documents control
	QM 10	Internal communication
Quality control	QC 01	Data collection
	QC 02	Estimation of emissions / removals
	QC 03	Data quality control check
	QC 04	Input data record keeping
Archiving of inventory information	AI 01	Centralised archiving of inventory information
	AI 02	Compilation of reports
Quality assurance	QA 01	Expert review of input data and parameters
	QA 02	Expert review of GHG emissions / removals inventory
	QA 03	Review from public
Estimation of uncertainties	EU 01	Uncertainty analysis
Inventory improvement	II 01	Recalculations management

Additional QA/QC procedures exist through the EU process that is implemented after the submission of the annual national inventories to the European Commission. More specifically, the procedure followed for the 2014 submission is the following:

- Loop 1 (NE/notation key checks): On 6/2 Findings made available on a web tool by the review team. The member states have until 14/2 to provide responses.
- Loop 2 (outlier checks): On 28/2 findings made available on web tool and the member states have until 15/3 to provide responses.
- Loop 3 (issues for clarification): On 26/3 findings made available on web tool. Member states have until 31/3 to provide clarification.

1.6.2. Verification activities

Verification processes are intended to help establish an inventory's reliability. These processes provide alternative information on annual emissions and trends. The results of verification processes provide inputs to improve inventories, build confidence in emissions estimates and trends and enhance cooperation in improving inventory estimates.

The verification techniques applied include internal quality checks, inventory inter-comparison and comparison of indicators. In all cases, comparisons of the systems for which data are available and the processes of data acquisition are considered along with the results of the studies.

Comparisons with other, independently compiled, national or regional emissions estimates are a quick option to verify completeness, approximate emission levels, or allocations to source categories or sub-source categories. The availability of such independently compiled inventories varies.

Comparison of national greenhouse gas inventories with international data sets is an independent means to verify inventory estimates. Comparisons with inventories from other countries enable cross-checking of assumptions regarding the use of emission factors, completeness of source categories and overall approaches. In addition to

comparisons with single country emissions inventories, it is possible to make more systematic comparisons for larger groups of countries.

For a given source category, different types of bottom-up comparisons are performed in parallel. These comparisons examine activity data and emission factors. These include:

- Comparisons with other datasets, in order to check for completeness, magnitude, and source allocation;
- Inter-country comparisons in which input data are compared for different countries for the same year.

The verification activities implemented are presented in Table 1.8. The verification activities carried out in comparison to the activities listed in Box 2.1 in Annex 2 of the GPG (page A2.10) are presented in Table 1.9.

Table 1.8. Verification activities implemented

Type	Activity
Top-down Vs. bottom-up	Carbon dioxide from fossil fuel combustion: a reference calculation based on apparent fuel consumption per fuel type is mandatory according to the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines).
	This type of top-down completeness and order-of-magnitude check is also applied in the estimation of emissions from the consumption of halocarbons and SF6: the bulk imports of the gases are considered the top-down estimates and the actual emissions estimates are the bottom-up.
Comparison of activity data	Fuel consumption is compared where available with the fuel consumption collected/estimated by the Statistical Service, Energy Service and the Department of Labour Inspection. Fuel consumption for electricity, cement and ceramics production, is also compared with the data collected annually from the installations through the implementation of the ETS law No. 110(I)/2011.
	Industrial production is possible to be collected directly from the installations due to their small number. The data collected is compared with data collected by the Department of Labour Inspection, the Statistical Service and the data collected annually from the installations through the implementation of the ETS law No. 110(I)/2011.
	Animal population is compared between the data available from the Department of Labour Inspection, the Statistical Service, the Department of Agriculture and FAOSTAT (where data is available).
Comparison of emission factors	Emission factors for fuel consumption for electricity, cement and ceramics production are available from the annual reports submitted by the installations for the implementation of the ETS law No. 110(I)/2011.
Comparison of emissions between countries	Comparison of emissions and resulting implied emission factors is performed by the European Environment Agency and the EU experts review team through the QA/QC processes of the European Union.
Comparisons of emission intensity indicators between countries	Comparison of emissions between countries and the resulting emissions per capita has been performed for the estimation of emissions from solvents and other product use (sector 3) and actual emissions from the consumption of halocarbons and SF6 (source 2F).

Table 1.9. Verification activities included in Box 2.1 in Annex 2 of the GPG

Category	activity	Performed
A. Checks	• Check for discontinuities in emission trends from base year (usually 1990) to end year.	✓
B. Comparisons of emissions and other such features	• Compare the Reference Approach for CO ₂ emissions from fuel combustion with other approaches.	✓
	• Compare inventory emissions estimates by source category and gas against independently compiled national estimates from international databases.	x
	• Compare activity data against independently compiled estimates and perhaps activity data from countries with similar source categories and sectors.	✓
	• Compare (implied) emission factors for source categories and gases with independent estimates and estimates from countries with similar source categories and sectors.	✓
	• Compare sector intensity estimates of selected source categories with estimates from other countries with similar source categories and sectors. If necessary, calculate emission intensity estimates based on international statistical compendia.	✓
C. Comparisons of uncertainties	• Compare uncertainty estimates with those from reports of other countries and the IPCC default values.	x
D. On-site measurements	• Perform direct source testing on key source categories, if possible.	x

1.6.3. Treatment of confidentiality issues

No data is reported as confidential in the national inventory with the exception of the fuel consumption for military purposes. The fuel consumption for military purposes is included in the total of the country, but emissions are not estimated separately.

1.7. General uncertainty evaluation

In order to evaluate the accuracy of an emissions inventory, an uncertainty analysis has to be carried out for both annual estimates of emissions and emissions trends over time.

Detailed explanation regarding the choice of the uncertainty values on the activity data and emission factors estimations is presented in Annex II. The uncertainty analysis for the Cypriot GHG inventory is based on Tier 1 methodology described in the IPCC Good Practice Guidance and the LULUCF Good Practice Guidance, with 1990 as base year for CO₂, CH₄, N₂O and F-gases emissions.

For the estimation of uncertainties per gas, a combination of the information provided by the IPCC and critical evaluation of information from indigenous sources was applied.

The uncertainty analysis was carried out without the LULUCF sector.⁷

Table 1.10 presents the uncertainty estimates as % of total national emissions in 2012 per source category and gas without LULUCF, while the detailed calculations are presented in Annex II. The combined uncertainty estimates for GHG emissions per gas in 2012, were estimated at: 0.10% for CO₂ emissions, 0.00021% for CH₄ emissions, 0.00001% for N₂O emissions and 0.34% for the F-gases emissions.

⁷ As recommended by the UNFCCC review team in the “Provisional findings and recommendations” document for the National Inventory Report of 2013

Table 1.10. Uncertainty estimates as % of total national emissions in 2012 per source category and gas (without LULUCF)

Source category	Combined uncertainty as % of total national emissions in 2012	Uncertainty introduced into the trend in total national emissions
CO2		
1AA1A. Public electricity and heat production	2.71%	4.20%
1AA1B. Petroleum refining	0.00%	0.11%
1AA2A. Iron and steel	0.01%	0.02%
1AA2C. Chemicals	0.0024%	0.0037%
1AA2E. Food processing, Beverages and Tobacco	0.04%	0.07%
1AA2F1. Other	0.01%	0.01%
1AA2F2. Non-metallic minerals	0.26%	0.48%
1AA3A. Civil aviation	0.02%	0.03%
1AA3B. Road transport	1.55%	2.36%
1AA4A. Commercial/ Institutional	0.00002%	0.00003%
1AA4B. Residential	0.13%	0.19%
1AA4C. Agriculture/ Forestry/ Fisheries	0.02%	0.04%
1AA5A. Other Stationary	0.01%	0.02%
2A1. Cement Production	0.39%	0.74%
2A2. Lime production	0.0028%	0.01%
2A3. Limestone and dolomite use	0.0000%	0.0001%
2A7. Other	0.01%	0.03%
3A. Paint application	0.0017%	0.0028%
3B. Degreasing and dry cleaning	0.0001%	0.0003%
3D. Other	0.0013%	0.0020%
TOTAL	0.10%	0.24%
CH4		
1AA1A. Public electricity and heat production	0.00148%	0.00063%
1AA1B. Petroleum refining	0.00000%	0.00010%
1AA2A. Iron and steel	0.000004%	0.00000%
1AA2C. Chemicals	0.000001%	0.00000%
1AA2E. Food processing, Beverages and Tobacco	0.00001%	0.00001%
1AA2F1. Other	0.000003%	0.00000%
1AA2F2. Non-metallic minerals	0.00013%	0.00063%
1AA3A. Civil aviation	0.00001%	0.00000%
1AA3B. Road transport	0.00429%	0.00179%
1AA4A. Commercial/ Institutional	0.00170%	0.00147%
1AA4B. Residential	0.00044%	0.00016%
1AA4C. Agriculture/ Forestry/ Fisheries	0.00082%	0.00115%
1AA5A. Other Stationary	0.00001%	0.00001%
1B2A4. Refining / Storage	0.000000%	0.00044%
4A. Enteric Fermentation	0.10%	0.08%
4B. Manure Management	0.02%	0.01%
4F. Field burning of agricultural residues	0.00014%	0.001089%
6A. Solid waste disposal on land	0.10%	0.05%
6B. Wastewater handling	0.01%	0.04%
TOTAL	0.00021%	0.00010%
N2O		
1AA1A. Public electricity and heat production	0.000888%	0.000369%
1AA1B. Petroleum refining	0.000000%	0.000059%
1AA2A. Iron and steel	0.000003%	0.000004%
1AA2C. Chemicals	0.000001%	0.000000%
1AA2E. Food processing, Beverages and Tobacco	0.000002%	0.000002%

Source category	Combined uncertainty as % of total national emissions in 2012	Uncertainty introduced into the trend in total national emissions
1AA2F1. Other	0.000002%	0.000001%
1AA2F2. Non-metallic minerals	0.000095%	0.000259%
1AA3A. Civil aviation	0.000036%	0.000002%
1AA3B. Road transport	0.000570%	0.000131%
1AA4A. Commercial/ Institutional	0.000009%	0.000002%
1AA4B. Residential	0.000183%	0.000044%
1AA4C. Agriculture/ Forestry/ Fisheries	0.000015%	0.000019%
1AA5A. Other Stationary	0.0000004%	0.000001%
3D. Other	0.000247%	0.000238%
4B. Manure Management	0.01%	0.001966%
4D1. Direct Soil Emissions	0.03%	0.02%
4D3. Indirect emissions	0.003008%	0.003242%
4F. Field burning of agricultural residues	0.000002%	0.000006%
6B. Wastewater handling	0.000093%	0.000090%
TOTAL	0.00001%	0.00001%
HFCs & SF6		
2F. Consumption of Halocarbons and SF6	5.80%	9.08%
TOTAL	0.34%	0.82%
TOTAL EMISSIONS	6.60%	10.32%
Percentage uncertainty in total inventory	6.60%	10.32%

1.8. General assessment of the completeness

In the present inventory report, estimates of GHG emissions in Cyprus for the years 1990-2012 are presented. Emissions estimates included in the CRF tables submitted and discussed in the present report, cover the areas of the Republic of Cyprus under the effective control of the Government of the Republic of Cyprus. All major sources are reported including emissions estimates for indirect greenhouse gases and SO₂. Completeness in the present inventory submission will be further discussed in the relevant chapters. Nevertheless, the main deficiencies are the following:

LULUCF: most important deficiency. Emissions for the LULUCF sector have never been fully reported. Since June 2011 there is a new addition to the inventory team, whose responsibility is to prepare the LULUCF GHG inventory and the accompanying report. Available data has been collected for land uses and land use changes in Cyprus. Further work is however necessary to complete the time series and then to setup the methodologies to estimate the GHG emissions. Extensive work is going to take place during 2014, with support from the JRC. The goal is by the 2015 submission to have a full LULUCF GHG inventory in line with the 2006 IPCC guidelines and the IPCC "Good Practice Guidance for Land Use, Land Use Change and Forestry".

Navigation (1AA3d): no data available on consumption of fuel for domestic navigation. Work is in progress to obtain/ estimate the data.

Transport of oil (1B2A3) , Distribution of oil products (1B2A5) and venting of oil (1B2C1.1): no method is available to estimate the emissions. However, the work is in progress to determine a country specific methodology.

Use of notation keys: there are still some empty cells in the xml. Work is in progress to fill all the cells and use the correct notation keys.

Further details on deficiencies are provided in the appropriate chapter. A national inventory improvement plan is available and implemented.

Chapter 2: Trends in greenhouse gas emissions

2.1. Description and interpretation of emission trends for aggregated greenhouse gas emissions

The GHG emissions in 2012 were 9240 Gg CO₂ eq. including LULUCF and 9259 Gg CO₂ eq. excluding LULUCF. Between 1990 and 2012, the total national emissions excluding LULUCF increased by 52%.

Carbon dioxide emissions accounted for 76% of total GHG emissions in 2012 without LULUCF and increased by 53% from 1990. Methane emissions accounted for 14% of total GHG emissions in 2012 without LULUCF and increased by 43% since 1990, while nitrous oxide emissions accounted for 6.6% of the total GHG emissions in 2012 without LULUCF and increased by 11% since 1990. Finally, F-gases and SF₆ emissions accounted for 2.8% of total GHG emissions in 2012.

The emissions by gas and sector are presented in Table 2.1, while the trend of the emissions is also presented in Figure 2.1. The summary tables for each year of the inventory by gas and source as these were generated by CRFReporter v. 6.7.3 are presented in Annex III.

Table 2.1. Total GHG emissions in Cyprus with and without LULUCF for the period 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ emissions including net CO ₂ from LULUCF	4,485.30	5,625.21	6,883.30	7,774.85	7,754.81	7,473.78	7,038.34
CO ₂ emissions excluding net CO ₂ from LULUCF	4,626.88	5,776.69	7,037.97	7,857.89	7,831.82	7,566.19	7,082.83
CH ₄ emissions including CH ₄ from LULUCF	910.18	1,119.56	1,186.39	1,277.09	1,296.73	1,243.07	1,306.31
CH ₄ emissions excluding CH ₄ from LULUCF	909.91	1,119.30	1,185.95	1,275.12	1,294.73	1,241.37	1,303.68
N ₂ O emissions including N ₂ O from LULUCF	553.40	627.53	655.27	648.76	629.90	630.15	634.88
N ₂ O emissions excluding N ₂ O from LULUCF	551.07	625.23	651.43	631.85	612.63	615.47	612.27
HFCs	NA,NO	2.30	28.69	121.19	249.78	259.12	260.44
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF ₆	NA,NO	NA,NO	0.01	0.07	0.08	0.09	0.09
Total (including LULUCF)	5,948.88	7,374.61	8,753.66	9,821.97	9,931.31	9,606.21	9,240.06
Total (excluding LULUCF)	6,087.85	7,523.53	8,904.04	9,886.13	9,989.04	9,682.23	9,259.30

1. Energy	3,878.69	4,954.29	6,212.36	6,979.26	7,269.28	7,022.30	6,555.77
2. Industrial Processes	759.44	841.28	875.52	1,016.06	835.01	831.40	814.20
3. Solvent and Other Product Use	51.96	55.94	59.80	71.15	77.17	73.36	73.29
4. Agriculture	732.47	842.15	860.94	844.44	824.04	825.29	815.50
5. LULUCF	-138.97	-148.92	-150.38	-64.17	-57.73	-76.02	-19.24
6. Waste	665.30	829.86	895.42	975.23	983.55	929.88	1,000.55
Total (including LULUCF)	5,948.88	7,374.61	8,753.66	9,821.97	9,931.31	9,606.21	9,240.06
Total (excluding LULUCF)	6,087.85	7,523.53	8,904.04	9,886.13	9,989.04	9,682.23	9,259.30

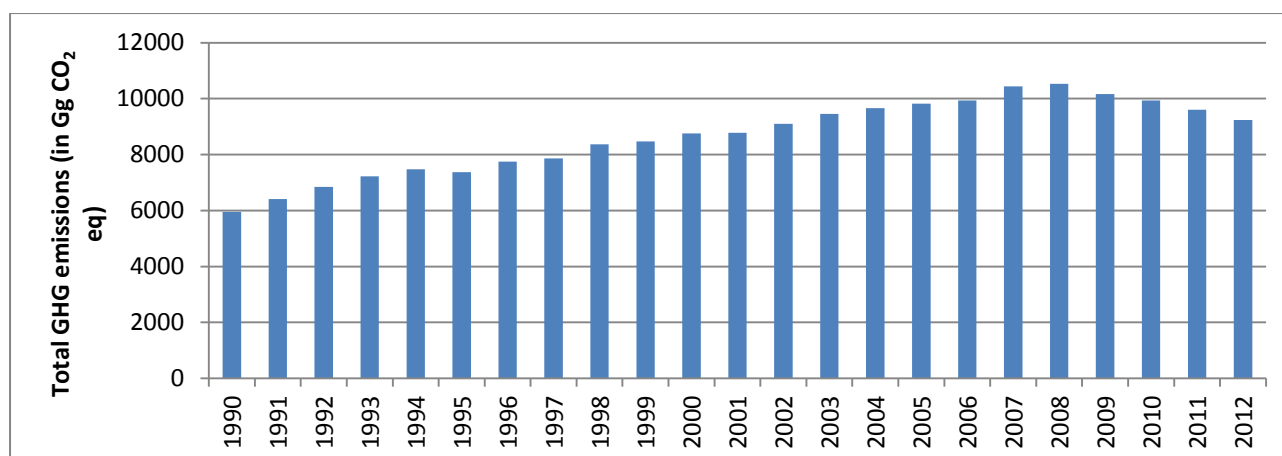


Figure 2.1. Total national GHG emissions 1990-2012 (including LULUCF)

2.2. Description and interpretation of emission trends by category

GHG emissions trends by sector for the period 1990 - 2012 are presented in Figure 2.2 and Table 2.2.

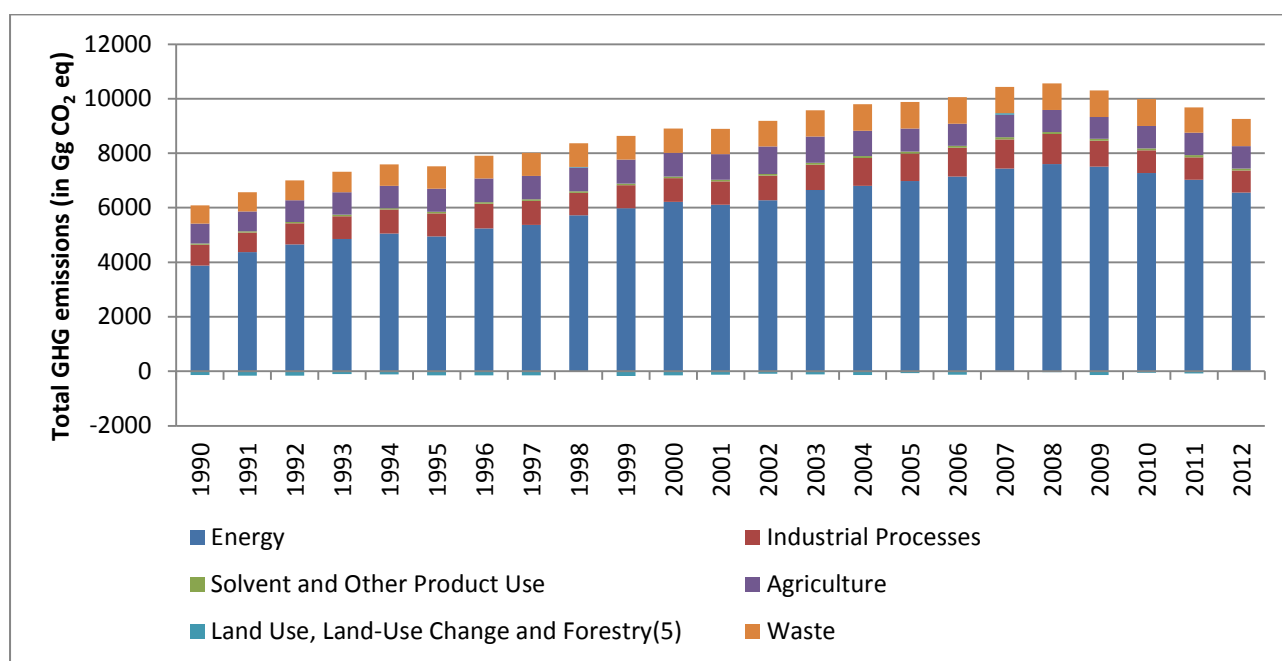


Figure 2.2. Total national GHG emissions by sector 1990-2012 (including LULUCF)

2.2.1. Energy

The energy sector in Cyprus relies on fossil fuel combustion for meeting the bulk of energy requirements. Final consumption in 2012 amounted to approximately 89 PJ compared to 95 PJ in 2011 (6.6% decrease). 99.99% of the consumption in 2012 was from liquid fuels. In previous years a small percentage also originated from solid fuels. In 2012 only 1 kt lignite was consumed, since the larger consumer (cement production) did not use any solid fuel for the production of energy. In comparison to 1990, total fuel consumption in 2012 including biomass increased by 54%. Natural gas is not available in Cyprus.

After robust growth rates in the 1980s (average annual growth was 6.1%), economic performance in the 1990s was mixed: real GDP growth was 9.7% in 1992, 1.7% in 1993, 6.0% in 1994, 6.0% in 1995, 1.9% in 1996 and 2.3% in 1997. This pattern underlined the economy's vulnerability to swings in tourist arrivals (i.e. to economic and political conditions in Cyprus, Western Europe, and the Middle East) and the need to diversify the economy. Declining

competitiveness in tourism and especially in manufacturing are acting as a drag on growth until structural changes are in effect. This is greatly affecting the energy sector.

The emissions from the energy sector in Cyprus increased by 69% during the period 1990-2012. The greatest increase in emissions was between 1990 and 2008 (96%), the emission reached their peak (7601 Gg CO₂ eq.). All the emissions in 2012 are from fuel combustion. The contribution of the emissions from the energy sector to the total without LULUCF in 2012 was 70.8% compared to 63.7% in 1990. The contribution of the main energy sources of emissions to the total energy emissions in 2012 is presented in Figure 2.3.

Table 2.2. Total national GHG emissions by sector 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998
1. Energy	3,879	4,368	4,660	4,849	5,056	4,954	5,240	5,376	5,718
2. Industrial Processes	759	716	768	841	874	841	903	872	832
3. Solvent and Other Product Use	52	52	54	55	56	56	57	58	58
4. Agriculture	732	734	795	819	816	842	871	857	864
5. LULUCF	-139	-157	-160	-95	-114	-149	-152	-149	25
6. Waste	665	696	728	756	783	830	832	850	863
Total (including LULUCF)	5,949	6,410	6,844	7,225	7,472	7,375	7,751	7,864	8,361
Total (excluding LULUCF)	6,088	6,567	7,005	7,320	7,585	7,524	7,903	8,013	8,336

	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Energy	5,984	6,212	6,109	6,270	6,648	6,810	6,979	7,148	7,435
2. Industrial Processes	846	876	860	908	933	1,022	1,016	1,055	1,075
3. Solvent and Other Product Use	59	60	60	63	66	69	71	75	75
4. Agriculture	875	861	940	1,001	966	922	844	804	831
5. LULUCF	-171	-150	-122	-85	-115	-130	-64	-129	55
6. Waste	878	895	931	945	958	971	975	981	966
Total (including LULUCF)	8,470	8,754	8,778	9,103	9,456	9,664	9,822	9,933	10,436
Total (excluding LULUCF)	8,641	8,904	8,900	9,188	9,572	9,795	9,886	10,062	10,382

	2008	2009	2010	2011	2012				
1. Energy	7,601	7,505	7,269	7,022	6,556				
2. Industrial Processes	1,102	955	835	831	814				
3. Solvent and Other Product Use	73	74	77	73	73				
4. Agriculture	812	793	824	825	816				
5. LULUCF	-29	-132	-58	-76	-19				
6. Waste	970	973	984	930	1,001				
Total (including LULUCF)	10,530	10,168	9,931	9,606	9,240				
Total (excluding LULUCF)	10,559	10,299	9,989	9,682	9,259				

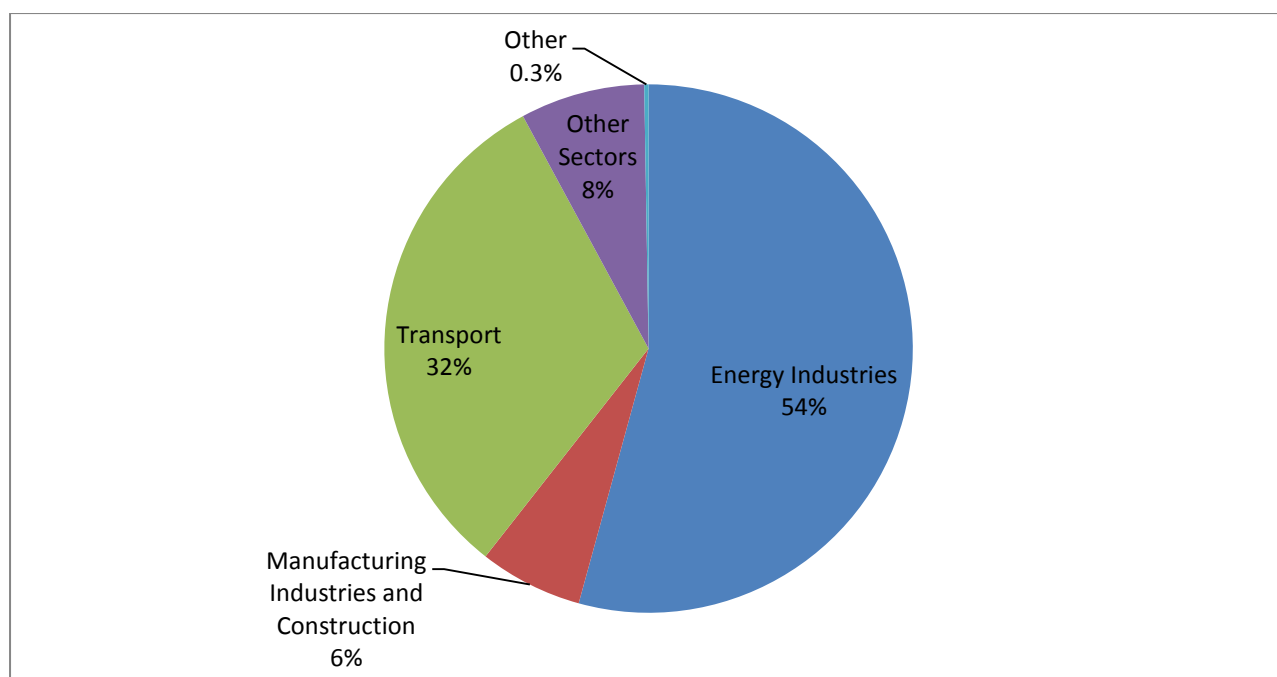


Figure 2.3. Contribution of the main energy sources of emissions to the total energy emissions in 2012

2.2.2. Industrial processes

In 2012, GHG emissions from Industrial processes accounted for 8.8% of total emissions excluding LULUCF compared to 12.5% in 1990. The emissions have increased by 7% compared to 1990. Emissions from Lime production (2A2) have been recalculated due to revised activity data, while emissions from limestone and dolomite use (2A3) are reported for the first time. Revisions also took place for the estimation of emissions from consumption of f-gases. For this submission it was also decided to use the IPCC 1996 guidelines and GPG to estimate the emissions from cement production, regardless that installation specific data is available from the annual verified reports submitted by the installations included in the ETS, to maintain consistency in the method used for the whole period. 68% of the industrial processes emissions is from mineral production and the remaining 32% from consumption of Halocarbons and SF₆.

2.2.3. Solvents and other products use

According to the Revised IPCC 1996 guidelines, “no methods for the calculation of greenhouse gases from solvent and other product use are included in the phase I version of the workbook”. Therefore an alternative country specific methodology is used to estimate the emissions from this sector. GHG emissions from solvent and other product use in 2012 were 73.29 Gg which corresponds to 0.8% of the total GHG emissions of Cyprus, without LULUCF.

2.2.4. Agriculture

Emissions from Agriculture accounted for 8.8% of total emissions in 2012 (without LULUCF), and increased by 11.3% compared to 1990 levels. Agriculture in 1990 contributed 12% to the total emissions of the country without LULUCF. The peak of Agriculture emissions was in 2002 when an increase of 26% compared to 1990 was observed. Since 2002 a reduction in emissions was observed, due to the reduction of N₂O emissions from agricultural soils, because of the reduction in the use of synthetic nitrogen fertilisers. The reduction of the use of fertilisers was caused by the drought that was taking place during the same period that had an extreme in 2008. Further reduction was caused by the recent changes in manure management. Agriculture is responsible for methane and nitrous oxide emissions. In 2012 agriculture has contributed 23.6% to the total methane emissions and 82.8% to the total nitrous oxide emissions. The contribution of the main agricultural sources of emissions to the total agriculture emissions in 2012 is presented in Figure 2.4.

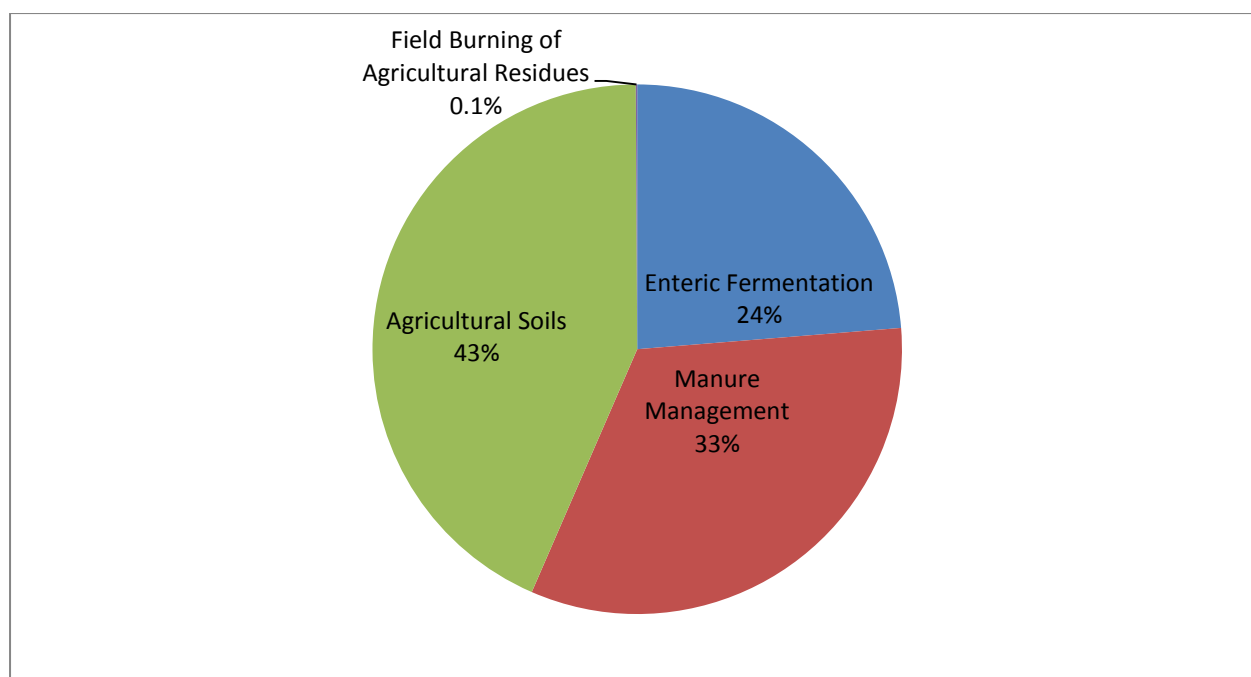


Figure 2.4. Contribution of the main agricultural sources of emissions to the total agriculture emissions in 2012

2.2.5. Land use, land use change and forestry

LULUCF is the most incomplete sector of the national GHG inventory of Cyprus. The system for the collection of data has not yet completed to collect the necessary activity data for the complete reporting of emissions. Therefore, the only emissions reported for LULUCF by Cyprus are the removals from Forest land remaining forest land (source 5A1) including biomass burning from wildfires (5A1, 5(V)) and emissions from Harvest wood products (under 5G). Some recalculations have taken place due to new data on area of forests and wildfires. The emissions from LULUCF changed from -139 Gg CO₂ eq. to -20 Gg CO₂ in 2012. The reduction in absorption of CO₂ during the recent years has been caused by the increase in wildfires and the area burnt.

2.2.6. Waste

Emissions from the Waste Sector in 2012 contributed 10.8% of the total emissions without LULUCF and increased by 50% since 1990. In 2012, 93.6% of the emissions is from solid waste disposal on land and the remaining 6.4% from wastewater handling.

74.8% of the total methane emissions and 3.8% of the nitrous oxide emissions of the country are from the sector of waste. The emissions from waste have changed considerably between 1990 and 2012 due to changes that are taking place in the waste and wastewater management practices of the country. The amount of solid waste disposed to shallow unmanaged disposal sites decreased from 33% in 1990 to 0% in 2012, therefore all the emissions from solid waste disposal on land is from managed disposal sites. Recycling and composting have been reducing the amount of waste disposal on land since 2010. The emissions from industrial wastewater have increased since there is an increase in the amount of waste treated by anaerobic digestion. Additionally, approximately 78% of the population was served by a sewer and tertiary aerobic treatment systems in 2012. Since the amount of wastewater collected in septic tanks has reduced from 65% in 1990 to 16% in 2012.

2.3. Description and interpretation of emission trends by gas

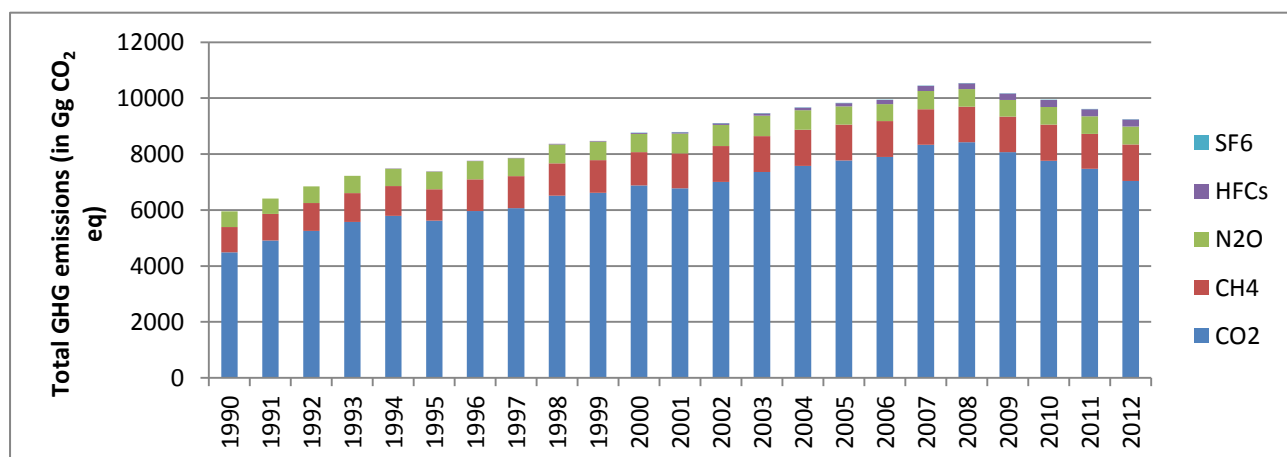
GHG emissions trends by gas for the period 1990 - 2012 are presented in Figure 2.5 and Table 2.3.

Table 2.3. Total national GHG emissions by gas 1990-2012

Gg CO2 eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998
CO2 emissions including LULUCF	4,485	4,913	5,253	5,569	5,793	5,625	5,966	6,069	6,508
CO2 emissions excluding LULUCF	4,627	5,070	5,413	5,675	5,915	5,777	6,121	6,222	6,517
CH4 emissions including LULUCF	910	946	991	1,035	1,062	1,120	1,132	1,146	1,158
CH4 emissions excluding LULUCF	910	946	991	1,034	1,061	1,119	1,132	1,146	1,155
N2O emissions including LULUCF	553	551	600	620	617	628	649	640	680
N2O emissions excluding LULUCF	551	550	600	610	610	625	647	637	650
HFCs	NA,NO	NA,NO	NA,NO	0	0	2	4	9	14
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF6	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Total (including LULUCF)	5,949	6,410	6,844	7,225	7,472	7,375	7,751	7,864	8,361
Total (excluding LULUCF)	6,088	6,567	7,005	7,320	7,585	7,524	7,903	8,013	8,336

Gg CO2 eq.	1999	2000	2001	2002	2003	2004	2005	2006	2007
CO2 emissions including LULUCF	6,615	6,883	6,775	7,002	7,358	7,575	7,775	7,899	8,328
CO2 emissions excluding LULUCF	6,787	7,038	6,907	7,103	7,484	7,713	7,858	8,036	8,311
CH4 emissions including LULUCF	1,166	1,186	1,248	1,284	1,288	1,294	1,277	1,278	1,270
CH4 emissions excluding LULUCF	1,166	1,186	1,247	1,283	1,287	1,294	1,275	1,277	1,266
N2O emissions including LULUCF	666	655	715	761	732	694	649	604	658
N2O emissions excluding LULUCF	666	651	706	747	723	686	632	597	624
HFCs	22	29	40	56	78	102	121	152	181
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF6	NA,NO	0	0	0	0	0	0	0	0
Total (including LULUCF)	8,470	8,754	8,778	9,103	9,456	9,664	9,822	9,933	10,436
Total (excluding LULUCF)	8,641	8,904	8,900	9,188	9,572	9,795	9,886	10,062	10,382

Gg CO2 eq.	2008	2009	2010	2011	2012				
CO2 emissions including LULUCF	8,421	8,064	7,755	7,474	7,038				
CO2 emissions excluding LULUCF	8,474	8,203	7,832	7,566	7,083				
CH4 emissions including LULUCF	1,276	1,277	1,297	1,243	1,306				
CH4 emissions excluding LULUCF	1,274	1,276	1,295	1,241	1,304				
N2O emissions including LULUCF	626	596	630	630	635				
N2O emissions excluding LULUCF	605	589	613	615	612				
HFCs	206	230	250	259	260				
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO				
SF6	0	0	0	0	0				
Total (including LULUCF)	10,530	10,168	9,931	9,606	9,240				
Total (excluding LULUCF)	10,559	10,299	9,989	9,682	9,259				

**Figure 2.5.** Total national GHG emissions by gas 1990-2012 (including LULUCF)

2.3.1. Carbon dioxide

Carbon dioxide emissions from 1990 to 2012 by source category are presented in Table 2.4. Total CO₂ emissions without LULUCF increased from 4627 Gg in 1990 to 7083 Gg in 2012. The increase of 53% from 1990 to 2012 is mainly attributed to the increased electricity production as well as to the increased energy consumption in the residential and transport sectors. The decrease of 16% from 2008 to 2011 is mainly attributed to economic crisis and the increasing share of renewable energy technologies.

CO₂ emissions from Energy increase from 3858 Gg in 1990 to 6519 Gg in 2012, presenting a total increase of 69% from 1990 to 2012. Carbon dioxide emissions from Industrial processes in 2012 decreased by 27% compared to 1990 (from 759 to 554 Gg CO₂).

Table 2.4. CO₂ emissions 1990-2012

Gg CO ₂	1990	1995	2000	2005	2010	2011	2012
1. Energy	3,858.47	4,929.83	6,182.42	6,946.43	7,231.00	6,983.75	6,519.27
A. Fuel Combustion	3,858.47	4,929.83	6,182.42	6,946.43	7,231.00	6,983.75	6,519.27
1. Energy Industries	1,766.89	2,169.91	2,960.79	3,471.84	3,868.00	3,710.04	3,545.93
2. Manufacturing Industries, Construction	529.49	740.09	800.85	885.86	625.18	542.08	413.24
3. Transport	1,187.67	1,490.99	1,772.79	2,062.50	2,277.23	2,211.57	2,052.53
4. Other Sectors	363.21	511.34	626.17	504.86	443.50	499.81	490.50
5. Other	11.20	17.49	21.83	21.37	17.08	20.26	17.08
2. Industrial Processes	759.44	838.98	846.82	894.79	585.14	572.20	553.67
A. Mineral Products	759.44	838.98	846.82	894.79	585.14	572.20	553.67
3. Solvent and Other Product Use	8.97	7.89	8.73	16.67	15.68	10.24	9.89
5. LULUCF	-141.58	-151.48	-154.67	-83.04	-77.01	-92.41	-44.48
A. Forest Land	-156.51	-162.84	-160.64	-85.35	-78.59	-93.87	-45.81
G. Other	14.93	11.36	5.97	2.31	1.58	1.47	1.32
Total CO₂ emissions including LULUCF	4,485.30	5,625.21	6,883.30	7,774.85	7,754.81	7,473.78	7,038.34
Total CO₂ emissions excluding LULUCF	4,626.88	5,776.69	7,037.97	7,857.89	7,831.82	7,566.19	7,082.83
<i>Memo Items:</i>							
<i>International Bunkers</i>	<i>906.31</i>	<i>1,011.47</i>	<i>1,420.22</i>	<i>1,794.96</i>	<i>1,402.96</i>	<i>1,518.76</i>	<i>1,420.56</i>
<i>Aviation</i>	<i>725.40</i>	<i>797.58</i>	<i>818.24</i>	<i>886.56</i>	<i>822.08</i>	<i>900.45</i>	<i>807.31</i>
<i>Marine</i>	<i>180.91</i>	<i>213.88</i>	<i>601.97</i>	<i>908.40</i>	<i>580.88</i>	<i>618.31</i>	<i>613.25</i>
<i>CO₂ Emissions from Biomass</i>	<i>15.14</i>	<i>23.22</i>	<i>22.17</i>	<i>30.08</i>	<i>142.95</i>	<i>160.63</i>	<i>159.30</i>

2.3.2. Methane

The methane emissions from 1990 to 2012 by source category are presented in Table 2.5. Waste represents the largest anthropogenic source of methane emissions in Cyprus, accounting for 75% of total methane emissions in 2012 without LULUCF. Methane emissions from Waste in 2012 increased by 50% compared to 1990 levels. Methane emissions from Agriculture in 2011 accounted for 24% of total methane emissions and increased by 22% from 1990. Methane emissions from the Energy sector account for the remaining 1.4% of the total methane emissions.

Table 2.5. CH₄ emissions 1990-2012

Gg CH ₄	1990	1995	2000	2005	2010	2011	2012
1. Energy	0.45	0.55	0.65	0.69	0.87	0.92	0.89
A. Fuel Combustion	0.41	0.49	0.57	0.69	0.87	0.92	0.89
1. Energy Industries	0.07	0.09	0.12	0.14	0.15	0.14	0.14
2. Manufacturing Industries, Construction	0.04	0.02	0.03	0.04	0.04	0.02	0.01
3. Transport	0.19	0.23	0.26	0.35	0.43	0.42	0.40
4. Other Sectors	0.11	0.15	0.15	0.16	0.25	0.33	0.34
5. Other	0.00	0.00	0.00	0.01	0.01	0.01	0.01
B. Fugitive Emissions from Fuels	0.04	0.06	0.08	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
2. Oil and Natural Gas	0.04	0.06	0.08	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO

Gg CH4	1990	1995	2000	2005	2010	2011	2012
4. Agriculture	11.98	14.15	14.18	14.58	15.05	15.05	14.69
A. Enteric Fermentation	7.69	8.59	8.49	8.67	8.92	9.14	9.21
B. Manure Management	4.19	5.45	5.65	5.87	6.11	5.88	5.45
F. Field Burning of Agricultural Residues	0.10	0.11	0.03	0.03	0.02	0.03	0.03
5. LULUCF	0.01	0.01	0.02	0.09	0.10	0.08	0.13
A. Forest Land	0.01	0.01	0.02	0.09	0.10	0.08	0.13
6. Waste	30.89	38.60	41.65	45.46	45.73	43.14	46.50
A. Solid Waste Disposal on Land	25.80	33.01	36.11	40.55	42.94	40.76	44.58
B. Waste-water Handling	5.10	5.59	5.54	4.91	2.79	2.39	1.92
Total CH4 emissions including LULUCF	43.34	53.31	56.49	60.81	61.75	59.19	62.21
Total CH4 emissions excluding LULUCF	43.33	53.30	56.47	60.72	61.65	59.11	62.08
<i>Memo Items:</i>							
<i>International Bunkers</i>	<i>0.02</i>	<i>0.02</i>	<i>0.05</i>	<i>0.07</i>	<i>0.04</i>	<i>0.05</i>	<i>0.05</i>
<i>Aviation</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>
<i>Marine</i>	<i>0.01</i>	<i>0.01</i>	<i>0.04</i>	<i>0.06</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>

2.3.3. Nitrous Oxide

Nitrous oxide emissions from 1990 to 2012 by source category are presented in Table 2.6. Agriculture represents the largest anthropogenic source of nitrous oxide emissions in Cyprus with 82% of the total nitrous oxide emissions in 2012, without LULUCF. Emissions from this sector increased by only 5% since 1990, mainly because of new agricultural practices applied, affecting the use of synthetic nitrogen fertilizers and manure management. Nitrous oxide is also produced from the reaction between nitrogen and oxygen during fossil fuel combustion. Nitrous oxide emissions from fossil fuels combustion (accounting for 2.9% of total nitrous oxide emissions in 2012) increased by 65% from 1990. N2O emissions from solvent and other product used account for 10% of the national total N2O without LULUCF and increased by 47% compared to 1990. N2O emissions from Waste in 2012 (4% of total emissions without LULUCF) decreased by 45% compared to 1990 levels.

Table 2.5. N2O emissions 1990-2012

Gg N2O	1990	1995	2000	2005	2010	2011	2012
1. Energy	0.03	0.04	0.05	0.06	0.06	0.06	0.06
A. Fuel Combustion (Sectoral Approach)	0.03	0.04	0.05	0.06	0.06	0.06	0.06
1. Energy Industries	0.01	0.02	0.02	0.03	0.03	0.03	0.03
2. Manufacturing Industries and Construction	0.01	0.01	0.01	0.01	0.01	0.01	0.00
3. Transport	0.01	0.01	0.02	0.02	0.02	0.02	0.02
4. Other Sectors	0.00	0.01	0.01	0.01	0.01	0.01	0.01
5. Other	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	0.0001
3. Solvent and Other Product Use	0.14	0.16	0.16	0.18	0.20	0.20	0.20
4. Agriculture	1.55	1.76	1.82	1.74	1.64	1.64	1.64
B. Manure Management	0.40	0.44	0.55	0.52	0.49	0.49	0.49
D. Agricultural Soils	1.15	1.31	1.26	1.22	1.14	1.15	1.14
F. Field Burning of Agricultural Residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. LULUCF	0.01	0.01	0.01	0.05	0.06	0.05	0.07
A. Forest Land	0.01	0.01	0.01	0.05	0.06	0.05	0.07
6. Waste	0.05	0.06	0.07	0.07	0.07	0.08	0.08
B. Waste-water Handling	0.05	0.06	0.07	0.07	0.07	0.08	0.08
Total N2O emissions including LULUCF	1.79	2.02	2.11	2.09	2.03	2.03	2.05
Total N2O emissions excluding LULUCF	1.78	2.02	2.10	2.04	1.98	1.99	1.98
<i>Memo Items:</i>							
<i>International Bunkers</i>	<i>0.02</i>	<i>0.02</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>
<i>Aviation</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>	<i>0.03</i>	<i>0.02</i>	<i>0.03</i>	<i>0.02</i>
<i>Marine</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.01</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>

2.3.4. Halocarbons and sulphur hexafluoride

HFC and PFC are chemical substances, the production of which aims mainly to the substitution of ozone depleting substances (see Montreal Protocol – 1987). HFC and PFC are not harmful to the stratospheric ozone layer and thus their emissions are not controlled by the above-mentioned Protocol. However, many of these substances, as well as SF₆, are powerful greenhouse gases. Apart from being characterized by a high Global Warming Potential (GWP), these gases have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere. Especially sulphur hexafluoride is the most potent greenhouse gas according to the IPCC evaluation.

No actual emissions of these gases were estimated prior to 1993, due to lack of activity data. HFC emissions increased significantly since then, mainly due to the increase of air conditioning equipment in the residential sector, the increasing trend of emissions from the commercial refrigeration and the introduction of new passenger cars with air-conditioning systems, but also due to the implementation of the Montreal Protocol, leading to an increase in the number of equipment operating with f-gases.

Table 2.7. Halocarbons and sulphur hexafluoride emissions for the period 1993-2012 in Gg CO₂ eq.

	1993	1995	2000	2005	2010	2011	2012
Emissions of HFCs (t CO ₂ eq.)	5.4	2,303	28,688	121,195	249,782	259,116	260,439
HFC-32 (kg)	0.5	217	2,240	9,649	35,588	39,627	38,545
HFC-125 (kg)	0.6	262	2,714	12,131	42,606	47,307	46,742
HFC-134a (kg)	2.5	1,049	12,347	56,018	74,578	69,331	69,755
HFC-143a (kg)	0.04	17	173	1,264	2,138	2,223	3,021
HFC-227ea (kg)	NA,NO	NA,NO	67	134	115	114	119
HFC-245ca (kg)	NA,NO	NA,NO	1,741	1,875	1,238	1,271	1,276
Unspecified mix of listed HFCs (t CO ₂ eq.)	NA,NO	NA,NO	1,754	1,890	1,248	1,281	1,287
Emissions of SF ₆ (t CO ₂ eq.)	NA,NO	NA,NO	10.576	72	85	87	87
SF ₆ (kg)	NA,NO	NA,NO	0.4	3	4	4	4

2.4. Description and interpretation of emission trends for indirect greenhouse gases and SO₂

The role of carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane organic volatile compounds (NMVOC) is important for climate change as these gases act as precursors of tropospheric ozone. In this way, they contribute to ozone formation and alter the atmospheric lifetimes of other greenhouse gases. For example, CO interacts with the hydroxyl radical (OH), the major atmospheric sink for methane, to form carbon dioxide. Therefore, increased atmospheric concentration of CO limits the number of OH compounds available to destroy methane, thus increasing the atmospheric lifetime of methane.

These gases are generated through a variety of anthropogenic activities. Emissions for indirect greenhouse gases and SO₂ are presented in Table 2.8. The emissions (except LULUCF) have been estimated by the Department of Labour Inspection that is the competent authority for the preparation of air pollutants inventories under Directive 2001/81/EC.

Table 2.8. Indirect greenhouse gases and SO₂ emissions for the period 1990-2012 in Gg

	1990	1991	1992	1993	1994	1995	1996	1997
Energy								
NO _x	15.61	15.71	17.55	17.98	19.11	17.87	18.38	18.64
CO	50.80	47.38	47.78	46.61	46.09	43.79	42.30	40.21
NMVOC	11.64	11.11	11.31	11.14	11.17	10.79	10.48	10.26
SO ₂	29.76	31.01	35.83	38.00	40.49	37.45	39.52	41.70
Industrial processes								
NO _x	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
CO	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025

NMVOC	0.0090	0.0090	0.0090	0.0091	0.0090	0.0091	0.0090	0.0090
SO2	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
Solvent and other product use								
NOx	NA	NA	NA	NA	NA	NA	NA	NA
CO	NA	NA	NA	NA	NA	NA	NA	NA
NMVOC	2.85	2.50	2.62	2.63	2.85	2.51	2.50	2.69
SO2	NA	NA	NA	NA	NA	NA	NA	NA
Agriculture								
NOx	0.08	0.07	0.08	0.08	0.07	0.07	0.06	0.04
CO	2.03	1.64	2.07	2.08	1.80	1.61	1.46	0.99
NMVOC	2.23	2.20	2.47	2.61	2.59	2.67	2.72	2.70
SO2	NA	NA	NA	NA	NA	NA	NA	NA
LULUCF								
NOx	0.13	0.01	0.00	0.56	0.42	0.13	0.12	0.16
CO	0.06	0.01	0.00	0.28	0.21	0.06	0.06	0.08
NMVOC	NE	NE	NE	NE	NE	NE	NE	NE
SO2								
Waste								
NOx	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0007
CO	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
NMVOC	0.0167	0.0179	0.0190	0.0202	0.0213	0.0224	0.0235	0.0246
SO2	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0007
Total including LULUCF								
NOx	15.83	15.79	17.64	18.62	19.61	18.06	18.56	18.84
CO	52.90	49.03	49.86	48.97	48.10	45.47	43.82	41.28
NMVOC	16.75	15.84	16.44	16.41	16.65	16.00	15.73	15.69
SO2	29.76	31.01	35.83	38.00	40.50	37.45	39.53	41.71

	1998	1999	2000	2001	2002	2003	2004	2005
Energy								
NOx	19.02	19.36	20.86	20.07	20.15	20.29	19.93	19.74
CO	37.31	35.26	33.36	32.02	31.13	30.23	27.48	25.17
NMVOC	9.65	9.18	8.65	8.27	7.67	7.54	6.30	5.62
SO2	45.02	47.36	46.34	43.39	43.71	44.79	38.35	35.45
Industrial processes								
NOx	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
CO	0.0025	0.0025	0.0028	0.0023	0.0025	0.0024	0.0028	0.0023
NMVOC	0.0090	0.0090	0.0099	0.0081	0.0088	0.0084	0.0100	0.0079
SO2	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
Solvent and other product use								
NOx	NA	NA	NA	NA	NA	NA	NA	NA
CO	NA	NA	NA	NA	NA	NA	NA	NA
NMVOC	2.56	2.59	2.77	2.67	3.43	4.11	4.96	5.30
SO2	NA	NA	NA	NA	NA	NA	NA	NA
Agriculture								
NOx	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.02
CO	1.25	1.15	0.91	0.89	0.84	0.73	0.88	0.55
NMVOC	2.72	2.61	2.60	2.69	2.81	2.74	2.72	2.57
SO2	NA	NA	NA	NA	NA	NA	NA	NA
LULUCF								
NOx	1.68	0.00	0.21	0.46	0.78	0.53	0.40	0.94
CO	0.83	0.00	0.11	0.23	0.39	0.26	0.20	0.47
NMVOC	NE	NE	NE	NE	NE	NE	NE	NE
SO2								

Waste								
NOx	0.0007	0.0007	0.0007	0.0007	0.0007	0.0002	NA,NO	NA,NO
CO	0.0014	0.0014	0.0014	0.0014	0.0015	0.0004	NA,NO	NA,NO
NMVOC	0.0256	0.0266	0.0277	0.0287	0.0304	0.0313	0.0323	0.0334
SO2	0.0007	0.0007	0.0007	0.0007	0.0007	0.0002	NA,NO	NA,NO
Total including LULUCF								
NOx	20.76	19.41	21.11	20.56	20.97	20.85	20.37	20.71
CO	39.40	36.41	34.38	33.14	32.35	31.22	28.57	26.20
NMVOC	14.97	14.42	14.06	13.67	13.95	14.43	14.02	13.53
SO2	45.02	47.36	46.34	43.40	43.71	44.79	38.35	35.45

	2006	2007	2008	2009	2010	2011	2012	
Energy								
NOx	19.60	20.06	18.69	18.41	16.88	19.79	19.97	
CO	23.83	23.33	21.35	19.24	14.81	IE,NA,NE,NO	IE,NA,NE,NO	
NMVOC	4.60	4.80	4.58	4.22	3.86	3.67	3.50	
SO2	28.94	26.86	21.58	17.05	21.89	20.93	16.08	
Industrial processes								
NOx	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NO	NA,NO	NA,NO	
CO	0.0020	0.0019	0.0018	0.0017	NA,NE,NO	NA,NE,NO	NA,NE,NO	
NMVOC	0.0071	0.0066	0.0063	0.0060	0.22	0.22	0.01	
SO2	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	0.02	0.02	0.02	
Solvent and other product use								
NOx	NA	NA	NA	NA	NA	NA	NA	
CO	NA	NA	NA	NA	NA	NA	NA	
NMVOC	6.15	5.75	4.78	4.33	5.01	3.27	3.15	
SO2	NA	NA	NA	NA	NA	NA	NA	
Agriculture								
NOx	0.02	0.01	0.01	0.01	0.01	0.00	0.01	
CO	0.42	0.28	0.15	0.22	IE,NA,NE,NO	IE,NA,NE,NO	IE,NA,NE,NO	
NMVOC	2.51	2.49	2.44	2.39	2.39	2.28	2.19	
SO2	NA	NA	NA	NA	NA	NA	NA	
LULUCF								
NOx	0.41	1.88	1.20	0.37	0.96	0.82	1.26	
CO	0.20	0.93	0.60	0.19	0.48	0.41	0.63	
NMVOC	NE	NE	NE	NE	NE	NE	NE	
SO2								
Waste								
NOx	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	
CO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	
NMVOC	0.0342	0.0349	0.0352	0.0353	0.0374	0.0384	0.0401	
SO2	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	
Total including LULUCF								
NOx	20.02	21.95	19.90	18.79	17.85	20.61	21.24	
CO	24.46	24.55	22.10	19.65	15.29	0.41	0.63	
NMVOC	13.30	13.08	11.84	10.97	11.52	9.48	8.90	
SO2	28.94	26.86	21.58	17.05	21.91	20.95	16.10	

2.5. Description and interpretation of emission trends for KP-LULUCF inventory in aggregate and by activity, and by gas

Not estimated

Chapter 3: Energy (CRF sector 1)

3.1. Overview of sector

Carbon dioxide (CO₂) emissions from stationary combustion result from the release of the carbon in fuel during combustion. CO₂ emissions depend on the carbon content of the fuel. During the combustion process, most carbon is emitted as CO₂ immediately. However, some carbon is released as carbon monoxide (CO), methane (CH₄) or non-methane volatile organic compounds (NMVOCs), all of which oxidise to CO₂ in the atmosphere within a period of a few days to about 12 years. The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines) account for all the released carbon as CO₂ emissions. Unoxidised carbon, in the form of particulate matter, soot or ash, is excluded from greenhouse gas emissions totals.

3.1.1. Emissions trends

The energy sector in Cyprus relies on fossil fuel combustion for meeting the bulk of energy requirements. Final consumption in 2012 amounted to approximately 89 PJ compared to 95 PJ in 2011 (6.6% decrease). 99.99% of the consumption in 2012 was from liquid fuels. In previous years a small percentage also originated from solid fuels. In 2012 only 1 kt lignite was consumed, since the larger consumer (cement production) did not use any solid fuel for the production of energy. In comparison to 1990, total fuel consumption in 2012 including biomass increased by 54% (Figure 3.1). Natural gas is not available in Cyprus.

After robust growth rates in the 1980s (average annual growth was 6.1%), economic performance in the 1990s was mixed: real GDP growth was 9.7% in 1992, 1.7% in 1993, 6.0% in 1994, 6.0% in 1995, 1.9% in 1996 and 2.3% in 1997. This pattern underlined the economy's vulnerability to swings in tourist arrivals (i.e. to economic and political conditions in Cyprus, Western Europe, and the Middle East) and the need to diversify the economy. Declining competitiveness in tourism and especially in manufacturing are acting as a drag on growth until structural changes are in effect. This is greatly affecting the energy sector.

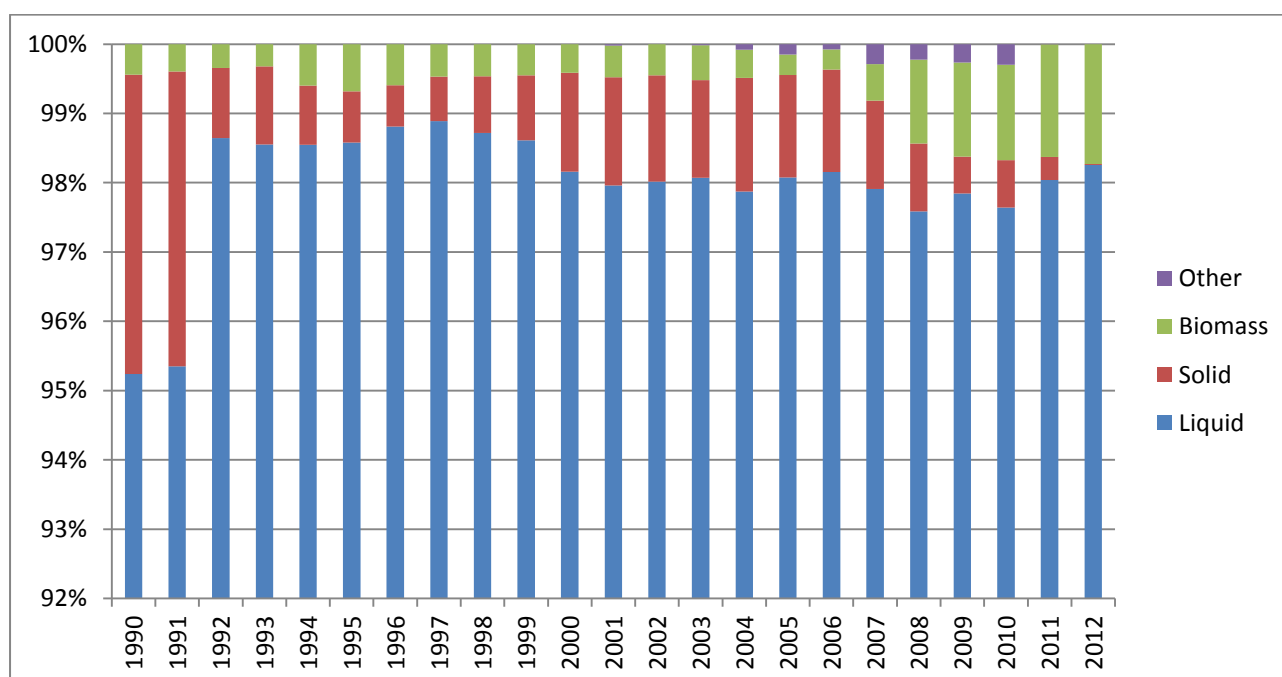


Figure 3.1. Contribution of fuels to the production of energy in Cyprus (1990-2012)

The emissions from the energy sector in Cyprus increased by 69% during the period 1990-2012. The greatest increase in emissions was between 1990 and 2008 (96%), the emission reached their peak (7601 Gg CO₂ eq.). All the emissions in 2012 are from fuel combustion. The contribution of the emissions from the energy sector to the total without LULUCF in 2012 was 70.8% compared to 63.7% in 1990.

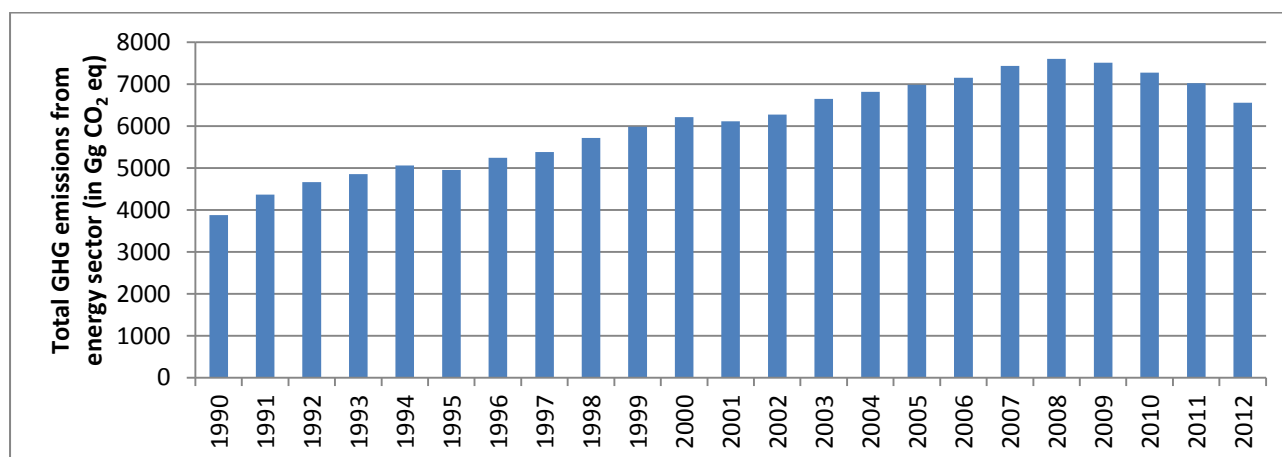


Figure 3.2. Emissions from the energy sector 1990-2012 (sectoral approach)

Energy is mainly responsible for carbon dioxide emissions, while it contributes also to methane and nitrous oxide emissions. In 2012, 99.4% of the emissions from the energy sector were carbon dioxide, 0.29% methane and 0.27% nitrous oxide (Table 3.1). Fugitive emissions from fuels have not been estimated since 2004 when the refining activities stopped in Cyprus. The contribution of each source to the total of the energy sector is presented in Table 3.1.

Table 3.1. Emissions from the energy sector 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	3858	4930	6182	6946	7231	6984	6519
CH ₄ (Gg)	0.45	0.55	0.65	0.69	0.87	0.92	0.89
N ₂ O (Gg)	0.035	0.042	0.053	0.059	0.064	0.062	0.057
Total (Gg CO ₂ eq.)	3879	4954	6212	6979	7269	7022	6556
Gg CO ₂ eq.							
Fuel combustion	3878	4953	6211	6979	7269	7022	6556
Fugitive emissions	0.9	1.2	1.7	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO

3.1.2. Methodology

There are three methods provided in the IPCC Guidelines: two Tier 1 approaches (the 'Reference Approach' and the 'Sectoral Approach') and the Tier 2/Tier 3 approach (a detailed technology-based method, also called 'bottom-up' approach). For the Tier 1 Sectoral Approach, total CO₂ is summed across all fuels (excluding biomass) and all sectors. For Tiers 2 and 3, the Detailed Technology-Based Approach, total CO₂ is summed across all fuels and sectors, plus combustion technologies (e.g. stationary and mobile sources). Both approaches provide more disaggregated emission estimates, but also require more data. For the estimation of emissions for Cyprus, the two Tier 1 approaches i.e. the 'Reference Approach' and the 'Sectoral Approach'. The sectoral approach is presented in this chapter. The reference approach is presented in details in [section 3.2.7](#). A comparison of the results of the two approaches is presented in [section 3.2.8](#).

The calculation of GHG emissions from energy is based on the revised IPCC 1996 Guidelines. Where data is available for installations included in the Emissions Trading System of the EU, emission factors have been reported as country or plant specific. The methodologies applied for the calculation of emissions by source category is presented in Table 3.2.

Table 3.2. Methodology for the estimation of emissions from energy

	CO ₂		CH ₄		N ₂ O	
	Method	EF	Method	EF	Method	EF
FUEL COMBUSTION						
1. Energy industries						
A. Public electricity	CS	CS	D	D	D	D
B. Petroleum refining	D	D	D	D	D	D
2. Manufacturing Industries						
A. Iron and steel	T1	D	D	D	D	D
C. Chemicals	T1	D	D	D	D	D
E. Food processing, beverages and tobacco	T1	D	D	D	D	D
F. Other						
- Non-metallic Minerals	CS,T1	CS,PS	D	D	D	D
- Other	T1	D	D	D	D	D
3. Transport						
A. Civil aviation	OTH	OTH	OTH	OTH	OTH	OTH
B. Road Transportation	T1	D	T1	D	T1	D
4. Other Sectors						
A. Commercial/ Institutional	T1	D	D	D	D	D
B. Residential	T1	D	D	D	D	D
C. Agriculture/ Forestry/ Fisheries	T1	D	D	D	D	D
5. Other						
A. Stationary						
- Other	T1	D	D	D	D	D
B. FUGITIVE EMISSIONS FROM FUELS						
2. Oil and Natural Gas						
A. Oil			D	D		

T1: IPCC methodology Tier 1; D: IPCC default methodology and emission factor; CS: Country specific emission factor; PS: Plant specific emission factor; OTH: Other

Key categories

The results of the key categories assessment are presented in [section 1.5](#).

Uncertainty

The uncertainty analysis is presented in [section 1.7](#).

3.1.3. Completeness

3.2. Fuel combustion (CRF source category 1A)

3.2.1. Source category description

The emissions from the fuel combustion in Cyprus increased by 69% during the period 1990-2012 (Figure 3.3). The greatest increase in emissions was between 1990 and 2008 (96%), the emission reached their peak (7601 Gg CO₂ eq.). The majority of energy related GHG emissions (54%) in 2012 was derived from energy industries, while transport contributes 31%, other sectors 7.6% and manufacturing industries and construction 6.3%.

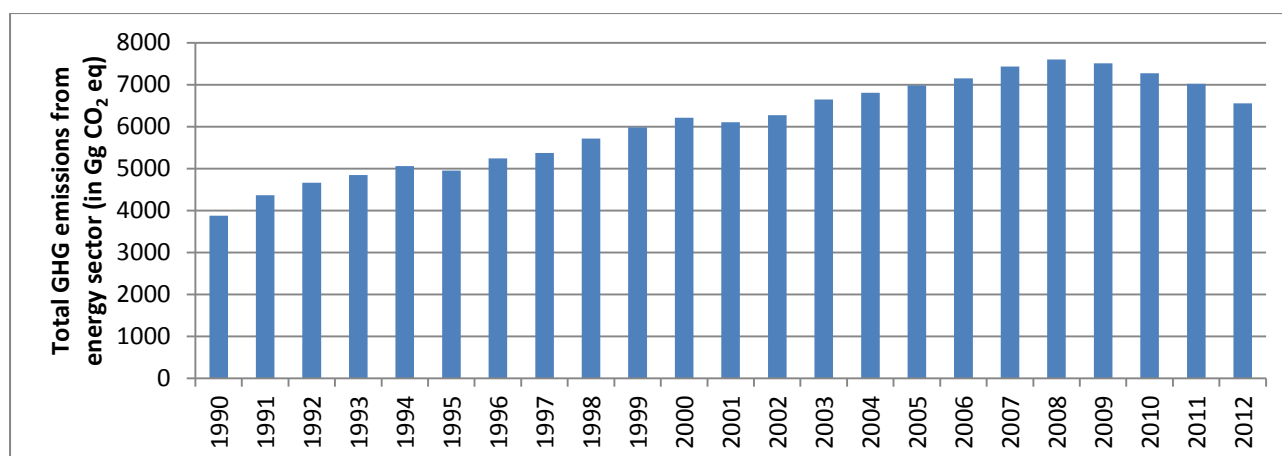


Figure 3.3. Emissions from the energy sector 1990-2012 (sectoral approach)

The substantial increase of GHG emissions from road transport (73% between 1990 and 2012) is directly linked to the increase of vehicles fleet but also to the increase of transportation activity. The renewal of the passenger car fleet and the implied improvement of energy efficiency, limit the increase of GHG emissions. The implemented, adopted and planned measures for the improvement of public transport are expected to moderate the high use of passenger cars.

Energy is mainly responsible for carbon dioxide emissions, while it contributes also to methane and nitrous oxide emissions. In 2012, 99.4% of the emissions from the energy sector were carbon dioxide, 0.29% methane and 0.27% nitrous oxide (Table 3.3). The contribution of each source to the total of the sector is presented in Figure 3.4 and Table 3.3.

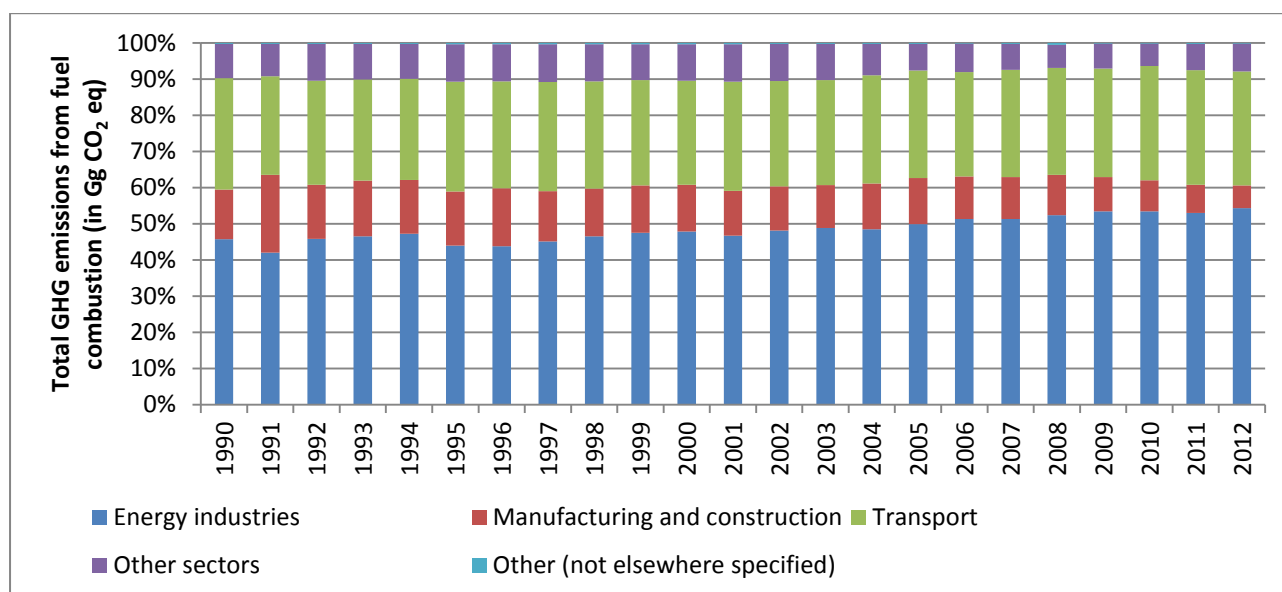


Figure 3.4. Contribution of fuel combustion activities to total emissions

Table 3.3. Emissions from the energy sector 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	3858	4930	6182	6946	7231	6984	6519
CH ₄ (Gg)	0.41	0.49	0.57	0.69	0.87	0.92	0.89
N ₂ O (Gg)	0.03	0.04	0.05	0.06	0.06	0.06	0.06
Total (Gg CO ₂ eq.)	3878	4953	6211	6979	7269	7022	6556

	1990	1995	2000	2005	2010	2011	2012
Gg CO2 eq.							
Energy industries	1773	2177	2970	3483	3880	3722	3557
Manufacturing and construction	532	742	804	889	628	544	415
Transport	1195	1500	1783	2075	2293	2227	2067
Other sectors	367	516	631	510	451	509	500
Other (not elsewhere specified)	11	18	22	22	17	20	17

3.2.2. Methodological issues

Emission factors

The emission factors used are predominately the defaults proposed by the IPCC guidelines. Further details on the emission factor are provided in the methodological issues section of each source.

Activity data

The fuel consumption data published by the National Statistical Service in 2013 for the period 1990-2012 is presented in Table 3.4.

Table 3.4a. Fuel consumption according to the National Energy balance 2013 (1990-1997)

	1990	1991	1992	1993	1994	1995	1996	1997
LIQUID FUELS								
LPG (kt)								
Iron and steel								
Non-metallic minerals								
Food, beverages and tobacco								
Not elsewhere specified (Industry)								
Commercial and public services								
Residential	49	49	55	51	50	51	51	52
Agriculture/forestry								
Gasoline (kt)								
Road	163	170	172	169	180	183	186	191
Jet kerosene (kt)								
International aviation	236	280	272	231	237	260	249	245
Other kerosene (kt)								
Not elsewhere specified (Industry)								
Residential	12	12	17	16	17	17	18	20
Biodiesel (kt)								
Road								
Gas-diesel oil (kt)								
Main activity producer electricity plants			11	3	2	8	6	6
Autoproducer electricity plants								
Road	210	202	246	255	261	285	298	314
Chemical and petrochemical								
Non-metallic minerals								
Mining and Quarrying								
Food, beverages and tobacco								
Not elsewhere specified (Industry)	98	109	132	137	141	153	161	169
Commercial and public services								
Residential								
Agriculture/forestry								
Not elsewhere specified (Other)								
RFO (kt)								
Refinery fuel	11	12	13	13	14	17	16	14

	1990	1991	1992	1993	1994	1995	1996	1997
Main activity producer electricity plants	540	561	645	697	727	662	703	743
Autoproducer electricity plants								
Autoproducer CHP Plants								
Iron and steel								
Non-metallic minerals	37	124	118	100	110	97	111	70
Food, beverages and tobacco								
Not elsewhere specified (Industry)								
Commercial and public services								
Pet-coke (kt)								
Non-metallic minerals		93	85	114	112	125	147	152
Other products (kt)								
Refinery fuel								
Not elsewhere specified (Industry)	40	5						1
Refinery Gas (kt)								
Refinery fuel	18	17	17	13	24	13	12	16
White spirit SBP (kt)								
Not elsewhere specified (Industry)				1		1	1	1
SOLID FUELS								
Other bituminous coal (kt)								
Non-metallic minerals	97	97	26	31	27	20	18	19
Lignite (kt)								
Not elsewhere specified (Other)								
RENEWABLES								
Industrial waste (non-renewable) (TJ)								
Non-metallic minerals								
Solid biofuels (TJ)								
Non-metallic minerals								
Commercial and public services								
Residential								
Agriculture/Forestry								
Not elsewhere specified (Other)	145	120	118	117	85	91	136	70
Charcoal (kt)								
Commercial and public services								
Residential								
Not elsewhere specified (Other)	1	1	1	1	2	7	7	7
Biogases (TJ)								
Main activity producer CHP plants								
Autoproducer CHP plants								
Commercial and public services								
Agriculture/Forestry								

Table 3.4b. Fuel consumption according to the National Energy balance 2013 (1998-2005)

	1998	1999	2000	2001	2002	2003	2004	2005
LIQUID FUELS								
LPG (kt)								
Iron and steel								
Non-metallic minerals								
Food, beverages and tobacco								
Not elsewhere specified (Industry)								
Commercial and public services								
Residential	50	49	53	53	54	58	56	53
Agriculture/forestry								
Gasoline (kt)								

	1998	1999	2000	2001	2002	2003	2004	2005
Road	195	203	206	219	228	252	282	303
Jet kerosene (kt)								
International aviation	258	264	268	314	302	323	295	291
Other kerosene (kt)								
Not elsewhere specified (Industry)								3
Residential	21	20	24	24	31	31	24	13
Biodiesel (kt)								
Road								
Gas-diesel oil (kt)								
Main activity producer electricity plants	12	21	19	4	2	5	8	16
Autoproducer electricity plants								
Road	334	340	350	355	341	351	354	346
Chemical and petrochemical								
Non-metallic minerals								
Mining and Quarrying								
Food, beverages and tobacco								
Not elsewhere specified (Industry)	180	185	191	193	185	190	171	47
Commercial and public services								
Residential								83
Agriculture/forestry								27
Not elsewhere specified (Other)								
RFO (kt)								
Refinery fuel	15	16	16					
Main activity producer electricity plants	811	856	902	897	932	1095	1046	1104
Autoproducer electricity plants								
Autoproducer CHP Plants						2	5	6
Iron and steel								
Non-metallic minerals	68	68	70	54	55	62	68	37
Food, beverages and tobacco								
Not elsewhere specified (Industry)								28
Commercial and public services								1
Pet-coke (kt)								
Non-metallic minerals	150	154	141	133	139	137	146	154
Other products (kt)								
Refinery fuel					16	16		
Not elsewhere specified (Industry)							6	
Refinery Gas (kt)								
Refinery fuel	16	20	19	19	21	21	9	
White spirit SBP (kt)								
Not elsewhere specified (Industry)		1		1				1
SOLID FUELS								
Other bituminous coal (kt)								
Non-metallic minerals	26	30	49	53	53	53	57	52
Lignite (kt)								
Not elsewhere specified (Other)							1	1
RENEWABLES								
Industrial waste (non-renewable) (TJ)								
Non-metallic minerals				18		15	71	138
Solid biofuels (TJ)								
Non-metallic minerals			41	70	90	211	127	38
Commercial and public services								
Residential								
Agriculture/Forestry								

	1998	1999	2000	2001	2002	2003	2004	2005
Not elsewhere specified (Other)	64	88	78	80	74	67	61	58
Charcoal (kt)								
Commercial and public services								
Residential								
Not elsewhere specified (Other)	8	7	5	5	7	7	8	10
Biogases (TJ)								
Main activity producer CHP plants								
Autoproducer CHP plants								
Commercial and public services								
Agriculture/Forestry								

Table 3.4c. Fuel consumption according to the National Energy balance 2013 (2006-2012)

	2006	2007	2008	2009	2010	2011	2012
LIQUID FUELS							
LPG (kt)							
Iron and steel	1	1		1	1	1	1
Non-metallic minerals					1	1	
Food, beverages and tobacco	3	3	3	3	3	4	3
Not elsewhere specified (Industry)	1	1	1	1			1
Commercial and public services	13	13	14	13	13	14	14
Residential	35	36	34	36	34	38	37
Agriculture/forestry	1	1	1	1	1	1	1
Gasoline (kt)							
Road	323	352	373	383	390	385	372
Jet kerosene (kt)							
International aviation	300	287	286	266	271	296	265
Other kerosene (kt)							
Not elsewhere specified (Industry)							
Residential	16	16	14	19	14	16	17
Biodiesel (kt)							
Road		1	16	17	17	18	18
Gas-diesel oil (kt)							
Main activity producer electricity plants	7	16	23	92	158	112	214
Autoproducer electricity plants		1				2	2
Road	323	337	330	321	329	313	277
Chemical and petrochemical							1
Non-metallic minerals							4
Mining and Quarrying							4
Food, beverages and tobacco							5
Not elsewhere specified (Industry)	24	20	18	18	14	16	2
Commercial and public services	19	18	20	19	23	20	16
Residential	98	89	78	83	70	80	78
Agriculture/forestry	28	28	26	24	23	25	24
Not elsewhere specified (Other)	4	6	13	5	5	6	5
RFO (kt)							
Refinery fuel							
Main activity producer electricity plants	1137	1174	1219	1163	1053	1058	896
Autoproducer electricity plants		4	3	2	2	2	
Autoproducer CHP Plants	7	14	12	11	8	2	2
Iron and steel							3
Non-metallic minerals	35	38	38	30	25	15	12
Food, beverages and tobacco							9
Not elsewhere specified (Industry)	19	27	25	17	20	34	1

	2006	2007	2008	2009	2010	2011	2012
Commercial and public services	2	2	2	2	2	2	3
Pet-coke (kt)							
Non-metallic minerals	146	143	152	144	116	100	94
Other products (kt)							
Refinery fuel							
Not elsewhere specified (Industry)							
Refinery Gas (kt)							
Refinery fuel							
White spirit SBP (kt)							
Not elsewhere specified (Industry)	1	1					
SOLID FUELS							
Other bituminous coal (kt)							
Non-metallic minerals	54	49	40	21	26	12	
Lignite (kt)							
Not elsewhere specified (Other)	1	1	1	1	1	1	1
RENEWABLES							
Industrial waste (non-renewable) (TJ)							
Non-metallic minerals	73	288	239	276	299	4	
Solid biofuels (TJ)							
Non-metallic minerals	61	133	281	304	347	306	141
Commercial and public services		14	15	15	15	13	15
Residential	74	95	123	222	84	123	129
Agriculture/Forestry	5						
Not elsewhere specified (Other)							
Charcoal (kt)							
Commercial and public services	5	7	7	6	6	6	6
Residential	5	6	6	5	5	6	6
Not elsewhere specified (Other)							
Biogases (TJ)							
Main activity producer CHP plants				13	21	92	91
Autoproducer CHP plants		9	78	131	148	180	192
Commercial and public services				11	12	11	11
Agriculture/Forestry	1	6		54	93	165	182

Due to the unavailability of consumption data for several years and sectors, using the data as is, would create issues of consistence and comparability. Therefore it was decided to complete the period using the following assumptions. The resulting data used for the estimation of the emissions will be presented at the methodological issues section of the appropriate sector. The following pages present the assumptions made to allocate consumption to activities where data was not available.

LGP

(a) All consumption during 1990-2005 was allocated to residential. (b) According to the ETS reports submitted by the cement installations, LPG has been consumed for cement production during 2006-2012 whereas the energy balance only shows consumption by the specific sector only for the years 2010 and 2011. Therefore all the consumption from Not elsewhere specified (Industry) for the years 2006-2009 and 2012 was moved to non-metallic minerals. With this, data is available for all the consumers of LPG for 2006-2012. Since there is no particular trend during this period, it was decided to use the allocation of consumption of 2006 (Table 3.5) to estimate the consumption per sector for the period 1990-2005.

Table 3.5. Contribution of different activities to LPG consumption (2006) used to allocate consumption to different sectors for 1990-2005

Activity	Consumption
Iron and steel	1.9%
Non-metallic minerals	1.9%
Food, beverages and tobacco	5.6%
Commercial and public services	24.1%
Residential	64.8%
Agriculture/forestry	1.9%

Jet kerosene

According to the energy balance, all jet kerosene is consumed by international aviation. To estimate the emissions from domestic aviation, the available information on landings and take off (LTOs) were used. The fuel consumption estimated for LTOs was subtracted from the jet kerosene from international aviation.

Other kerosene

Other kerosene consumption was recorded for non-elsewhere specified (industry) only for 2005. For the same year the consumption of residential sector was much lower than other years. The consumption from non-elsewhere specified (industry) of 2005 was moved to residential.

Gas-diesel oil

According to the energy balance of 2012, the consumers of gas-diesel oil are Main activity producer electricity plants, Autoproducer electricity plants, Road, Chemical and petrochemical, Non-metallic minerals, Mining and Quarrying, Food, beverages and tobacco, Not elsewhere specified (Industry), Commercial and public services, Residential, Agriculture/forestry and Not elsewhere specified (Other). Consumption data for all these activities is only available for 2012.

(a) For the years 2006-2011 all consumption from industrial activities (incl. autoproducers) was included in Not elsewhere specified (Industry). The consumption was allocated to the industrial sectors according to the ratio of 2012 (Table 3.6).

Table 3.6. Contribution of different activities to gas-diesel oil consumption (2012) used to allocate consumption to Chemical and petrochemical, Non-metallic minerals, Mining and Quarrying, Food, beverages and tobacco, Not elsewhere specified (Industry) for 2006-2011

Activity	Consumption
Chemical and petrochemical	6%
Non-metallic minerals	25%
Mining and Quarrying	25%
Food, beverages and tobacco	31%
Not elsewhere specified (Industry)	13%

(b) For 2005, consumption is available for Main activity producer electricity plants, road, Residential and Agriculture/forestry. Due to the large increase of the Not elsewhere specified (Industry) compare to 2006-2011, it is assumed that consumption by Commercial and public services, and Not elsewhere specified (Other) is included in the Not elsewhere specified (Industry). The assumed contribution of each sector to the consumption allocated to Not elsewhere specified (Industry) is based on the 2012 consumption ratio for these sectors (Table 3.7).

Table 3.7. Contribution of different activities to gas-diesel oil consumption (2012) used to allocate consumption to Chemical and petrochemical, Non-metallic minerals, Mining and Quarrying, Food, beverages and tobacco, Not elsewhere specified (Industry), Commercial and public services, Not elsewhere specified (Other) from Not elsewhere specified (Industry) for 2005

Activity	Consumption
Chemical and petrochemical	3%
Non-metallic minerals	11%
Mining and Quarrying	11%
Food, beverages and tobacco	14%
Not elsewhere specified (Industry)	5%
Commercial and public services	43%
Not elsewhere specified (Other)	14%

(c) For 1990-2004 all consumption other than Main activity producer electricity plants and Road is allocated to Not elsewhere specified (Industry). Autoproducer electricity plants are assumed to be in non-metallic minerals. The consumption ratio compared to Not elsewhere specified (Industry) is assumed to be the same as 2012 (Table 3.8).

Table 3.8. Contribution of different activities to gas-diesel oil consumption (2012) used to allocate consumption to from Not elsewhere specified (Industry) for 1990-2004

Activity	Consumption
Chemical and petrochemical	0.7%
Non-metallic minerals	2.9%
Mining and Quarrying	2.9%
Food, beverages and tobacco	3.6%
Not elsewhere specified (Industry)	1.4%
Commercial and public services	11.5%
Residential	56.1%
Agriculture/ forestry	17.3%
Not elsewhere specified (Other)	3.6%

RFO

(a) Autoproducer electricity Food, beverages and tobacco plants and Autoproducer CHP Plants are operated for the production of non-metallic minerals. Therefore all the consumption allocated to these two activities was moved to non-metallic minerals. (b) The consumption for iron and steel, and food, beverages and tobacco, is only available for 2012. For 2005-2012 consumption is also reported for not elsewhere specified (Industry). The consumption of not elsewhere specified (Industry) for the years 2005-2011 was allocated to iron and steel, and food, beverages and tobacco and not elsewhere specified (Industry), according to the consumption ratio of 2012 (Table 3.9).

Table 3.9. Contribution of different activities to RFO consumption (2012) used to allocate consumption to iron and steel, and food, beverages and tobacco and not elsewhere specified (Industry) for 2005-2011

Activity	Consumption
Iron and steel	23.1%
Food, beverages and tobacco	69.2%
Not elsewhere specified (industry)	7.7%

(c) All consumption during 1990-2004 except Refinery fuel and Main activity producer electricity plants was allocated to non-metallic minerals. This consumption was allocated to sectors Iron and steel, Non-metallic minerals, Food, beverages and tobacco, Not elsewhere specified (Industry) and Commercial and public services, according to the 2012 ratio (Table 3.10).

Table 3.10. Contribution of different activities to RFO consumption (2012) used to allocate consumption Iron and steel, Non-metallic minerals, Food, beverages and tobacco, Not elsewhere specified (Industry) and Commercial and public services for 1990-2004

Activity	Consumption
Iron and steel	10.0%
Non-metallic minerals	46.7%
Food, beverages and tobacco	30.0%
Not elsewhere specified (Industry)	3.3%
Commercial and public services	10.0%

Bitumen

All bitumen consumption during 1990-2005 is reported under non-elsewhere specified (industry), while for 2006-2012 all consumption is reported in construction. As construction does not have a separate source of emissions according to the IPCC guidelines, the consumption for all years was moved to non-elsewhere specified (industry).

Pet-coke

Pet-coke in Cyprus is consumed only for cement production. According to the information received from the cement installations, pet-coke was consumed in 1990. The energy balance shows that pet-coke was not imported in 1990. To reduce the inconsistency and the impact on the times series, it was decided to move the “other liquid fuels” consumption of 1990 to cement as pet-coke.

Solid biofuels

(a) All consumption of solid biofuels for the period 1990-1999 is reported as non-elsewhere specified (other). (b) For 2001-2005 consumption is reported as non-elsewhere specified (other) and non-metallic minerals. (c) Consumption in agriculture is reported only for 2006.

The consumption of agriculture of 2006 was moved to commercial and public services for which consumption is reported for 2007-2012. All the consumption reported as non-elsewhere specified (other) for 1990-2005 was distributed to commercial and public services, and residential sector according to the consumption ratio the two sectors had in 2007 (Table 3.11).

Table 3.11. Contribution of different activities to solid biofuels consumption (2007) used to allocate consumption to commercial and public services, and residential for 1990-2005

Activity	Consumption
Commercial and public services	12.8%
Residential	87.2%

Charcoal

All charcoal consumption for the period 1990-2005 was reported as non-elsewhere specified (other). For the period 2006-2012, the charcoal consumption is allocated to commercial and public services, and residential sectors using the ratio of 50:50. This ratio was used to allocate charcoal consumption to the two sectors for the period 1990-2005.

Biogases

Biogas consumption is available in Cyprus after 2006, when the first anaerobic digester of the country started its operation. The biogas in Cyprus is consumed onsite to produce electricity and heat through a combined heat power (CHP) generator. Therefore, the biogas consumed by “Main activity producer CHP plants” (2009-2012) and “Autoproducer CHP plants” (2007-2012) was moved to agriculture.

3.2.3. Energy industries (CRF 1A1)

3.2.3.1. Source category description

Prior to the introduction of electricity production from renewable energy sources, the Electricity Authority of Cyprus (EAC) was the solely provider of electrical energy in Cyprus. EAC remains the single electricity producer for the public. Heat production (included in 1A1A) and manufacture of solid fuels and other energy industries (1A1C) do not occur in Cyprus. Refining activities in the country stopped in 2004 following a government decision not to upgrade it to EU standards, instead turning it into a fuel import and storage terminal. Consequently emissions from petroleum refinery (1A1B) are reported for the years 1990-2004 only.

The consumption of fossil fuels by energy industries in 2012 (45.7 PJ) increased by 109% compared to 1990 (21.8 PJ). Between 2011 and 2012 the consumption reduced by 5%. Since 2005, when the refinery stopped its operations, the emissions from energy industries are entirely caused by the production of electricity (1A1A). Emissions from energy industries account for 38.4% of total national emissions without LULUCF for 2012, while in 1990 the contribution was 25.3%. The total GHG emissions from energy industries in 2012 (3.5 Tg CO₂ eq.) increased by 101% compared to 1990 (1.8 Tg CO₂ eq.). The emissions from energy industries are presented in Table 3.12 and Figure 3.5. Since 2009, a decreasing trend of emissions has been observed. This decreasing trend is attributed to the penetration of renewable energy technologies to the energy mix, and to the economic recession that the country is facing since 2010.

Table 3.12. Emissions from energy industries 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	1767	2170	2961	3472	3868	3710	3546
CH ₄ (Gg)	0.07	0.09	0.12	0.14	0.15	0.14	0.14
N ₂ O (Gg)	0.014	0.017	0.023	0.027	0.030	0.029	0.027
Total (Gg CO ₂ eq.)	1773	2177	2970	3483	3880	3722	3557
Gg CO ₂ eq.							
Public electricity and heat production	1681	2083	2860	3483	3880	3722	3557
Petroleum Refining	91.4	94.0	110.1	NO	NO	NO	NO

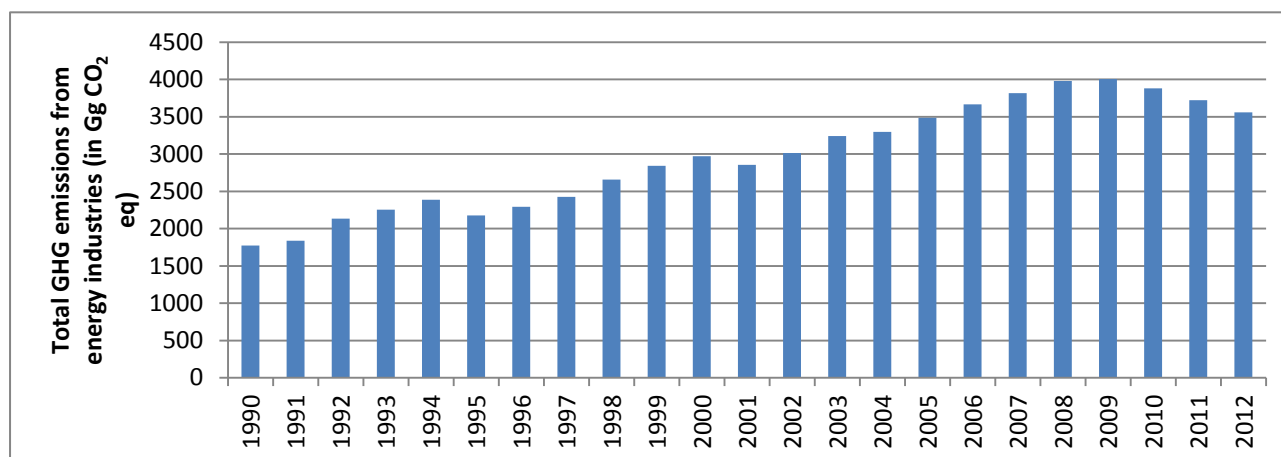


Figure 3.5. Emissions from energy industries 1990-2012

3.2.3.2. Methodological issues

Carbon dioxide emissions

Public electricity and heat production

The IPCC approach to the calculation of emission inventories encourages the use of fuel statistics collected by an officially recognised national body, as this is usually the most appropriate and accessible activity data. As already

mentioned, there is only one electricity producing company in Cyprus (EAC), therefore the fuel consumption for public electricity and heat production was obtained from this one company. The fuel consumption data for all the years was obtained in kt. The fuel consumption data used for the years 1990-2004 is presented in Table 3.13.

Table 3.13. Fuel consumption data obtained from the electricity production company in Cyprus (1990-2004)

Fuel consumption (kt)	1990	1991	1992	1993	1994	1995	1996	1997
HFO	540.4	560.5	644.6	694.8	726.4	661.2	702.5	742.9
Diesel	0.0	0.0	10.5	3.5	2.0	8.2	5.9	5.8

	1998	1999	2000	2001	2002	2003	2004	
HFO	810.9	856.1	900.5	893.8	930.8	1000.3	1042.1	
Diesel	11.6	21.0	18.7	3.7	1.6	5.1	8.4	

Detailed data on fuel consumption and other parameters are submitted annually by the installation since 2005 in compliance to the Emissions Trading System law (110(I)/2011). The data collected through the ETS for the period 2005-2012 and used for the estimation of the emissions is presented in Table 3.14.

Table 3.14. Data collected through the ETS for electricity production in Cyprus (2005-2012)

	2005	2006	2007	2008	2009	2010	2011	2012
Fuel consumption (kt)								
HFO	1103	1137	1175	1219	1163	1053	1058	896
Diesel	16	7	16	23	92	158	112	214
Net calorific value (TJ/kt)*								
HFO	40.446	40.460	40.463	40.690	40.795	40.641	40.741	40.791
Diesel	42.700	42.700	42.700	42.563	42.653	42.942	42.701	42.701
CO2 emissions (Gg)								
HFO	3421.2	3632.1	3751.9	3896.3	3707.6	3377.5	3373.4	2869.8
Diesel	50.60	21.28	49.72	70.98	284.84	490.53	336.65	676.13

* weighted average based on consumption

The emissions for 1990-2004 were estimated using the implied emission factors derived from the annual report of the company for 2005 in compliance with the ETS law which are 76.67 tCO₂/TJ HFO and 72.43 tCO₂/TJ diesel. For the years 2005-2012, the CO₂ emissions as reported by the company in compliance with the ETS law have been used (Table 3.14). The emission factor was multiplied with the fuel consumption of the respective fuel. This method has been considered as a country specific method, since it does not follow the methodologies proposed by the IPCC guidelines.

Petroleum refining

Data for the consumption of fuel for petroleum refining was obtained from the National Statistical Service in kt (Table 3.15). No information is available on the characteristics of the consumption reported as other oil products. The fuel consumption was converted to TJ using the default NCVs of 40.19 TJ/kt RFO, 40.19 TJ/kt other oil product and 48.15 TJ/kt refinery gas. Carbon emission factors are also the defaults proposed by the revised IPCC 1996 guidelines (workbook, pg. 1.6); i.e. 21.1 tC/TJ RFO, 20 tC/TJ other oil product and 18.2 tC/TJ refinery gas. Oxidation factor is assumed 0.99 as proposed as default for oil by the revised IPCC 199 guidelines (workbook, pg. 1.8).

Table 3.15. Fuel consumed for petroleum refining in Cyprus (1990-2004)

Fuel consumption (kt)	1990	1991	1992	1993	1994	1995	1996	1997
RFO	11	12	13	13	14	17	16	14
Other products	0	0	0	0	0	0	0	0
Refinery gas	18	17	17	13	24	13	12	16

	1998	1999	2000	2001	2002	2003	2004	
RFO	15	16	16	0	0	0	0	
Other products	0	0	0	0	16	16	0	
Refinery gas	16	20	19	19	21	21	9	

Non-Carbon dioxide emissions

Non-CO2 emissions were estimated using the default emission factors proposed by the revised IPCC1996 methodology for energy industries (reference manual, pg. 1.35 and 1.36); i.e. 3 kg CH₄/TJ liquid fuel and 0.6 kg N₂O/TJ liquid fuel.

3.2.3.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.2.3.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.2.3.5. Source-specific recalculations

Recalculations have taken place for the source Public electricity and Heat production for the years 1990-2004. The emissions' estimates were revised because of revision of methodology. For the previous submission the T1 methodology proposed by the revised IPCC guidelines was used. The resulting emission factors of T1 were 76.59 tCO₂/TJ for RFO and 73.33 tCO₂/TJ for diesel. The emission factor used for this submission was 76.67 tCO₂/TJ for RFO and 72.43 tCO₂/TJ for diesel. These emission factors are the implied emission factors from the ETS reports of 2005 for the three installations producing electricity. The changes in the emissions between 2013 and 2014 submission and the impact to the emissions of the source are presented in Table 3.16.

Table 3.16. Changes caused by recalculations

	1990	1991	1992	1993	1994	1995	1996	1997
NIR02013	1771	1833	2131	2252	2384	2175	2290	2421
NIR2014	1676	1738	2032	2165	2259	2076	2197	2322
% difference	-5.4%	-5.2%	-4.7%	-3.8%	-5.2%	-4.5%	-4.1%	-4.1%

	1998	1999	2000	2001	2002	2003	2004	
NIR02013	2655	2841	2968	2850	3012	3239	3294	
NIR2014	2551	2721	2851	2783	2892	3118	3258	
% difference	-3.9%	-4.2%	-3.9%	-2.4%	-4.0%	-3.7%	-1.1%	

3.2.3.6. Source-specific planned improvements

There are no planned improvements for Public electricity and Heat production.

3.2.4. Manufacturing industries and construction (CRF 1A2)

3.2.4.1. Source category description

Emissions from energy consumption for the production of steam and process heat are mainly reported under Manufacturing industry and construction.

Even though the shock inflicted on the manufacturing sector by the Turkish invasion of 1974 was severe, recovery during the period 1975-1983 was remarkable. By 2002 the sector accounted for about 10% of GDP and 12% of employment. However, during the past decade, the manufacturing industry of Cyprus has been going through difficult times, experiencing a fall in the growth of production, exports and employment. This development has been the result

of erosion in competitiveness, both abroad and in the local market, at a time of increasingly intensified, international competition. At the root of these problems lie the structural weaknesses of the sector, the drastic reduction of tariff protection due to the participation of Cyprus in the World Trade Organization, the rising labour costs and low productivity. As a result the share of the manufacturing sector in the Gross Domestic Product and in employment remained stagnant. International competition is increasingly intensified mainly from two directions: on the one hand, the high-wage producers, who have combined design, quality and new forms of flexible production to cut working and capital costs and improve response times and on the other, the low-wage mass producers of South-East Asia.

The main industrial activities that take place in Cyprus are food and beverage processing, cement and gypsum production, light chemicals (predominately pharmaceuticals), metal and wood products. The industrial sector in 2012 registered a negative growth rate in real terms for a second year in a row.

The GHG emissions caused by energy consumption in manufacturing industries and construction (Figure 3.6) in 2012 were 414 Gg CO₂ eq. Between 1990 and 2012, emissions decreased by 22%, while the corresponding decrease in fuel consumption was 16%. There is no available information to explain the large change in emissions between 1990 and 1991.

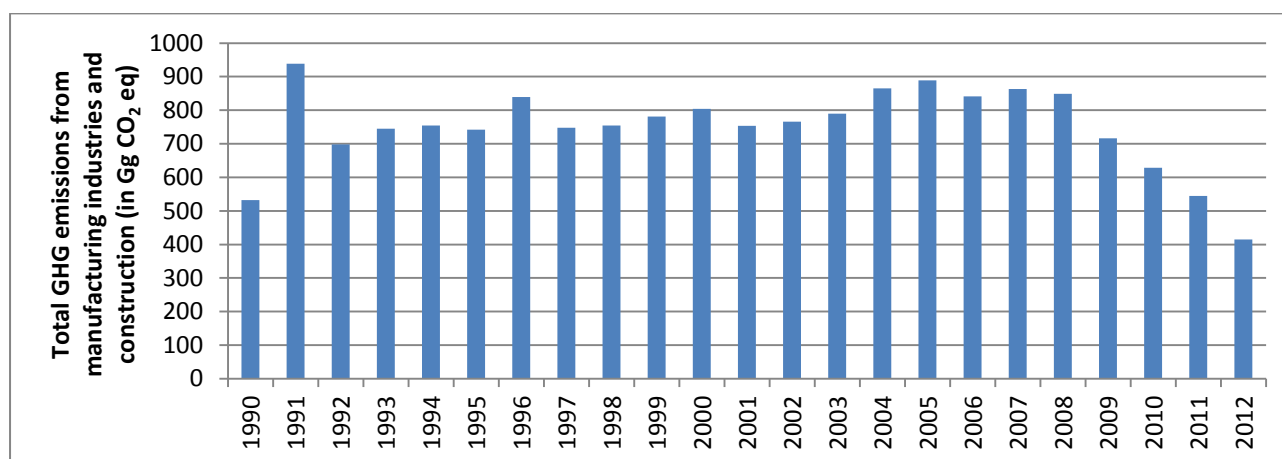


Figure 3.6 Emissions from energy consumption in manufacturing industries and construction 1990-2012

Previous submissions only included cement and other industries in this source. This is the first submission for which emissions are reported for other industrial activities. The reason this is possible for NIR2014 is that the Statistical Service published energy consumption for activities other than cement. The methodology applied to estimate for fuel consumption allocation to sectors has already been presented in [section 3.2.1.2](#).

3.2.4.2. Methodological issues

Data

The data used to estimate the emissions for the industrial activities from energy consumption in manufacturing industries and construction 1990-2012 is presented in Table 3.17.

Table 3.17. Fuel consumption in manufacturing industries and construction 1990-2012 (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Iron & steel									
LPG (kt)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9
RFO (kt)	3.7	12.4	11.8	10.0	11.0	9.7	11.1	7.0	6.8
Chemical									
Gas-diesel oil (kt)	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.2	1.3
Food, beverages & tobacco									
LPG (kt)	2.7	2.7	3.1	2.8	2.8	2.8	2.8	2.9	2.8

Gas-diesel oil (kt)	3.5	3.9	4.7	4.9	5.1	5.5	5.8	6.1	6.5
RFO (kt)	11.1	37.2	35.4	30.0	33.0	29.1	33.3	21.0	20.4
Non-metallic minerals									
Pet-coke (kt)	40.0	93.0	85.0	114.0	112.0	125.0	147.0	152.0	150.0
RFO (kt)	17.3	57.9	55.1	46.7	51.3	45.3	51.8	32.7	31.7
Gas-diesel oil (kt)	5.6	6.3	7.6	7.9	8.1	8.8	9.3	9.7	10.4
LPG (kt)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9
Other bituminous coal (kt)	97.0	97.0	26.0	31.0	27.0	20.0	18.0	19.0	26.0
Solid biomass (TJ)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial waste (TJ) *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other									
Gas-diesel oil (kt)	1.4	1.6	1.9	2.0	2.0	2.2	2.3	2.4	2.6
RFO (kt)	1.2	4.1	3.9	3.3	3.7	3.2	3.7	2.3	2.3
Other oil products (kt)	0.0	5.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
White spirit (kt)	0.0	0.0	0.0	1.0	0.0	1.0	1.0	1.0	0.0

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Iron & steel									
LPG (kt)	0.9	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
RFO (kt)	6.8	7.0	5.4	5.5	6.4	7.3	6.5	4.4	6.2
Chemical									
Gas-diesel oil (kt)	1.3	1.4	1.4	1.3	1.4	1.2	1.3	1.5	1.3
Food, beverages & tobacco									
LPG (kt)	2.7	2.9	2.9	3.0	3.2	3.1	2.9	3.0	3.0
Gas-diesel oil (kt)	6.7	6.9	6.9	6.7	6.8	6.2	6.4	7.5	6.3
RFO (kt)	20.4	21.0	16.2	16.5	19.2	21.9	19.4	13.2	18.7
Non-metallic minerals									
Pet-coke (kt)	154.0	141.0	133.0	139.0	137.0	146.0	154.0	146.0	143.0
RFO (kt)	31.7	32.7	25.2	25.7	29.9	34.1	43.0	42.0	56.0
Gas-diesel oil (kt)	10.6	11.0	11.1	10.6	10.9	9.8	10.2	12.0	11.0
LPG (kt)	0.9	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Other bituminous coal (kt)	30.0	49.0	53.0	53.0	53.0	57.0	52.0	54.0	49.0
Solid biomass (TJ)	0.0	41.0	70.0	90.0	211.0	127.0	38.0	61.0	133.0
Industrial waste (TJ) *	0.0	0.0	18.0	0.0	15.0	71.0	138.0	73.0	288.0
Other									
Gas-diesel oil (kt)	2.7	2.7	2.8	2.7	2.7	2.5	2.5	3.0	2.5
RFO (kt)	2.3	2.3	1.8	1.8	2.1	2.4	2.2	1.5	2.1
Other oil products (kt)	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0
White spirit (kt)	1.0	0.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0

	2008	2009	2010	2011	2012				
Iron & steel									
LPG (kt)	0.0	1.0	1.0	1.0	1.0				
RFO (kt)	5.8	3.9	4.6	7.8	3.0				
Chemical									
Gas-diesel oil (kt)	1.1	1.1	0.9	1.0	1.0				
Food, beverages & tobacco									
LPG (kt)	3.0	3.0	3.0	4.0	3.0				
Gas-diesel oil (kt)	5.6	5.6	4.4	5.0	5.0				
RFO (kt)	17.3	11.8	13.8	23.5	9.0				
Non-metallic minerals									
Pet-coke (kt)	152.0	144.0	116.0	100.0	94.0				
RFO (kt)	53.0	43.0	35.0	19.0	14.0				
Gas-diesel oil (kt)	9.0	9.0	7.0	10.0	10.0				

LPG (kt)	1.0	1.0	1.0	1.0	1.0				
Other bituminous coal (kt)	40.0	21.0	26.0	12.0	0.0				
Solid biomass (TJ)	281.0	304.0	347.0	306.0	141.0				
Industrial waste (TJ) *	239.0	276.0	299.0	4.0	0.0				
Other									
Gas-diesel oil (kt)	2.3	2.3	1.8	2.0	2.0				
RFO (kt)	1.9	1.3	1.5	2.6	1.0				
Other oil products (kt)	0.0	0.0	0.0	0.0	0.0				
White spirit (kt)	0.0	0.0	0.0	0.0	0.0				

* non-renewable

Methodology

The emissions from energy use in manufacturing industries and construction were estimated using predominately the revised IPCC 1996 guidelines. Details for each industrial activity are presented below.

Iron and steel: the liquid fuels are consumed by iron and steel industries, namely LPG and RFO (Table 3.17). Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.18). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil, manufacturing & construction); i.e. 2 kg CH₄/TJ and 0.6 kg N₂O/TJ.

Chemicals: according the energy balance only gas-diesel oil is consumed by chemical industries (Table 3.17). Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.18). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil, manufacturing & construction); i.e. 2 kg CH₄/TJ and 0.6 kg N₂O/TJ.

Food processing, beverages and tobacco: according the energy balance the fuels consumed by food processing, beverages and tobacco industries are LPG, gas-diesel oil and RFO (Table 3.17). Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.18). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil, manufacturing & construction); i.e. 2 kg CH₄/TJ and 0.6 kg N₂O/TJ.

Non-metallic minerals: according the energy balance the non-metallic minerals industries consume LPG, gas-diesel oil, RFO, pet-coke, other bituminous coal, solid biomass and non-renewable waste (Table 3.17).

All liquid fuel consumption (LPG, gas-diesel oil, RFO and pet-coke) was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.18). For all liquid fuels except pet-coke, the oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used for all liquid fuels except pet-coke is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). Pet-coke is consumed only by two cement producing installations during 1990-2011, which merged into one in 2011. These installations have been submitting annual emissions' report according to the requirements of the ETS law 110(I)/2011, since 2005. The CO₂ emissions from pet-coke for the period 2005-2012 were used as reported for the ETS. CO₂ emissions for the period 1990-2004 were estimated using the IEF of 2005, resulting from the division of CO₂ emissions by the TJ fuel consumed (88.59 t CO₂/TJ). CH₄ and N₂O emissions for all liquid fuels were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil, manufacturing & construction); i.e. 2 kg CH₄/TJ and 0.6 kg N₂O/TJ.

Other bituminous coal was consumed during the period 1990-2011 by only one cement-producing installation, which has been submitting annual emissions' report according to the requirements of the ETS law 110(I)/2011, since 2005. Fuel consumption for the period 2005-2011 was obtained in TJ from the annual ETS reports. Fuel consumption for the period 1990-2004 was converted to TJ with the NCV of the first ETS report submitted (i.e. 2005), which was 29.824 TJ/kt. The CO₂ emissions from other bituminous coal for the period 2005-2012 were used as reported for the ETS. CO₂ emissions for the period 1990-2004 were estimated using the IEF of 2005, resulting from the division of CO₂ emissions by the TJ fuel consumed (92.60 t CO₂/TJ). CH₄ and N₂O emissions for other bituminous coal were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, coal, manufacturing & construction); i.e. 10 kg CH₄/TJ and 1.4 kg N₂O/TJ.

Solid biomass data was available in TJ. Solid biomass is consumed by only one cement-producing installation, which has been submitting annual emissions' report according to the requirements of the ETS law 110(I)/2011, since 2005. The CO₂ emissions from solid biomass for the period 2005-2012 were used as reported for the ETS. CO₂ emissions for the period 1990-2004 were estimated using the IEF of 2005, resulting from the division of CO₂ emissions by the TJ fuel consumed (105 t CO₂/TJ). CH₄ and N₂O emissions for solid biomass were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, other biomass and waste, manufacturing & construction); i.e. 30 kg CH₄/TJ and 1.4 kg N₂O/TJ.

Non-renewable waste data was available in TJ. Non-renewable waste is consumed by only one cement-producing installation, which has been submitting annual emissions' report according to the requirements of the ETS law 110(I)/2011, since 2005. The CO₂ emissions from non-renewable waste for the period 2005-2012 were used as reported for the ETS. CO₂ emissions for the period 1990-2004 were estimated using the IEF of 2005, resulting from the division of CO₂ emissions by the TJ fuel consumed (81.5 t CO₂/TJ). CH₄ and N₂O emissions for solid biomass were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, other biomass and waste, manufacturing & construction); i.e. 30 kg CH₄/TJ and 1.4 kg N₂O/TJ.

Not elsewhere specified (Industry): according the fuels consumed by unspecified industry is gas-diesel oil, RFO, Other oil products and White spirit (Table 3.17). Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.18). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil, manufacturing & construction); i.e. 2 kg CH₄/TJ and 0.6 kg N₂O/TJ.

Table 3.18. Parameters used for the estimation of emissions

	NCV (TJ/kt)	CEF (tC/TJ)	IEF (tCO ₂ /TJ)
Gas-diesel oil	43.33	20.2	
RFO	40.19	21.1	
Other oil products	40.19	20	
White spirit (assumed other oil product)	40.19	20	
Pet-coke	31.00		88.59
LPG	47.31	17.2	
Other bituminous coal	29.824		92.6
Solid biomass			105
Non-renewable waste			81.5

3.2.4.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.2.4.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.2.4.5. Source-specific recalculations

The emissions from fuel consumption in manufacturing industries and construction have been recalculated according to the (a) new data and new assumptions applied for the years that data was not available as presented in [section 3.2.1.2](#) and (b) revised method for estimation of emissions for activities for which ETS data also exists. The changes in the data are presented in Table 3.19. The fuel consumption of Iron and steel, chemical and food etc. industries is not presented for NIR2013 because no data was available. The impact of the changes on the emissions from fuel consumption in manufacturing industries and construction is presented in Table 3.20 and Figure 3.7.

Table 3.19. Changes in activity data for fuel consumption in manufacturing industries and construction between NIR2013 and NIR2014

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013											
Non-metallic minerals											
Pet-coke (kt)	85	93	85	114	112	125	147	152	150	154	141
RFO (kt)	37	124	118	100	110	97	111	70	68	68	70
Gas-diesel oil (kt)	0	0	0	0	0	0	0	0	0	0	0
LPG (kt)	0	0	0	0	0	0	0	0	0	0	0
Other bit. coal (kt)	97	97	26	31	97	97	97	97	26	30	49
Solid biomass (TJ)	0	0	0	0	0	0	0	0	0	0	41
Industrial waste (TJ) *	0	0	0	0	0	0	0	0	0	0	0
Other											
Gas-diesel oil (kt)	98	109	132	137	141	153	161	169	180	185	191
RFO (kt)	0	0	0	0	0	0	0	0	0	0	0
Other oil products (kt)	40	5	0	0	0	0	0	1	0	0	0
White spirit (kt)	0	0	0	0	0	0	0	0	0	0	0
NIR2014											
Iron & steel											
LPG (kt)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0
RFO (kt)	3.7	12.4	11.8	10.0	11.0	9.7	11.1	7.0	6.8	6.8	7.0
Chemical											
Gas-diesel oil (kt)	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4
Food, bev. & tobacco											
LPG (kt)	2.7	2.7	3.1	2.8	2.8	2.8	2.8	2.9	2.8	2.7	2.9
Gas-diesel oil (kt)	3.5	3.9	4.7	4.9	5.1	5.5	5.8	6.1	6.5	6.7	6.9
RFO (kt)	11.1	37.2	35.4	30.0	33.0	29.1	33.3	21.0	20.4	20.4	21.0
Non-metallic minerals											
Pet-coke (kt)	40.0	93.0	85.0	114.0	112.0	125.0	147.0	152.0	150.0	154.0	141.0
RFO (kt)	17.3	57.9	55.1	46.7	51.3	45.3	51.8	32.7	31.7	31.7	32.7
Gas-diesel oil (kt)	5.6	6.3	7.6	7.9	8.1	8.8	9.3	9.7	10.4	10.6	11.0
LPG (kt)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0
Other bit. coal (kt)	97.0	97.0	26.0	31.0	27.0	20.0	18.0	19.0	26.0	30.0	49.0
Solid biomass (TJ)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0
Industrial waste (TJ) *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other											
Gas-diesel oil (kt)	1.4	1.6	1.9	2.0	2.0	2.2	2.3	2.4	2.6	2.7	2.7
RFO (kt)	1.2	4.1	3.9	3.3	3.7	3.2	3.7	2.3	2.3	2.3	2.3
Other oil products (kt)	0.0	5.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
White spirit (kt)	0.0	0.0	0.0	1.0	0.0	1.0	1.0	1.0	0.0	1.0	0.0

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013											
Non-metallic minerals											
Pet-coke (kt)	133	139	137	146	142	146	143	152	147	118	100

RFO (kt)	54	55	62	68	23	23	31	30	26	21	6
Gas-diesel oil (kt)	0	0	0	0	0.6	0.5	0.4	0.4	0.2	0.2	0.03
LPG (kt)	0	0	0	0	0.1	0.2	0.2	0.2	0.3	0.3	1.1
Other bit. coal (kt)	53	53	53	57	55	54	49	45	23	27	12
Solid biomass (TJ)	70	90	211	127	39	61	100	249	346	358	291
Industrial waste (TJ) *	18	0	15	71	138	73	114	104	38	99	0
Other											
Gas-diesel oil (kt)	193	185	190	171	47	24	21	18	18	14	16
RFO (kt)	0	2	5	52	44	36	41	26	28	26	0
Other oil products (kt)	0	0	0	6	0	0	0	0	0	0	0
White spirit (kt)	0	0	0	0	0	0	0	0	0	0	0
NIR2014											
Iron & steel											
LPG (kt)	1.0	1.0	1.1	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0
RFO (kt)	5.4	5.5	6.4	7.3	6.5	4.4	6.2	5.8	3.9	4.6	7.8
Chemical											
Gas-diesel oil (kt)	1.4	1.3	1.4	1.2	1.3	1.5	1.3	1.1	1.1	0.9	1.0
Food, bev. & tobacco											
LPG (kt)	2.9	3.0	3.2	3.1	2.9	3.0	3.0	3.0	3.0	3.0	4.0
Gas-diesel oil (kt)	6.9	6.7	6.8	6.2	6.4	7.5	6.3	5.6	5.6	4.4	5.0
RFO (kt)	16.2	16.5	19.2	21.9	19.4	13.2	18.7	17.3	11.8	13.8	23.5
Non-metallic minerals											
Pet-coke (kt)	133.0	139.0	137.0	146.0	154.0	146.0	143.0	152.0	144.0	116.0	100.0
RFO (kt)	25.2	25.7	29.9	34.1	43.0	42.0	56.0	53.0	43.0	35.0	19.0
Gas-diesel oil (kt)	11.1	10.6	10.9	9.8	10.2	12.0	11.0	9.0	9.0	7.0	10.0
LPG (kt)	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Other bit. coal (kt)	53.0	53.0	53.0	57.0	52.0	54.0	49.0	40.0	21.0	26.0	12.0
Solid biomass (TJ)	70.0	90.0	211.0	127.0	38.0	61.0	133.0	281.0	304.0	347.0	306.0
Industrial waste (TJ)	18.0	0.0	15.0	71.0	138.0	73.0	288.0	239.0	276.0	299.0	4.0
Other											
Gas-diesel oil (kt)	2.8	2.7	2.7	2.5	2.5	3.0	2.5	2.3	2.3	1.8	2.0
RFO (kt)	1.8	1.8	2.1	2.4	2.2	1.5	2.1	1.9	1.3	1.5	2.6
Other oil products (kt)	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White spirit (kt)	1.0	0.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0

Table 3.20. Changes in emissions from fuel consumption in manufacturing industries and construction between NIR2013 and NIR2014

Gg CO2 eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013											
Non-metallic minerals	652	944	701	750	960	960	1072	961	748	772	791
Other	430	362	421	437	450	488	513	542	574	590	609
Total	1081	1306	1122	1186	1409	1448	1585	1502	1322	1362	1400
NIR2014											
Iron & steel	14	41	39	34	37	33	37	24	24	24	25
Chemical	2.2	2.5	3.0	3.1	3.2	3.5	3.7	3.9	4.1	4.2	4.4
Food, bev. & tobacco	54	135	133	117	126	116	130	93	92	92	95
Non-metallic minerals	454	727	504	572	571	570	647	606	619	642	663
Other	8	32	18	20	18	20	22	21	15	18	16
Total	532	938	698	745	755	742	839	748	754	781	804
% difference	-51%	-28%	-38%	-37%	-46%	-49%	-47%	-50%	-43%	-43%	-43%

Gg CO2 eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013											
Non-metallic minerals	731	750	768	831	664	655	652	664	587	503	380

Other	615	590	612	578	244	210	206	219	156	148	131
Total	1346	1340	1379	1409	908	865	858	884	744	651	511
NIR2014											
Iron & steel	20	20	23	26	23	17	22	18	15	17	27
Chemical	4.4	4.2	4.4	3.9	4.0	4.8	4.0	3.6	3.6	2.8	3.2
Food, bev. & tobacco	81	81	91	96	89	73	87	80	63	66	100
Non-metallic minerals	631	646	657	706	756	730	733	734	623	532	399
Other	17	14	15	33	18	17	17	13	11	10	14
Total	754	766	790	865	889	842	863	849	716	628	544
% difference	-44%	-43%	-43%	-39%	-2%	-3%	1%	-4%	-4%	-4%	6%

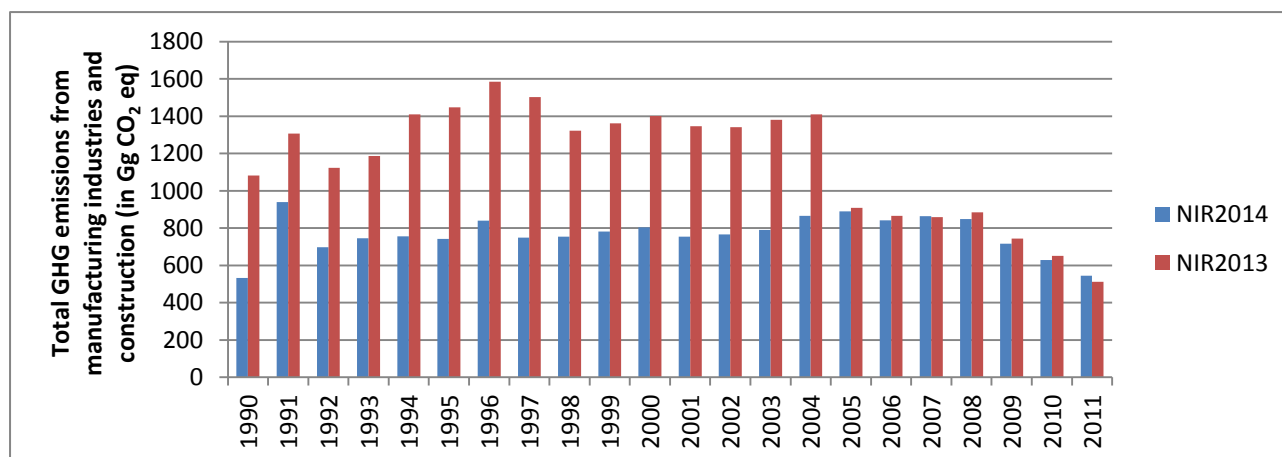


Figure 3.7. Changes in emissions from fuel consumption in manufacturing industries and construction between NIR2013 and NIR2014

3.2.4.6. Source-specific planned improvements

Efforts to further improve data on fuel consumption per industrial activity.

3.2.5. Transport (CRF 1A3)

3.2.5.1. Source category description

Internal aviation, road transportation, railways and internal navigation should be included in the transport sector (1A3). Emissions from international marine and aviation bunkers are not included in national totals, but are calculated and reported separately as Memo items (see [section 3.4.1](#)). In Cyprus, the sources of emissions reported in Transport are civil aviation (1A3A) and road transport (1A3B) because:

- (a) Railways (1A3C): no railways operate in Cyprus.
- (b) Navigation (1A3D): the majority of navigation activity in Cyprus is for recreational and educational. The boats used consumed road diesel. No data is currently available for consumption of fuel for navigation. All energy consumption is reported under road transport.

This is the first year for which emissions from domestic aviation are reported. Moreover, a mistake has been identified in diesel consumption for road transport for some years. These are the reasons that have caused recalculations.

Road transport also includes emissions from off-road vehicles and machinery, since the fuel consumption for this use is included in the fuel consumption for road transport.

Between 1990 and 2012 the emissions from transport have increased by 73%. During the same period the emissions from civil aviation increased by 49%, while emissions from road transport increased by 73%. Emissions have been reducing since 2010 (-3% between 2010 and 2011, further -7% between 2011 and 2012). The emissions for the period

are presented in Table 3.21 and Figure 3.8. Transport contributes 22.3% to the total emissions of the country in 2012 without LULUCF and 31% to the emissions from the energy sector.

Table 3.21. Transport emissions 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	1188	1491	1773	2062	2277	2212	2053
CH ₄ (Gg)	0.19	0.23	0.26	0.35	0.43	0.42	0.40
N ₂ O (Gg)	0.011	0.013	0.016	0.018	0.021	0.020	0.019
Total (Gg CO ₂ eq.)	1195	1500	1783	2075	2293	2227	2067
Gg CO ₂ eq.							
Domestic aviation	20	23	28	32	34	34	29
Road transport	1175	1477	1755	2043	2259	2192	2037

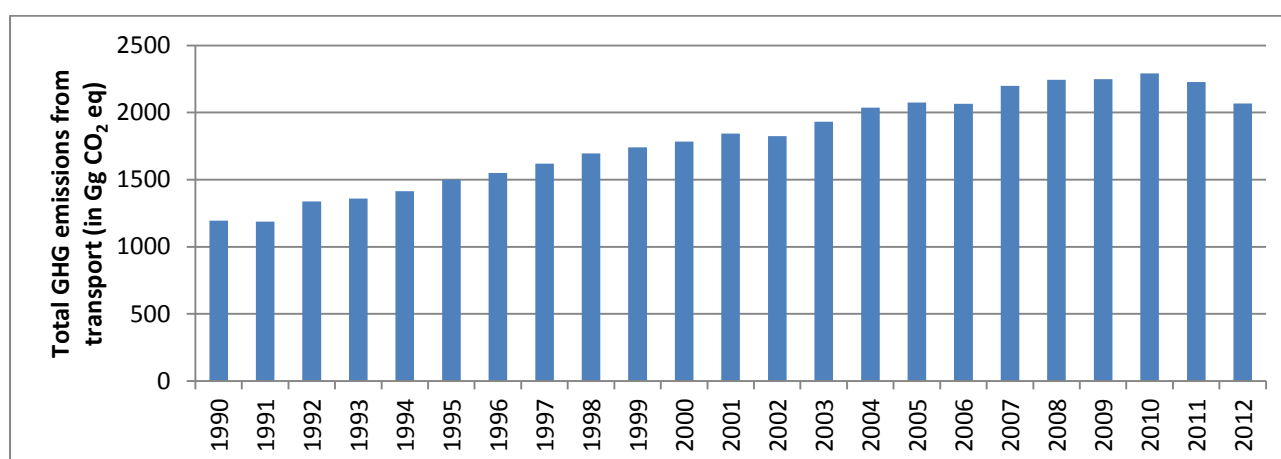


Figure 3.8. GHG emissions from transport 1990-2012

3.2.5.2. Methodological issues

Domestic aviation

This is the first time emissions are estimated for domestic aviation.

The emissions from domestic aviation were estimated using the Tier 1 method proposed by the EMEP/EEA air pollutant emission inventory guidebook 2013⁸ (Part B: sectoral guidance chapters, 1.A.3.a Aviation, pg. 18). The Tier 1 approach for aviation is based on quantity of fuel consumption data for aviation split by LTO and cruise for domestic flights separately. The method uses a simple approach to estimate the split of fuel use between cruise and LTO. The general equation applied is the following:

$$E_{\text{pollutant}} = AR_{\text{fuel consumption}} * EF_{\text{pollutant}}$$

where $E_{\text{pollutant}}$ is the annual emission of pollutant for the LTO phase of domestic flights; $AR_{\text{fuel consumption}}$ is the activity rate by fuel consumption for the LTO phase and $EF_{\text{pollutant}}$ is the emission factor of pollutant for the LTO phase.

Information on fuel consumption for domestic flights is not available from national statistics. However, the number of LTOs for domestic flights per year has been obtained from the Department of Civil Aviation⁹ (Table 3.22).

⁸ European Environment Agency, 2013. EEA Technical report No 12/2013, EMEP/EEA air pollutant emission inventory guidebook 2013 - Technical guidance to prepare national emission inventories. ISSN 1725-2237

⁹ Mr. Yiannis Yiannaki, Air Transport and Airports Officer A', Department of Civil Aviation, Tel. +357 22404134, Email. yyiannaki@dca.mcw.gov.cy

To proceed with the estimation of the emissions, several assumptions had to be made:

- (a) All the domestic flights are with small aircrafts. These aircrafts do not fly above 3000ft that is the limit for cruise phase of the trip.
- (b) All the fuel consumption is assumed to be jet-kerosene since no information is available for the import of aviation gasoline in Cyprus.

The LTO fuel consumption (Table 3.22) was estimated using coefficient proposed in the EMEP/EEA 2013 guidebook for average fleet (table 3-3, page 19) of 825 kg of jet kerosene per LTO. Fuel consumption was converted to TJ using the default proposed by the revised IPCC 1996 guidelines (workbook, pg. 1.6) of 44.59 TJ/kt.

The emissions were estimated using the emission factors per LTO proposed by the EMEP/EEA 2013 guidebook for average fleet (table 3-3, page 19): 2.6 t CO₂/LTO, 0.1 kg CH₄/LTO and 0.1 kg N₂O/LTO.

Table 3.22. Number of LTOs for the period 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997
LTOs	7485	6349	7691	7935	8419	8854	8704	9134
Fuel consumption (kt)	6.2	5.2	6.3	6.5	6.9	7.3	7.2	7.5
Fuel consumption (TJ)	275	234	283	292	310	326	320	336

	1998	1999	2000	2001	2002	2003	2004	2005
LTOs	9435	9941	10617	11677	11519	11672	12060	12262
Fuel consumption (kt)	7.8	8.2	8.8	9.6	9.5	9.6	9.9	10.1
Fuel consumption (TJ)	347	366	391	430	424	429	444	451

	2006	2007	2008	2009	2010	2011	2012	
LTOs	12267	12411	13494	13861	12780	12988	11178	
Fuel consumption (kt)	10.1	10.2	11.1	11.4	10.5	10.7	9.2	
Fuel consumption (TJ)	451	457	496	510	470	478	411	

Road transport

GHG emissions from road transport were estimated according to the revised IPCC1996 guidelines. Fuel consumption data was obtained from the energy balance prepared by the statistical service and is presented in Table 3.23. A mistake was identified in the diesel and biodiesel consumed for 2007 to 2011 reported in the NIR2013 and was corrected.

The carbon content and oxidation factor of diesel, gasoline and biodiesel used is according to the revised IPCC 1996 guidelines (workbook, pg. 1.6). Methane and nitrous oxide emission factors are according to the revised IPCC 1996 guidelines (reference manual, pg. 1.35 and 1.36 respectively). CEF, calorific values and emission factors for the estimation of emissions from road transport are presented in Table 3.24. Oxidation factor is according to the revised IPCC 1996 guidelines and is assumed 0.99 for all fuels. The method used for the estimation of all gases for diesel and gasoline is T1.

Table 3.23. Fuel consumed by road transport (kt) during 1990-2012

kt	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Gasoline	163	170	172	169	180	183	186	191	195	203	206	219
Diesel	210	202	246	255	261	285	298	314	334	340	350	355
Biodiesel	0	0	0	0	0	0	0	0	0	0	0	0

kt	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Gasoline	228	252	282	303	323	352	373	383	390	385	372	
Diesel	341	351	354	346	323	337	330	321	329	313	277	
Biodiesel	0	0	0	0	0	1	16	17	17	18	18	

Table 3.24. Parameters used for the estimation of emissions from road transport

Fuel	NCV (TJ/kt)	CEF (tC/TJ)	CH ₄ EF (kg/TJ)	N ₂ O EF (kg/TJ)
Diesel	43.33	20.2	5	0.6
Gasoline	44.8	18.9	20	0.6
Biodiesel	36.00*	20.0	5**	0.6**

* Implied calorific value: The activity data for biofuels was obtained in tons, converted to toe using 0.86 toe/t (Eurostat) and to TJ using 41.868 TJ/ktoe. The implied net calorific value for biofuels is therefore 36.00 TJ/t

** assumed same as road diesel

3.2.5.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.2.5.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.2.5.5. Source-specific recalculations

Emissions from domestic aviation have been estimated for the first time. Previous submissions report these emissions as NA. For road transport a mistake was identified in the consumption of diesel and biodiesel, which was corrected. The impact on the emissions resulting from these changes is presented in Table 3.25.

Table 3.25. Changes between NRI2013 and NIR2014

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	1175	1171	1318	1337	1391	1477	1527	1594	1670	1714	1755
NIR2014	1195	1188	1338	1358	1413	1500	1550	1618	1695	1740	1783
% difference	1.7%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.6%

Gg CO ₂ eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	1811	1795	1901	2004	2043	2032	2170	2260	2266	2313	2250
NIR2014	1842	1825	1932	2035	2075	2064	2199	2245	2248	2293	2227
% difference	1.7%	1.7%	1.6%	1.5%	1.6%	1.6%	1.3%	-0.7%	-0.8%	-0.9%	-1.0%

3.2.5.6. Source-specific planned improvements

The improvement of the estimation of emissions from domestic aviation is planned. However, because it is not considered a priority or urgent to complete it, due to the very small contribution to the total emissions, it is not foreseen to be completed by 2015.

3.2.6. Other sectors (CRF 1A4)

3.2.6.1. Source category description

Emissions from other sectors (1A4) include the emissions caused by the sectors commercial/ institutional (1A4A), residential (1A4B) and agriculture/ forestry/ fisheries (1A4C). The source of emissions is the energy consumption for heat in order to cover the needs for the space heating, water heating etc. Thermal needs in these sectors are covered mainly by liquid fossil fuels, while the contribution of biomass (fuel wood), especially in the residential sector, is also significant (mainly in mountainous areas).

Considerable changes have been made to other sectors. Due to the unavailability of consumption data for several years and sectors, using the fuel consumption data as published by the Statistical Service, would create issues of consistence and comparability. Therefore it was decided to complete the period using the assumptions presented in [section 3.2.1.2](#).

GHG emissions from other sectors in 2012 increased by 36% compared to 1990 emissions (from 367 Gg CO₂ eq in 1990 to 500 Gg CO₂ eq in 2012). Table 3.26 and Figure 3.9 present the trend between 1990 and 2012. Other sectors contribute 5.4% to the total emissions of the country in 2012 and 7.6% to the emissions from the energy sector.

Table 3.26. GHG emissions from Other sectors 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	363	511	626	505	444	500	490
CH ₄ (Gg)	0.1	0.2	0.2	0.2	0.3	0.3	0.3
N ₂ O (Gg)	0.004	0.006	0.006	0.005	0.006	0.008	0.008
Total (Gg CO ₂ eq.)	367	516	631	510	451	509	500
Gg CO ₂ eq.							
Commercial / Institutional	0.5	1.1	1.0	1.2	1.5	1.5	1.4
Residential	310	428	522	420	371	421	415
Agriculture/Forestry/Fisheries	57	87	108	89	78	86	83

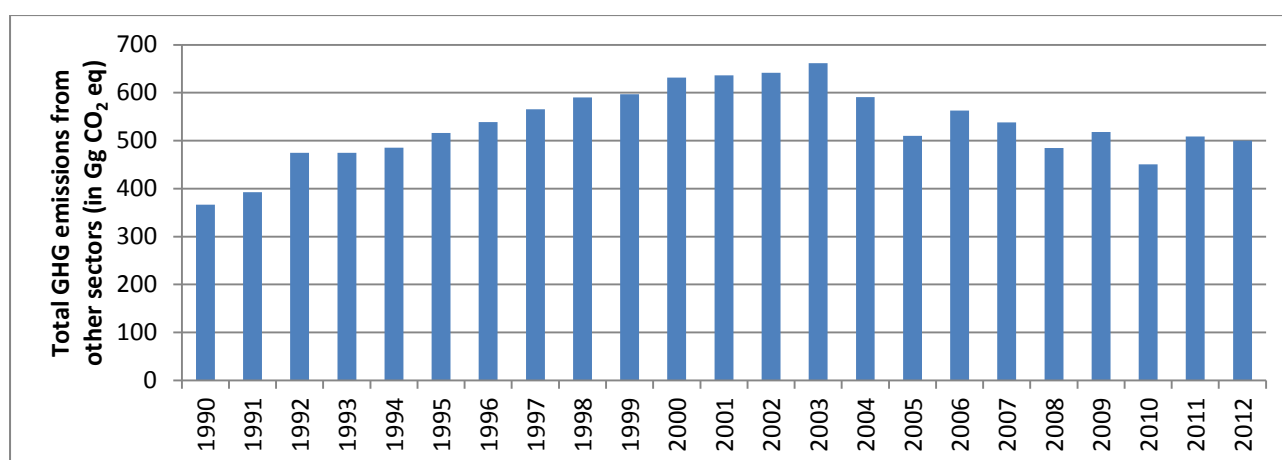


Figure 3.9. GHG emissions from Other sectors 1990-2012

3.2.6.2. Methodological issues

Considerable changes have been made to other sectors. Due to the unavailability of consumption data for several years and sectors, using the fuel consumption data as published by the Statistical Service, would create issues of consistence and comparability. Therefore it was decided to complete the period using the assumptions presented in [section 3.2.1.2](#). The activity data used for the estimation of GHG emissions of other sectors is presented in Table 3.27.

Table 3.27. Fuel consumption for other sectors 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Commercial / Institutional									
Diesel (kt)	11	13	15	16	16	18	19	19	21
RFO (kt)	4	12	12	10	11	10	11	7	7
LPG (kt)	12	12	13	12	12	12	12	13	12
Solid biomass (TJ)	19	15	15	15	11	12	17	9	8
Charcoal (kt)	0.5	0.5	0.5	0.5	1.0	4	4	4	4
Gas biomass (TJ)	0	0	0	0	0	0	0	0	0
Residential									
Other kerosene (kt)	12	12	17	16	17	17	18	20	21
Diesel (kt)	55	61	74	77	79	86	90	95	101
LPG (kt)	32	32	36	33	32	33	33	34	32
Solid biomass (TJ)	126	105	103	102	74	79	119	61	56
Charcoal (kt)	0.5	0.5	0.5	0.5	1.0	4	4	4	4
Agriculture/Forestry/Fisheries									

Diesel (kt)	17	19	23	24	24	26	28	29	31
LPG (kt)	1	1	1	1	1	1	1	1	1
Gas biomass (TJ)	0	0	0	0	0	0	0	0	0

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Commercial / Institutional									
Diesel (kt)	21	22	22	21	22	20	20	19	18
RFO (kt)	7	7	5	6	6	7	1	2	2
LPG (kt)	273	281	217	221	257	293	40	80	80
Solid biomass (TJ)	11	10	10	10	9	8	7	5	14
Charcoal (kt)	4	3	3	4	4	4	5	5	7
Gas biomass (TJ)	0	0	0	0	0	0	0	0	0
Residential									
Other kerosene (kt)	20	24	24	31	31	24	16	16	16
Diesel (kt)	104	107	108	104	107	96	83	98	89
LPG (kt)	32	34	34	35	38	36	34	35	36
Solid biomass (TJ)	77	68	70	64	58	53	51	74	95
Charcoal (kt)	4	3	3	4	4	4	5	5	6
Agriculture/Forestry/Fisheries									
Diesel (kt)	32	33	33	32	33	30	27	28	28
LPG (kt)	1	1	1	1	1	1	1	1	1
Gas biomass (TJ)	0	0	0	0	0	0	0	1	15

	2008	2009	2010	2011	2012				
Commercial / Institutional									
Diesel (kt)	20	19	23	20	16				
RFO (kt)	2	2	2	2	3				
LPG (kt)	80	80	80	80	121				
Solid biomass (TJ)	15	15	15	13	15				
Charcoal (kt)	7	6	6	6	6				
Gas biomass (TJ)	0	11	12	11	11				
Residential									
Other kerosene (kt)	14	19	14	16	17				
Diesel (kt)	78	83	70	80	78				
LPG (kt)	34	36	34	38	37				
Solid biomass (TJ)	123	222	84	123	129				
Charcoal (kt)	6	5	5	6	6				
Agriculture/Forestry/Fisheries									
Diesel (kt)	26	24	23	25	24				
LPG (kt)	1	1	1	1	1				
Gas biomass (TJ)	78	198	262	437	465				

The GHG emissions from other sectors were estimated according to the revised IPCC1996 guidelines. Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.28). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8, oil). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35, oil) as presented in Table 3.28.

Table 3.28. Parameters used for the estimation of emissions from other sectors

Fuel	NCV (TJ/kt)	CEF (tC/TJ)	kg CH ₄ /TJ	kg N ₂ O /TJ
Diesel	43.33	20.2	10	0.6
Other Kerosene	44.75	19.6	10	0.6
LPG	47.31	17.2	10	0.6

RFO	40.19	21.1	10	0.6
Solid Biomass		29.9	300	4
Charcoal	29.5	29.9	200	1
Gas biomass		30.6	300	4

3.2.6.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.2.6.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.2.6.5. Source-specific recalculations

The emissions from fuel consumption in other sectors have been recalculated according to the new data and new assumptions applied for the years that data was not available as presented in [section 3.2.1.2](#). The changes in the data are presented in Table 3.29. The fuels for which data was not available for NIR2013 are not presented on the Table. The impact of the changes on the emissions is presented in Table 3.30 and Figure 3.10.

Table 3.29. Changes in activity data for fuel consumption by other sources between NIR2013 and NIR2014

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013											
Commercial / Institutional	0	0	0	0	0	0	0	0	0	0	0
Diesel (kt)	0	0	0	0	0	0	0	0	0	0	0
RFO (kt)	0	0	0	0	0	0	0	0	0	0	0
Solid biomass (TJ)											
Residential	12	12	17	16	17	17	18	20	21	20	24
Other kerosene (kt)	0	0	0	0	0	0	0	0	0	0	0
Diesel (kt)	49	49	55	51	50	51	51	52	50	49	53
LPG (kt)	0	0	0	0	0	0	0	0	0	0	0
Solid biomass (TJ)											
Agriculture/Forestry/Fisheries	0	0	0	0	0	0	0	0	0	0	0
Diesel (kt)	0	0	0	0	0	0	0	0	0	0	0
NIR2014											
Commercial / Institutional											
Diesel (kt)	11	13	15	16	16	18	19	19	21	21	22
RFO (kt)	4	12	12	10	11	10	11	7	7	7	7
LPG (kt)	12	12	13	12	12	12	12	13	12	273	281
Solid biomass (TJ)	19	15	15	15	11	12	17	9	8	11	10
Charcoal (kt)	0.5	0.5	0.5	0.5	1.0	4	4	4	4	4	3
Gas biomass (TJ)	0	0	0	0	0	0	0	0	0	0	0
Residential											
Other kerosene (kt)	12	12	17	16	17	17	18	20	21	20	24
Diesel (kt)	55	61	74	77	79	86	90	95	101	104	107
LPG (kt)	32	32	36	33	32	33	33	34	32	32	34
Solid biomass (TJ)	126	105	103	102	74	79	119	61	56	77	68
Charcoal (kt)	0.5	0.5	0.5	0.5	1.0	4	4	4	4	4	3
Agriculture/Forestry/Fisheries											
Diesel (kt)	17	19	23	24	24	26	28	29	31	32	33
LPG (kt)	1	1	1	1	1	1	1	1	1	1	1
Gas biomass (TJ)	0	0	0	0	0	0	0	0	0	0	0

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013											

Commercial / Institutional	0	0	0	0	0	19	18				
Diesel (kt)	0	0	0	0	0	2	2	20	19	23	20
RFO (kt)	0	0	0	0	0	0	14	2	2	2	2
Solid biomass (TJ)								15	15	15	
Residential	24	31	31	24	16	16	16				
Other kerosene (kt)	0	0	0	0	83	98	89	14	19	14	16
Diesel (kt)	53	54	58	56	53	54	55	78	83	70	80
LPG (kt)	0	0	0	0	0	74	95	53	55	53	59
Solid biomass (TJ)								123	174	84	
Agriculture/Forestry/Fisheries	0	0	0	0	27	28	28				
Diesel (kt)	0	0	0	0	0	19	18	26	24	23	25
NIR2014											
Commercial / Institutional											
Diesel (kt)	22	21	22	20	20	19	18	20	19	23	20
RFO (kt)	5	6	6	7	1	2	2	2	2	2	2
LPG (kt)	217	221	257	293	40	80	80	80	80	80	80
Solid biomass (TJ)	10	10	9	8	7	5	14	15	15	15	13
Charcoal (kt)	3	4	4	4	5	5	7	7	6	6	6
Gas biomass (TJ)	0	0	0	0	0	0	0	0	11	12	11
Residential											
Other kerosene (kt)	24	31	31	24	16	16	16	14	19	14	16
Diesel (kt)	108	104	107	96	83	98	89	78	83	70	80
LPG (kt)	34	35	38	36	34	35	36	34	36	34	38
Solid biomass (TJ)	70	64	58	53	51	74	95	123	222	84	123
Charcoal (kt)	3	4	4	4	5	5	6	6	5	5	6
Agriculture/Forestry/Fisheries											
Diesel (kt)	33	32	33	30	27	28	28	26	24	23	25
LPG (kt)	1	1	1	1	1	1	1	1	1	1	1
Gas biomass (TJ)	0	0	0	0	0	1	15	78	198	262	437

Table 3.30. Changes in emissions from fuel consumption by other sources between NIR2013 and NIR2014

Gg CO2 eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013											
Commercial / Institutional	0	0	0	0	0	0	0	0	0	0	0
Residential	184	184	218	203	203	206	209	219	216	210	234
Agriculture/Forestry/Fisheries	0	0	0	0	0	0	0	0	0	0	0
Total	184	184	218	203	203	206	209	219	216	210	234
NIR2014											
Commercial / Institutional	0.5	0.7	0.7	0.7	0.8	1.1	1.2	1.1	1.1	1.1	1.0
Residential	310	329	398	396	404	428	446	468	487	491	522
Agriculture/Forestry/Fisheries	57	63	76	78	81	87	92	96	102	105	108
Total	367	393	474	475	485	516	539	565	590	597	631
<i>% difference</i>	<i>99%</i>	<i>113%</i>	<i>118%</i>	<i>134%</i>	<i>139%</i>	<i>151%</i>	<i>157%</i>	<i>159%</i>	<i>173%</i>	<i>185%</i>	<i>169%</i>

Gg CO2 eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013											
Commercial / Institutional	0	0	0	0	0	67	64	70	67	80	71
Residential	234	260	272	243	474	525	500	452	491	427	484
Agriculture/Forestry/Fisheries	0	0	0	0	86	89	89	83	77	73	80
Total	234	260	272	243	560	682	653	606	634	580	635
NIR2014											
Commercial / Institutional	1.0	1.1	1.1	1.1	1.2	1.2	1.5	1.5	1.5	1.5	1.5
Residential	526	536	552	492	420	470	444	397	435	371	421
Agriculture/Forestry/Fisheries	109	105	108	97	89	92	93	87	81	78	86

Total	636	642	662	591	510	563	538	485	518	451	509
% difference	171%	147%	144%	143%	-9%	-17%	-18%	-20%	-18%	-22%	-20%

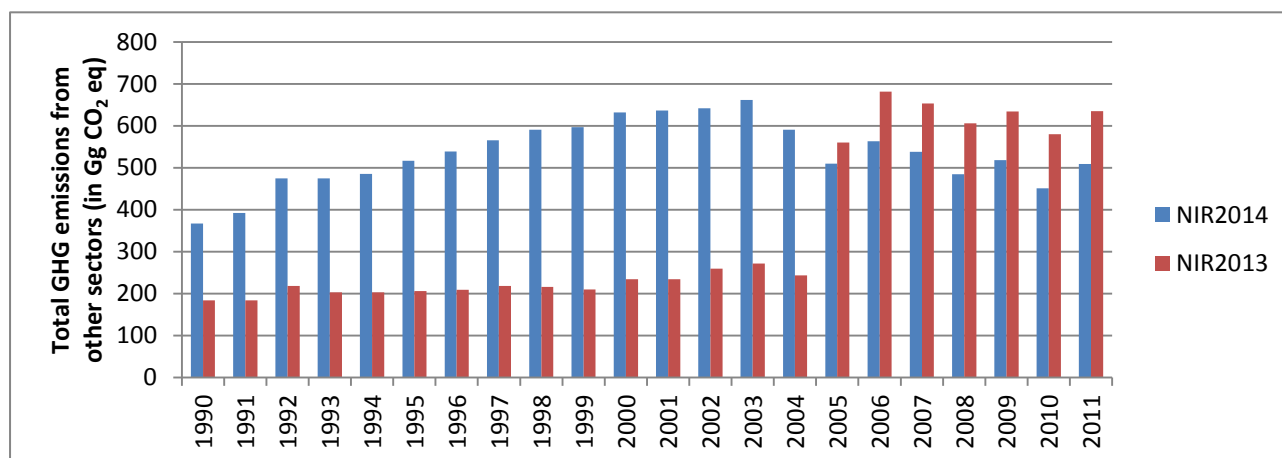


Figure 3.10. Changes in emissions from other sectors between NIR2013 and NIR2014

3.2.6.6. Source-specific planned improvements

Improve collaboration between involved authorities of the government, to increase the accuracy in data collection.

3.2.7. Other (CRF 1A5)

3.2.7.1. Source category description

Fuel consumption not elsewhere specified, has been allocated to an additional category CRF 1A5. Due to the changes in fuel combustion data already described there are considerable changes between the information previously submitted and the current submission. No information is available to explain the large increase in the emissions of 2008. The emissions during the period 1990-2012 are presented in Table 3.31 and Figure 3.11.

Table 3.31. Other GHG emissions 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	11.20	17.49	21.83	21.37	17.08	20.26	17.08
CH ₄ (t)	1.53	2.38	2.98	6.32	5.74	6.17	5.74
N ₂ O (t)	0.09	0.14	0.18	0.18	0.15	0.17	0.15
Total (Gg CO ₂ eq.)	11.26	17.58	21.95	21.56	17.24	20.44	17.24

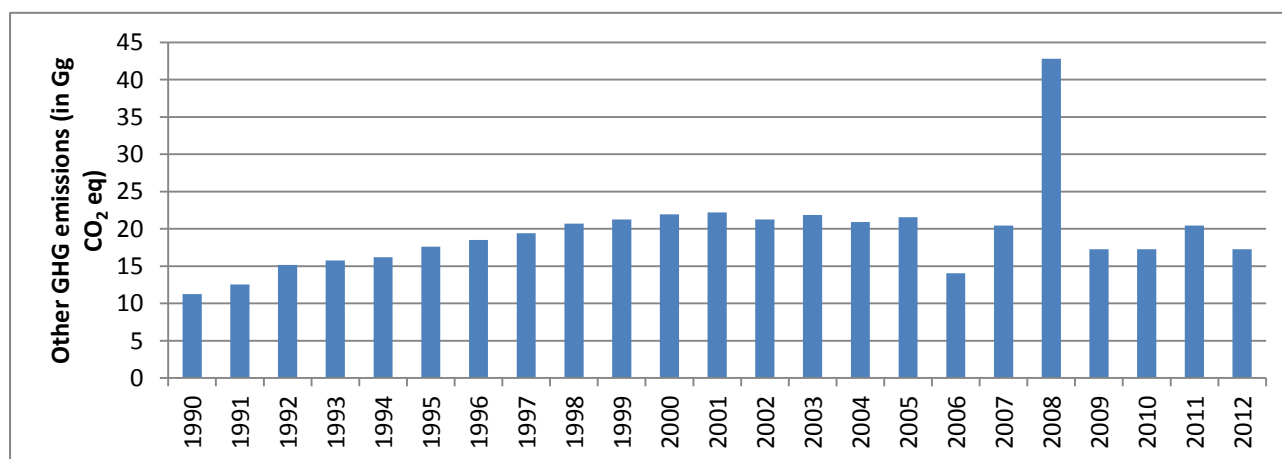


Figure 3.11. Other GHG emissions 1990-2012

3.2.7.2. Methodological issues

Considerable changes have been made to all sectors of fuel combustion, which have also affected the “other emissions”. Due to the unavailability of consumption data for several years and sectors, using the fuel consumption data as published by the Statistical Service, would create issues of consistence and comparability. Therefore it was decided to complete the period using the assumptions presented in [section 3.2.1.2](#). The activity data used for the estimation of GHG emissions of other sectors is presented in Table 3.32.

Table 3.32. Other non-specified fuel consumption 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Diesel (kt)	4	4	5	5	5	6	6	6	6	7	7	7
Lignite (kt)	0	0	0	0	0	0	0	0	0	0	0	0

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Diesel (kt)	7	7	6	6	4	6	13	5	5	6	5	
Lignite (kt)	0	0	1	1	1	1	1	1	1	1	1	

The GHG emissions were estimated according to the revised IPCC1996 guidelines. Fuel consumption was converted to TJ using the default NCV proposed by the revised IPCC 1996 guidelines (Table 3.33). The oxidation factor used is 0.99, as proposed by the revised IPCC 1996 guidelines (workbook pg. 1.8). The CEF used is according to the revised IPCC 1996 guidelines (workbook pg. 1.6). CH₄ and N₂O emissions were estimated using the default emission factors proposed by the revised IPCC1996 guidelines (IPCC1996, reference, pg1.35) as presented in Table 3.33.

Table 3.33. Parameters used for the estimation of other emissions

Fuel	NCV (TJ/kt)	CEF (tC/TJ)	kg CH ₄ /TJ	kg N ₂ O /TJ
Diesel	43.33	20.2	10	0.6
Lignite	11.9	27.6	300	1.4

3.2.7.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.2.7.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.2.7.5. Source-specific recalculations

The recalculations that took place have been caused by the changes in fuel combustion already explained. The changes in the fuel consumption are presented in Table 3.34 and the impact on the emissions in Table 3.35 and Figure 3.12.

Table 3.34. Changes in activity data for fuel consumption between NIR2013 and NIR2014

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013											
Diesel (kt)	0	0	0	0	0	0	0	0	0	0	0
Biomass (TJ)	145	120	118	117	85	91	136	70	64	88	78
NIR2014											
Diesel (kt)	4	4	5	5	5	6	6	6	6	7	7
Lignite (kt)	0	0	0	0	0	0	0	0	0	0	0

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013											
Diesel (kt)	0	0	0	0	0	4	6	13	5	5	6
Biomass (TJ)	80	74	67	61	58	0	0	0	0	0	0
NIR2014											
Diesel (kt)	7	7	7	6	6	4	6	13	5	5	6
Lignite (kt)	0	0	0	1	1	1	1	1	1	1	1

Table 3.35. Changes in total emissions from fuel consumption between NIR2013 and NIR2014

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	11.3	12.5	15.2	15.7	16.2	17.6	18.5	19.4	20.7	21.3	21.9
NIR2014	1.1	0.9	0.9	0.9	0.6	0.7	1.0	0.5	0.5	0.7	0.6
% difference	-90%	-93%	-94%	-94%	-96%	-96%	-94%	-97%	-98%	-97%	-97%
Gg CO ₂ eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	22.2	21.3	21.8	20.9	21.6	14.0	20.4	42.8	17.2	17.2	20.4
NIR2014	0.6	0.6	0.5	0.5	0.4	12.8	19.2	41.5	16.0	16.0	19.2
% difference	-97%	-97%	-98%	-98%	-98%	-9%	-6%	-3%	-7%	-7%	-6%

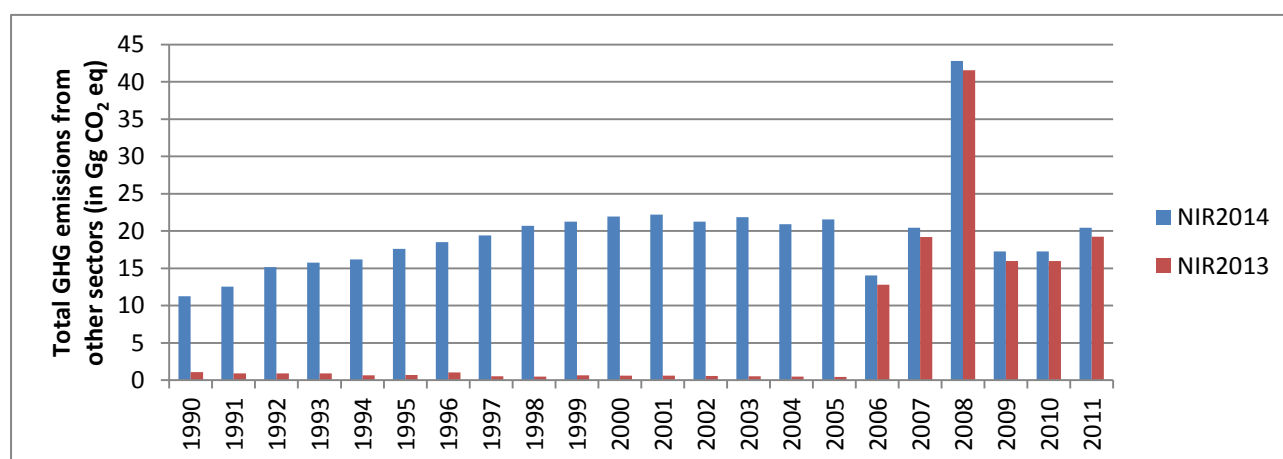


Figure 3.12. Changes in other emissions between NIR2013 and NIR2014

3.2.7.6. Source-specific planned improvements

Improve collaboration between involved authorities of the government, to increase the accuracy in data collection.

3.2.8. Reference approach (CRF 1AB)

The Reference Approach requires statistics for production of fuels and their external trade as well as changes in their stocks. It also needs a limited number of figures for the consumption of fuels used for non-energy purposes where carbon may be stored. It uses a simple assumption: once carbon is brought into a national economy in fuel, it is either saved in some way (e.g., in increases of fuel stocks, stored in products, left unoxidised in ash) or it must be released to the atmosphere. The estimation process is divided in six steps that are described below.

Step 1: Estimation of apparent consumption

This step concerns the estimation of apparent consumption in natural units or in the units commonly used for the recording of the relative fuel amounts. For secondary fuels production data are not included in the apparent consumption calculation, since they are already accounted for in the primary fuel consumption, from which they derive. Therefore, the apparent consumption of primary fuels is estimated by the following equation:

$$\text{Apparent consumption} = \text{Primary production} + \text{Imports} - \text{Exports} - \text{International bunkers} + \text{Stock change}$$

The apparent consumption of secondary fuels is estimated by the following equation:

$$\text{Apparent consumption} = \text{Imports} - \text{Exports} - \text{International bunkers} + \text{Stock change}$$

Step 2: Conversion of fuel data to a common energy unit

All data except biomass was available in kt. The values were multiplied by the net calorific values listed in Table 3.36 to provide the energy consumed in TJ. The NCV values used were the defaults proposed by the revised IPCC 1996 guidelines (pg. 1.6 workbook) except for crude oil, pet-coke and other bituminous coal. For crude oil there is no default proposed so the NCV was estimated using an intermediate conversion to ktoe. Pet-coke and other bituminous coal are consumed only from one cement producing installation. Therefore the NCV implied by the annual reports submitted according to national ETS legislation (law no. 110(I)/2011), instead of the default proposed by the IPCC were used, which is available for the years 2005-2012; for the years 1990-2004 the NCV was assumed the same as 2005.

Step 3: Estimation of carbon content

Total carbon included in each fuel is calculated by multiplying energy consumption by an emission factor (Table 3.36) that reflects the amount of carbon per energy unit for each fuel. The result gives the maximum amount of carbon that could be potentially released if all carbon in the fuels were converted to CO₂. The carbon emission factor of fuels used in the reference approach, are based predominately on the revised IPCC 1996 guidelines. The exceptions are pet-coke, other bituminous coal and non-renewable waste. These fuels are consumed only from one cement producing installation. Therefore it was preferred to use the carbon emission factor implied by the annual reports submitted according to national ETS legislation (law no. 110(I)/2011), instead of the default proposed by the IPCC.

Step 4: Estimation of carbon stored in products

Depending on the end use, non-energy uses of fuels can result in the storage of some or all of the carbon contained in the fuel to the non-energy product. The non-energy consumption of fuels is multiplied by an emission factor that reflects the amount of the carbon content of the fuel stored in non-energy product. The result is the maximum amount of carbon that could potentially be sequestered if that amount of carbon were stored in the non-energy product. By subtracting this amount from the total carbon calculated in step 3, the amount of carbon that could be theoretically converted in CO₂ is calculated.

Step 5: Estimation of carbon unoxidised during fuel use

The amount of carbon that was previously calculated is reduced by a fraction of 1%, in order to take account of the fact that a small part of the fuel carbon entering combustion escapes oxidation. It is assumed that the carbon that remains unoxidised is stored indefinitely.

Step 6: Estimation of CO₂ emissions

Carbon emissions from all fuels are multiplied by 44/12 to be converted to CO₂ emissions and are summed giving the total amount of CO₂ released in the atmosphere. The emissions estimated with the reference approach are presented in Table 3.37. Detailed presentation of the results is available in [Annex IV](#).

Table 3.36. Net calorific value (TJ/kt) and carbon emission factors (t CO₂/kt) of fuels consumed in Cyprus used for the reference approach

(a) Net calorific value (TJ/kt) and carbon emission factors (t CO₂/kt) that remain constant for the period 1990-2012

	Conversion factor (TJ/kt)	Carbon emission factor (tC/TJ)
Crude oil	42.20 ^a	20.00
Gasoline	44.80	18.90
Jet kerosene	44.59	19.50
Other kerosene	44.75	19.60
Gas-diesel oil	43.33	20.20
Residual fuel oil	40.19	21.10
LPG	47.31	17.20
Bitumen	40.19	22.00
Lubricants	40.19	20.00
Pet-coke	31.00	table (b)
Other oil	40.19	20.00
Refinery gas	48.15	18.20
White spirit SBP	40.19	20.00
Other bituminous coal	table (b)	table (b)
Lignite	11.90	27.60
Solid biomass	1	29.90
Liquid biomass	0.04 ^b	20.00
Gas biomass	1	30.60
Non-renewable waste	1	table (b)

^a estimated using 1.008 ktoe/kt¹⁰ * 41.868 TJ/ktoe

^b estimated using 0.86 ktoe/kt¹¹ * 41.868 TJ/ktoe / 1000

(b) Net calorific value (TJ/kt) and carbon emission factors (t CO₂/kt) that are not constant for the period 1990-2012

	1990-2005	2006	2007	2008	2009	2010	2011	2012
NCV (TJ/kt)								
Other bituminous coal	29.824	29.824	28.360	25.950	26.080	26.819	25.517	NO
Implied CEF (tC/TJ)								
Pet-coke	24.406	25.585	26.113	25.930	27.086	27.020	26.793	26.257
Other bituminous coal	25.510	25.410	23.045	26.048	25.920	26.055	25.879	NO
Non-renewable waste	22.454	23.495	9.299	10.207	3.239	7.775	NO	NO

Table 3.37. CO₂ emissions estimates according to the reference approach

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Liquid Fuels	4071	4106	4713	5019	5779	4956	5562	5413	5771	5768	6208	6123	6232
Solid Fuels	268	268	71.8	85.6	74.6	55.2	49.7	52.5	71.8	82.9	135	146	146
Biomass	27.9	25.2	25	24.9	53.2	52	50.4	38.9	41	40.1	39.8	43.7	43.3
Other fuels	0	0	0	0	0	0	0	0	0	0	0	1.47	NA
Total	4338	4374	4785	5105	5853	5011	5612	5465	5843	5851	6343	6269	6378

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2003	2004	2005
Liquid Fuels	6870	6414	6518	6820	7214	7600	7419	7075	6887	6499	6870	6414	6518
Solid Fuels	146	159	145	150	117	99.3	52.7	67.1	30	1.19	146	159	145
Biomass	52.9	40.4	29.3	30	57.7	119	131	128	148	145	52.9	40.4	29.3
Other fuels	1.22	5.79	11.2	6.23	9.72	8.85	3.25	8.44	NA	NA	1.22	5.79	11.2
Total	7017	6572	6663	6970	7331	7699	7471	7142	6917	6500	7017	6572	6663

¹⁰ EUROSTAT

¹¹ EUROSTAT

3.2.9. Comparison of the sectoral approach with the reference approach (CRF 1AC)

The data used in the reference and the sectoral approach and the resulting emissions are presented in [Annex IV](#). The comparison of the fuel consumption and the emissions is summarised in Table 3.38. The difference in the emissions is also presented schematically in Figure 3.13 and Figure 3.14.

The reason for the differences that occur between the two approaches is the statistical difference that exists in the energy balance, between the Gross inland deliveries (Calculated) and the Gross inland deliveries (Observed). For some fuels and years the statistical difference is extremely large (e.g. jet kerosene 1990 26% and 1994 87%, diesel 1990 5%, pet coke 1992 26% of observed gross inland deliveries). The statistical difference of the energy balance is presented in detail in [Annex IV](#).

Table 3.38. Difference between Reference and Sectoral Approach 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fuel Consumption									
Reference approach (PJ)	59.6	59.2	66.6	71.3	81.6	70	78	76.4	81.8
Sectoral approach (PJ)	52	58.6	63.1	65.3	68.2	66.9	70.7	72.4	76.9
Difference (%)	14.6	1.07	5.55	9.1	19.7	4.68	10.4	5.53	6.4
CO2 Emissions									
Reference approach (Gg)	4338	4374	4785	5105	5853	5011	5612	5465	5843
Sectoral approach (Gg)	3858	4346	4637	4826	5032	4930	5214	5349	5691
Difference (%)	12.4	0.65	3.19	5.78	16.3	1.66	7.63	2.17	2.67

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Fuel Consumption									
Reference approach (PJ)	82.4	88.8	88	89.3	97.1	90.8	92	95.5	100
Sectoral approach (PJ)	80.4	83.5	82.1	84.2	89.4	91.3	93.3	94.3	98.4
Difference (%)	2.45	6.41	7.16	5.98	8.67	-0.61	-1.38	1.36	1.92
CO2 Emissions									
Reference approach (Gg)	5851	6343	6271	6378	7018	6578	6674	6976	7341
Sectoral approach (Gg)	5954	6182	6079	6240	6616	6778	6946	7114	7399
Difference (%)	-1.73	2.6	3.16	2.22	6.08	-2.94	-3.92	-1.95	-0.78

	2008	2009	2010	2011	2012				
Fuel Consumption									
Reference approach (PJ)	106	103	99.3	95.5	89.1				
Sectoral approach (PJ)	101	100	97.1	94.2	87.9				
Difference (%)	4.8	2.75	2.19	1.36	1.39				
CO2 Emissions									
Reference approach (Gg)	7708	7475	7150	6917	6500				
Sectoral approach (Gg)	7563	7465	7231	6984	6519				
Difference (%)	1.92	0.12	-1.12	-0.95	-0.3				

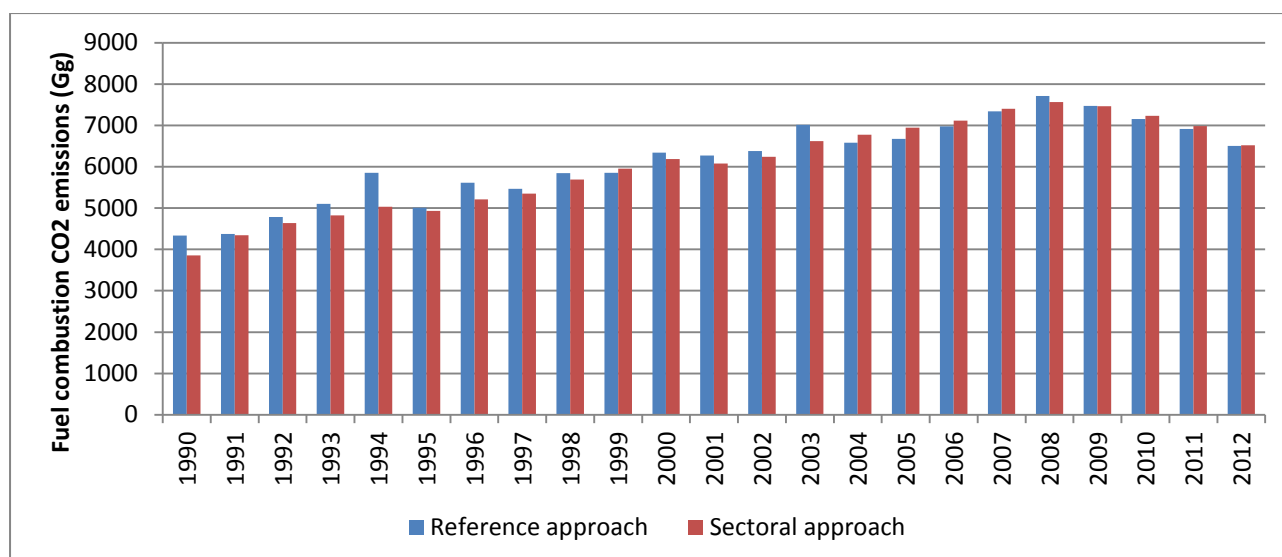


Figure 3.13. Comparison of CO2 emissions between Reference and Sectoral approach 1990-2012

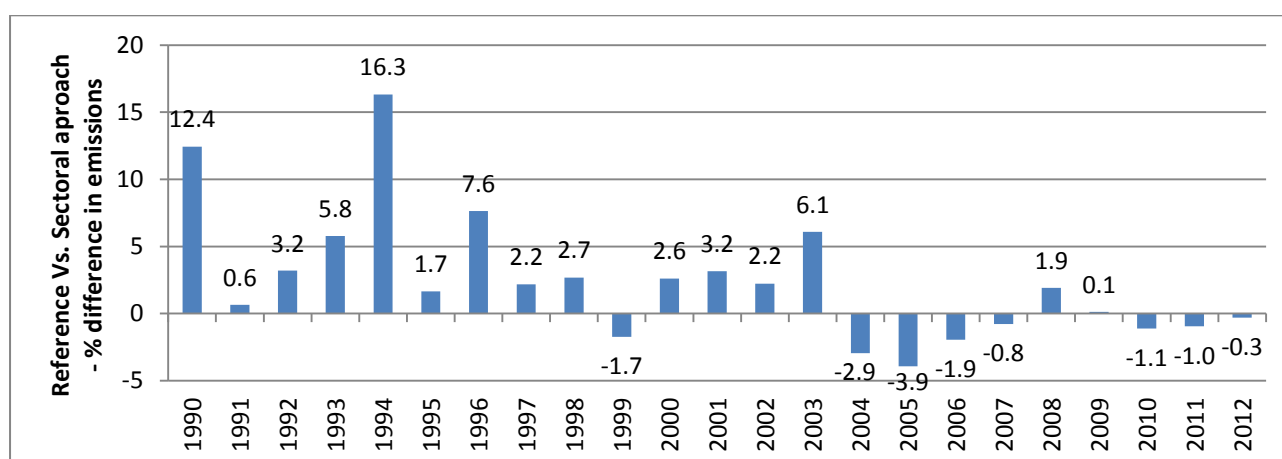


Figure 3.14. % difference in CO2 emissions between Reference and Sectoral approach 1990-2012

3.2.10. Feedstocks and non-energy use of fuels (CRF source 1AD)

Non-energy fuel use concerns the consumption of fuels as raw materials (e.g. in chemical industry, metal production) for the production of other products, or the use of fuels for non-energy purposes (e.g. bitumen). Part of the carbon content of fuels is stored in final products and is not oxidised into carbon dioxide for a certain time period. The fraction of the carbon contained in final products and the time period for which carbon is stored in them, depend on the type of fuel used and of the products produced.

The oxidation of the carbon stored in final products occurs either during the use of the product (e.g. solvents) or during their decomposition (e.g. through combustion). It should be noted that emissions from burning of products should be reported under the waste sector or energy sector (as long as energy exploitation takes place). In the case of Cyprus the products are used in the energy sector (it is assumed that 100% is collected and converted to fuel that is then consumed).

Non-energy use of fuels in Cyprus refers to the consumption of lubricants in transport and bitumen in construction. Data on the non-energy consumption of fuels was obtained from the national energy balance.

The calculation of carbon dioxide emissions from non-energy use of fuels is according to the methodology proposed by the revised IPCC1996 guidelines. NCVs, carbon emission factor and fraction of C stored are according to the IPCC 1996

guidelines (Table 3.39). Non-energy fuel use, carbon dioxide emissions and the amount of carbon stored in the final products are presented in Table 3.40.

Table 3.39. Parameters used for the calculation of emissions

	Lubricants	Bitumen
NCV (TJ/kt)	40.19	40.19
Carbon emission factor (t/TJ)	20.00	22.00
Fraction carbon stored	0.5	1

Table 3.40. Fuel consumption, carbon stored and CO₂ emissions for Feedstocks and non-energy use of fuels

	1990	1991	1992	1993	1994	1995	1996	1997	1998
1AD2. Lubricants									
Consumption (kt)	0	0	0	8	11	11	12	11	7
Carbon stored (Gg)	0.00	0.00	0.00	3.22	4.42	4.42	4.82	4.42	2.81
CO ₂ not emitted (Gg)	0.00	0.00	0.00	11.79	16.21	16.21	17.68	16.21	10.32
1AD3. Bitumen									
Consumption (kt)	33	23	50	59	57	54	57	62	75
Carbon stored (Gg)	29.18	20.34	44.21	52.17	50.40	47.75	50.40	54.82	66.31
CO ₂ not emitted (Gg)	107.0	74.6	162.1	191.3	184.8	175.1	184.8	201.0	243.1

	1999	2000	2001	2002	2003	2004	2005	2006	2007
1AD2. Lubricants									
Consumption (kt)	7	7	7	8	8	10	6	6	6
Carbon stored (Gg)	2.81	2.81	2.81	3.22	3.22	4.02	2.41	2.41	2.41
CO ₂ not emitted (Gg)	10.32	10.32	10.32	11.79	11.79	14.74	8.84	8.84	8.84
1AD3. Bitumen									
Consumption (kt)	86	83	81	84	70	65	69	69	57
Carbon stored (Gg)	76.04	73.39	71.62	74.27	61.89	57.47	61.01	61.01	50.40
CO ₂ not emitted (Gg)	278.8	269.1	262.6	272.3	226.9	210.7	223.7	223.7	184.8

	2008	2009	2010	2011	2012				
1AD2. Lubricants									
Consumption (kt)	6	6	6	6	5				
Carbon stored (Gg)	2.41	2.41	2.41	2.41	2.01				
CO ₂ not emitted (Gg)	8.84	8.84	8.84	8.84	7.37				
1AD3. Bitumen									
Consumption (kt)	66	74	83	64	36				
Carbon stored (Gg)	58.36	65.43	73.39	56.59	31.83				
CO ₂ not emitted (Gg)	214.0	239.9	269.1	207.5	116.7				

3.2.11. CO₂ capture from flue gases and subsequent CO₂ storage

Not applicable.

3.2.12. Country-specific issues

Not applicable.

3.3. Fugitive emissions from solid fuels and oil and natural gas (CRF source 1B)

Activities related to primary production (extraction), processing, storage and transmission/ distribution of fossil fuels should be included in this sector. GHG released in the atmosphere during these operations is the direct result of leaks,

disruptions and maintenance procedures. Moreover, the sector should also include emissions resulting from venting and flaring of gases that cannot be controlled by other means.

In Cyprus, there is no primary production of fuels or processing. There was one refinery in the country, which ceased its operation in 2004. Since then all fuels are imported. All transport of liquid fuels in Cyprus takes place by road transport. No central pipeline system is in place.

Based on the above, the fugitive emissions from oil for Cyprus are caused by refining, transport and distribution of oil products. For the distribution of oil products no emissions are reported since no method is proposed by IPCC (NE). For refining, no emissions are reported after 2004 when the refinery stop operating (NO). Emissions from transportation and refining according to the revised IPCC 1996 guidelines are associated to refining activities; therefore no emissions are reported after 2004. Table 3.41 and Figure 3.15 present the emissions of the source. All emissions are methane emissions and are from refining activities (1B2A.4) and only occur during 1990-2004 when the refinery was operating.

Table 3.41. CH₄ fugitive emissions from oil during 1990-2004, in tons

CH ₄ , t	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Transportation	20.0	24.0	22.9	24.6	28.5	26.0	23.9	32.8	34.0	37.1	36.9	36.3	34.1
Refining	20.0	24.0	22.9	24.6	28.5	26.0	23.9	32.8	34.0	37.1	36.9	36.3	34.1
Storage	3.6	4.3	4.1	4.4	5.2	4.7	4.3	5.9	6.2	6.7	6.7	6.6	6.2

CH ₄ , t	2003	2004											
Transportation	30.5	8.8											
Refining	30.5	8.8											
Storage	5.5	1.6											

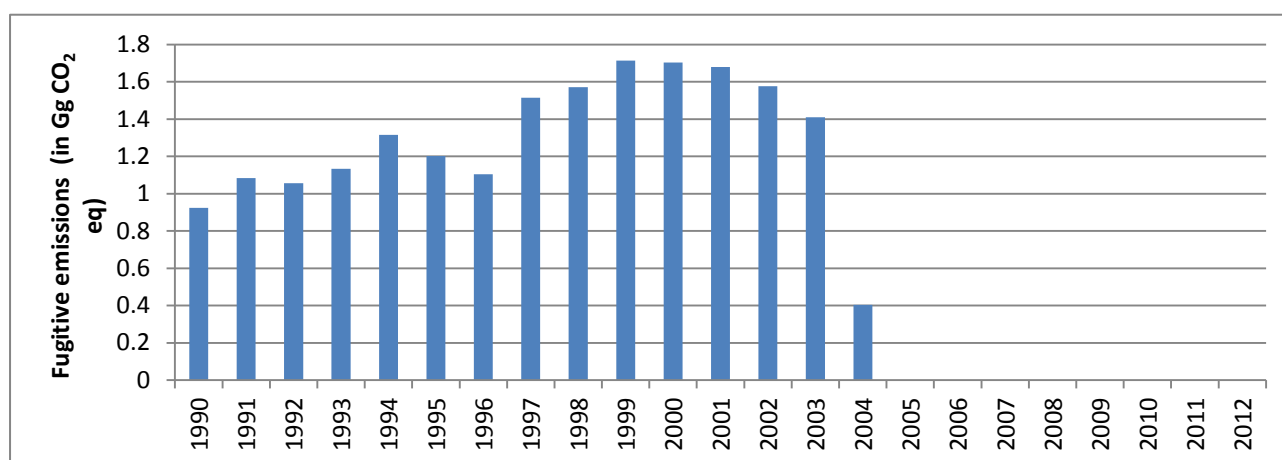


Figure 3.15. Fugitive emissions

Methodological issues

GHG emissions from oil until 2004 when the refinery was operating are estimated according to the Tier 1 methodology described in the revised IPCC 1996 guidelines. The activity data used is presented in Table 3.42.

Table 3.42. Oil refined during 1990-2004, kt

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Oil refined, kt	636	763	727	781	906	828	760	1,043	1,082	1,180	1,173	1,156

	2002	2003	2004									
Oil refined, kt	1,086	971	279									

The activity data is from the energy balance of the National Statistical Service. The data was converted from tons to TJ using the conversion factors of 1.008 ktoe/t and 41.868 TJ/ktoe. The emission factors are according to the revised IPCC 1996 guidelines, i.e. 745 g CH₄/TJ oil transported, 745 g CH₄/TJ oil refined (average of 90 and 1400 g CH₄/TJ oil refined which is proposed for all regions according to Table 1-6 of workbook, pg. 1.30) and 135 gCH₄/TJ oil stored (average of 20 and 250 g CH₄/TJ oil stored which is proposed for all regions according to Table 1-6 of workbook, pg. 1.30).

Uncertainties and time-series consistency

The uncertainty analysis of all sectors is presented in Section 1.7. Time-series consistency is ensured by (a) using the same source of data for all years and (b) using the same methodology for the estimation of emissions for all years.

Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

Source-specific recalculations

No recalculations.

Source-specific planned improvements

No source specific improvements are planned.

3.4. Memo items (CRF source 1C)

Memo items are emissions from source that have to be estimated and reported but do not count towards the national total. The activities that occur in Cyprus are International bunkers (1C1) and CO₂ from biomass (1C3). The emissions during the period 1990-2012 are presented in Table 3.43 and Figure 3.16.

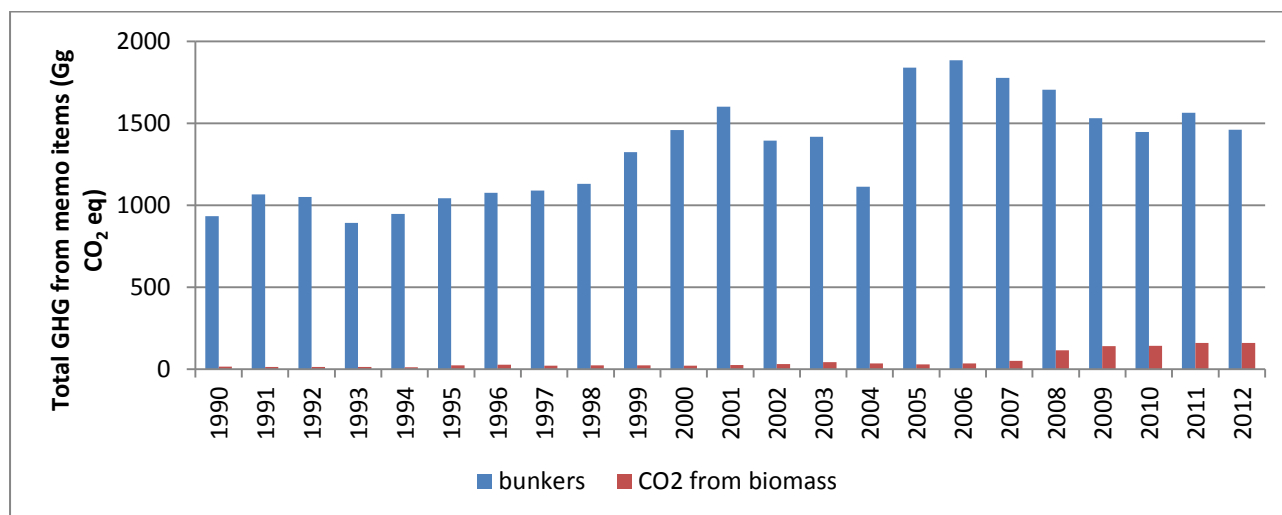


Figure 3.16. GHG from Memo items

Table 3.43. Emissions from memo items

	1990	1995	2000	2005	2010	2011	2012
International bunkers (Gg CO ₂ eq.)							
CO ₂ from biomass	15.1	23.2	22.2	30.1	143.0	160.6	159.3

3.4.1. International bunkers (CRF 1C1)

3.4.1.1. Source category description

According to the IPCC guidelines, fuels used for international transport should not be included in national totals of emissions from fuels used. However, the emissions from international bunkers should not be omitted entirely but reported separately. The definitions of national and international movements for ships and aircraft are covered under the “Definition of Source Categories” (Energy) in Volume 1, Reporting Instructions, in the revised IPCC 1996 guidelines.

The emissions from international bunkers (Table 3.44) increased by 56% between 1990 and 2012. Emissions from aviation increased by 11% and from maritime activities by 239%. The emissions are also presented in Figure 3.17.

Table 3.44. Emissions from international bunkers 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	906	1011	1420	1795	1403	1519	1420
CH ₄ (t)	0.017	0.020	0.045	0.066	0.044	0.047	0.046
N ₂ O (t)	0.022	0.024	0.028	0.032	0.028	0.030	0.028
Total (Gg CO₂ eq.)	913	1019	1430	1806	1412	1529	1430
Gg CO ₂ eq.							
Aviation	732	805	825	894	829	908	814
Maritime activities	182	215	604	912	583	621	616

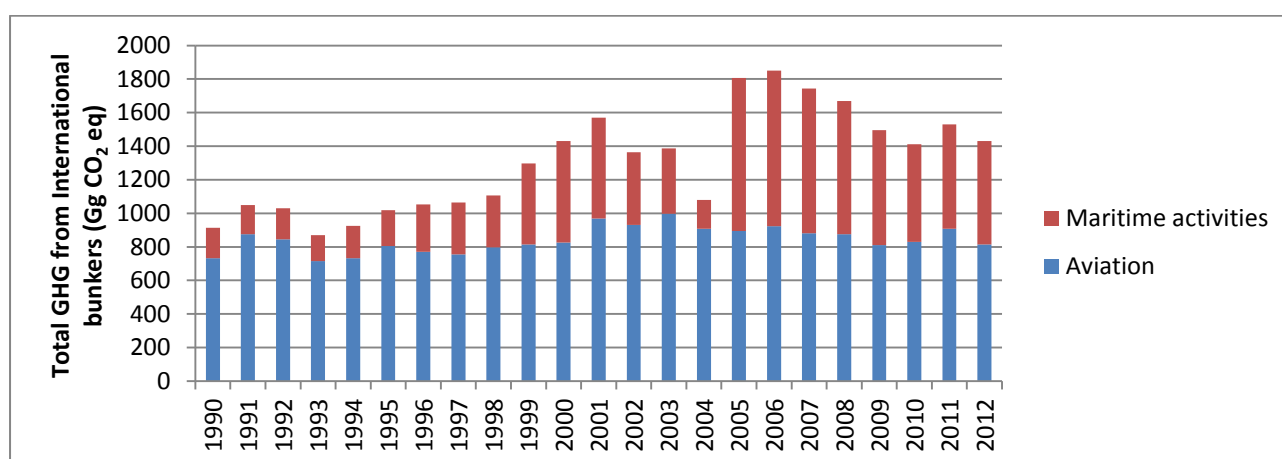


Figure 3.17. Total GHG from International bunkers

3.4.1.2. Methodological issues

Activity data used for the estimation of emissions from bunkers is presented in Table 3.45. Data for all fuels except jet-kerosene, was obtained from the energy balance of the national statistical service in kt of fuel consumed. The fuel consumption for jet-kerosene was estimated by subtracting the fuel consumed for LTOs from the total. The conversion to TJ was made according to the conversion factors presented in Table 3.46 and 41.868 TJ/kt. Emission factors are according to revised IPCC 1996 guidelines (Table 3.46). Oxidation is also according to revised IPCC 1996 guidelines (0.99).

Table 3.45. Fuel consumption for international aviation and maritime activities for 1990-2012 in kt

kt	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Jet Kerosene	230	275	266	224	230	253	242	237	250	256	259	304
Gas/Diesel Oil	24	20	21	14	12	15	25	27	35	46	50	47
RFO	34	36	38	36	50	54	65	71	63	108	143	145
Lubricants	0	0	0	0	0	0	1	1	1	1	1	1

kt	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Jet Kerosene	292	313	285	281	290	277	275	255	260	285	256	
Gas/Diesel Oil	33	36	27	67	106	104	88	73	53	58	69	
RFO	105	88	27	225	190	171	165	146	134	141	128	
Lubricants	1	1	1	1	1	1	1	0	0	0	0	

Table 3.46. Parameters used for the calculation of emissions

Fuel	NCV (TJ/kt)	CEF (tC/TJ)	kg CH ₄ / TJ	kg N ₂ O/ TJ
Jet Kerosene	44.59	19.5	0.5	2
Gas/Diesel Oil	43.33	20.2	5	0.6
RFO	40.19	21.1	5	0.6
Lubricants	40.19	20.0	5	0.6

3.4.1.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.4.1.4. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.4.1.5. Source-specific recalculations

Recalculations have been caused by the revision of Jet kerosene data (a) for the years 2009, 2010 and 2011 due to revision of data provided by the statistical service, (b) for the whole reporting period, since the fuel consumption for domestic flights was subtracted. The change in fuel consumption is presented in Table 3.47. The respective impact on the emissions of the sector is presented in Table 3.48.

Table 3.47. Changes in jet kerosene consumption between NIR2013 and NIR2014

kt	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	236	280	272	231	237	260	249	245	258	264	268
NIR2014	230	275	266	224	230	253	242	237	250	256	259

kt	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	314	302	323	295	291	300	287	286	266	271	296
NIR2014	304	292	313	285	281	290	277	275	255	260	285

Table 3.48. Changes in international aviation emissions between NIR2013 and NIR2014

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	752	892	866	736	755	828	793	780	822	841	853
NIR2014	732	875	846	715	733	805	770	756	797	815	826
% difference	-2.7%	-1.9%	-2.3%	-2.9%	-2.9%	-2.8%	-2.9%	-3.1%	-3.0%	-3.1%	-3.2%

Gg CO ₂ eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	1000	962	1029	939	927	955	914	911	844	860	936
NIR2014	969	931	998	908	894	923	881	875	811	829	908
% difference	-3.1%	-3.2%	-3.0%	-3.3%	-3.6%	-3.4%	-3.6%	-4.0%	-3.9%	-3.6%	-3.0%

3.4.1.6. Source-specific planned improvements

The options for improving the accuracy in fuel consumption are currently examined.

3.4.2. CO₂ from biomass (CRF 1C3)

The total national CO₂ emissions from biomass are presented in Table 3.49 and Figure 3.18.

Table 3.49. Emissions from international bunkers 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ from biomass (Gg)	15.1	23.2	22.2	30.1	143.0	160.6	159.3

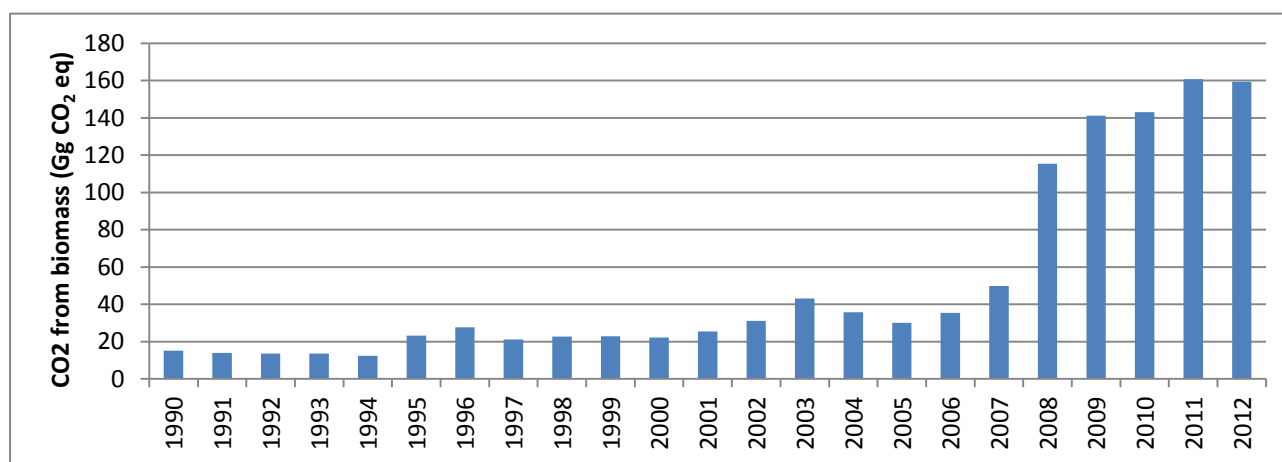


Figure 3.18. CO₂ from biomass

3.4.2.1. Methodological issues

Methodological issues have already been described in the sections where the biomass consumption occurs.

3.4.2.2. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

3.4.2.3. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

3.4.2.4. Source-specific recalculations

Changes to the current submission compared to NIR2013 have been caused by the inclusion of biogas and charcoal in addition to solid and liquid biomass. The impact on the emissions is presented in Table 3.50 and Figure 3.19.

Table 3.50. Changes caused by recalculations between NIR2013 and NIR2014

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	15.7	13.0	12.8	12.7	9.2	9.9	14.8	7.6	6.9	9.6	12.9
NIR2014	15.1	13.8	13.6	13.6	12.4	23.2	27.6	21.2	22.6	22.9	22.2
% difference	-4%	6%	7%	7%	35%	135%	87%	178%	225%	140%	72%

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	16.3	17.8	30.2	20.4	10.3	14.8	22.5	82.2	92.8	92.4	97.6
NIR2014	25.4	31.0	43.0	35.7	30.1	35.4	49.9	115.4	141.1	143.0	160.6
% difference	56%	74%	43%	75%	192%	139%	122%	40%	52%	55%	65%

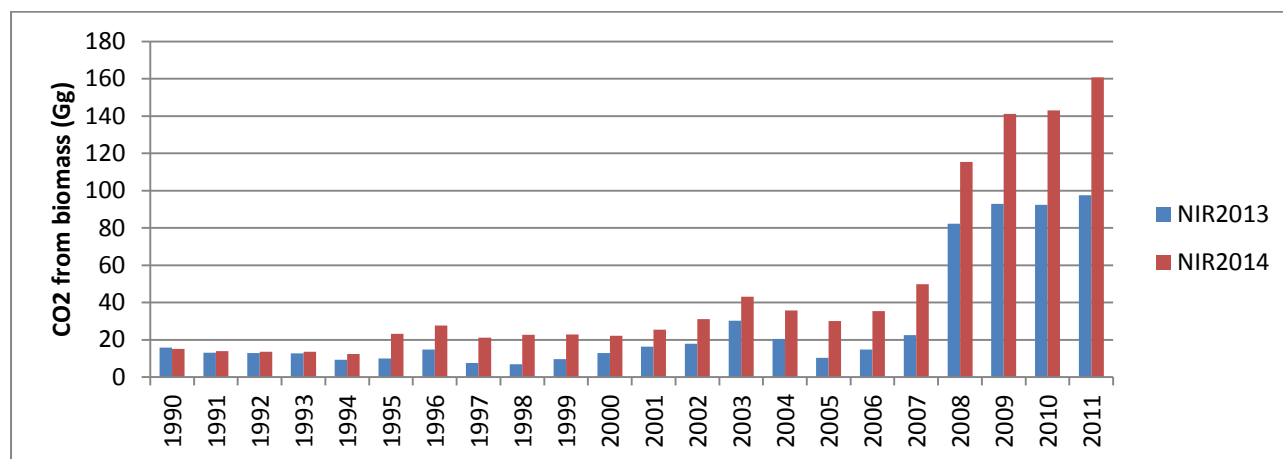


Figure 3.19. Changes caused by recalculations between NIR2013 and NIR2014

Chapter 4: Industrial processes (CRF sector 2)

4.1. Overview of sector

This chapter includes information on GHG emissions from Industrial processes and description of the methodologies applied per source for the calculation of emissions. The main industrial activities that take place in Cyprus are food and beverage processing, cement and gypsum production, light chemicals (predominately pharmaceuticals), metal and wood products. Therefore, the following source categories are applicable for Cyprus in this sector: Mineral products (2A), Food and drink production (2D2) and Consumption of halocarbons and SF6 (2F). Activity data for food and drink production is not available therefore emissions for source 2D2 have not been estimated.

4.1.1. Emissions trends

In 2012, GHG emissions from Industrial processes accounted for 8.8% of total emissions excluding LULUCF compared to 12.5% in 1990. The emissions have increased by 7% compared to 1990. Emissions from Lime production (2A2) have been recalculated due to revised activity data, while emissions from limestone and dolomite use (2A3) are reported for the first time. Revisions also took place for the estimation of emissions from consumption of f-gases. For this submission it was also decided to use the IPCC 1996 guidelines and GPG to estimate the emissions from cement production, regardless that installation specific data is available from the annual verified reports submitted by the installations included in the ETS, to maintain consistency in the method used for the whole period. 68% of the industrial processes emissions is from mineral production and the remaining 32% from consumption of Halocarbons and SF6.

Table 4.1. Total GHG emissions (in Gg CO₂ eq) from Industrial Processes for the period 1990 – 2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	759	839	847	895	585	572	554
HFCs (Gg CO ₂ eq.)		2	29	121	250	259	260
SF6 (Gg CO ₂ eq.)			0.01	0.07	0.08	0.09	0.09
Total (Gg CO ₂ eq.)	759	841	876	1016	835	831	814

2A. Mineral products	759	839	847	895	585	572	554
2F. Consumption of halocarbons and SF6		2	29	121	250	259	261
2FP. Consumption of halocarbons and SF6 potential emissions			30	505	992	925	665

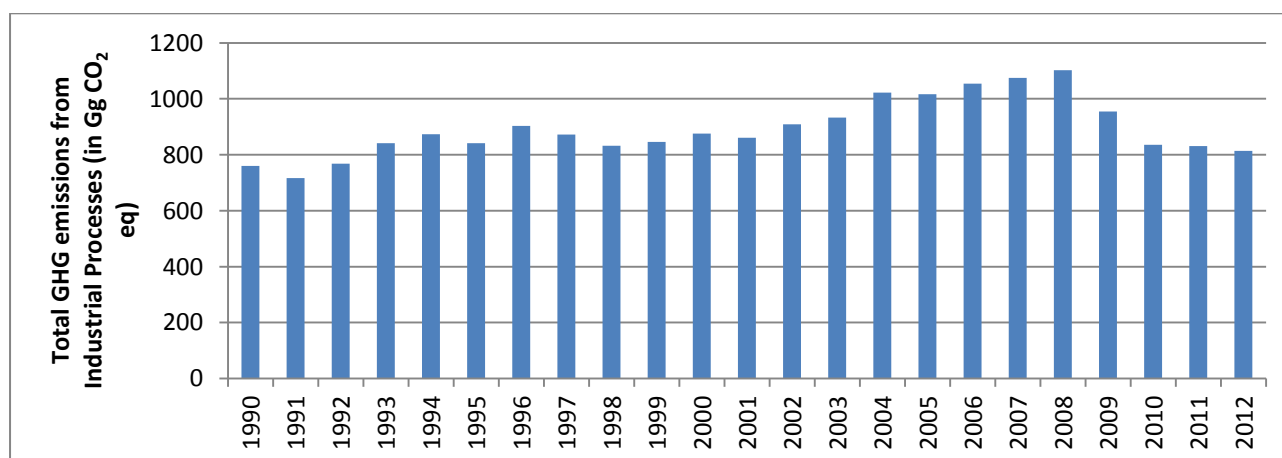


Figure 4.1. Total GHG emissions (in Gg CO₂ eq) from Industrial Processes for the period 1990 – 2012

4.1.2. Methodology

The calculation of GHG emissions from Industrial Activities is based on the methodologies and emission factors suggested by the revised IPCC 1996 Guidelines and the GPG. Data used for the estimation on emissions was obtained from the National Statistical Service, and the installations (cement, lime, limestone and dolomite, and ceramics). Tier 1 method with default revised IPCC 1996 emission factors are used for all calculations. The methodologies and emission factors used are summarised in Table 4.2.

Table 4.2. Industrial processes – methodologies and emission factors applied

	CO ₂		HFC	
	Method	EF	Method	EF
2A. Mineral production	D, T1	D, CS		
2F. Consumption of F-gases			CS	CS

T1: IPCC methodology Tier 1; D: IPCC default methodology and emission factor; CS: Country specific

Key categories

The results of the key categories assessment are presented in [section 1.5](#).

Uncertainty

The uncertainty analysis is presented in [section 1.7](#).

4.1.3. Completeness

Table 4.3 gives an overview of the IPCC source categories included in this chapter and presents the status of emissions estimates from all sub-sources in industrial processes. The CO₂ emissions from asphalt roofing and road paving with asphalt have not been estimated due to lack of methodology. Emissions from food and drink production (2D2) is not available therefore emissions for source have not been estimated either. Several sources from Consumption of halocarbons & SF₆ are also not reported due to lack of activity data.

Table 4.3. Industrial Processes – completeness

	CO ₂	HFC	PFC	SF ₆
2A. Mineral products				
1. Cement production	✓			
2. Lime production	✓			
3. Limestone & dolomite use	✓			
4. Soda ash production & use	✓			
5. Asphalt roofing	NE1			
6. Road paving with asphalt	NE1			
7. Other				
(a) Glass production	NO			
(b) Ceramics production	✓			
2B. Chemical industry	NO			
2C. Metal production	NO			
2D. Other production				
1. Pulp and paper	NO			
2. Food and drink	NE2			
2E. Production of halocarbons & SF ₆	NO			
2F. Consumption of halocarbons & SF ₆				
1. Refrigeration & air conditioning		✓	NO	NO
2. Foam blowing		✓	NE2	NO
3. Fire extinguishers		NE2	NE2	NO

	CO ₂	HFC	PFC	SF ₆
4. Aerosols / metered dose inhalers		✓	NE2	NO
5. Solvents		NE2	NE2	NO
6. Other applications using ODS substitutes		NO	NO	NO
7. Semiconductor manufacture		NO	NO	NO
8. Electrical equipment		NO	NO	✓

NO: Not occurring; NE1: Not estimated due to lack of method; NE2: Not estimated due to lack of activity data

4.2. Mineral products (2A)

The mineral products that are produced in Cyprus are cement, lime and ceramics. Other products that are consumed in Cyprus are limestone (only in cement and lime production - already accounted for in 2A1 and 2A2) and dolomite. For this submission, data was collected for the first time for dolomite consumption while the data for lime production was revised according to new information obtained from the one installation that produces it; the emissions for 1990-1994 were 0 because dolomite was not consumed during those years.

The emissions estimated by product are presented in Table 4.4 and the total trend in Figure 4.2.

Table 4.4. Emissions from mineral products (Gg CO₂)

	1990	1995	2000	2005	2010	2011	2012
Cement production	712	801	814	840	595	591	543
Lime production	5.75	4.69	5.84	13.02	7.76	7.72	3.66
Limestone and dolomite use	0.0	0.01	0.01	0.01	0.14	0.12	0.14
Other - ceramics	56.8	50.4	44.2	60.0	22.2	18.3	45.3
Total	774	856	864	912	625	617	593

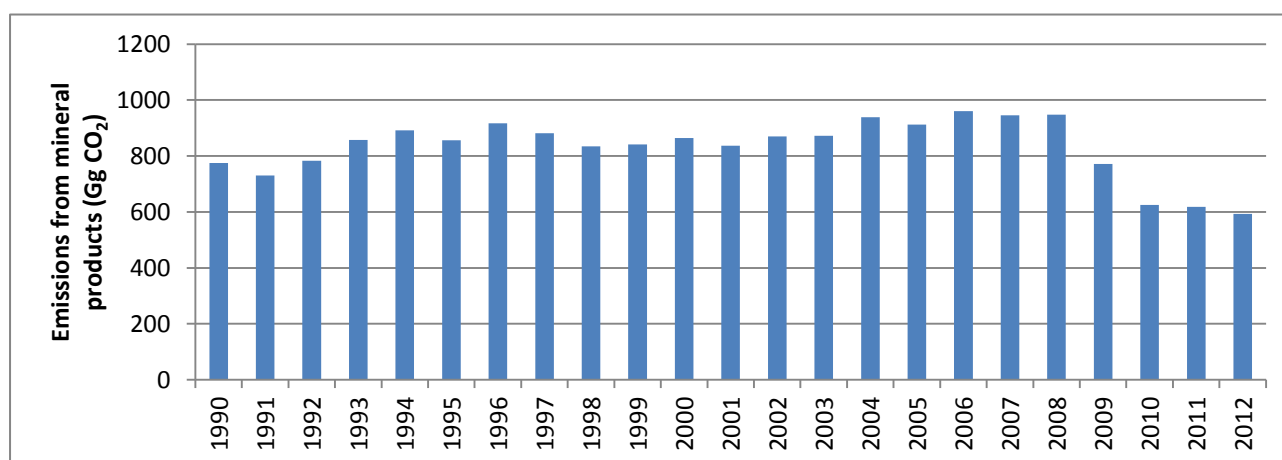


Figure 4.2. Emissions from mineral products (Gg CO₂)

4.2.1. Methodological issues

Cement production (2A1)

Data for clinker production was obtained from the installations that operate in Cyprus (2 installations 1990-2011, one installation 2011-2012). Data was compared to the data reported by the statistical service and the data used by the department of Labour Inspection for the preparation of air pollutants inventories under Directive 2001/81/EC. The emission factor of 0.5581 tCO₂/t clinker was used, which is the implied emission factor estimated from the CO₂ process emissions reported by the two cement producing installations for the 2005 according to the ETS national law. The CO₂ emissions for the years 2005-2012 were use as reported by the installations for ETS purposes.

The total clinker production and the reported CO₂ emissions (only for the period 2005-2012) are presented in Table 4.5. The activity data for 2005 and 2006 has been revised due to an identification of a mistake.

Table 4.5. Total clinker production (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Clinker production (kt)												
Installation 1	353	390	380	382	383	369	359	374	337	334	362	361
Installation 2	895	786	902	1015	1083	1035	1158	1085	1045	1047	1065	1033
Total	1249	1176	1282	1397	1466	1405	1516	1459	1382	1382	1428	1394

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Clinker production (kt)												
Installation 1	373	363	367	330	365	350	368	231	260	76	0	
Installation 2	1059	1043	1142	1143	1177	1166	1158	1033	783	961	953	
Total	1432	1405	1509	1473	1542	1515	1526	1264	1043	1037	953	
CO₂ process emissions												
Installation 1 (t)				195	198	190	200	125	140	41	0	
Installation 2 (t)				626	623	622	618	548	415	505	505	
Total (Gg)				822	821	812	818	673	555	546	505	

Lime production (2A2)

The activity data for lime production was obtained from the one installation in Cyprus that produces slaked lime. The emission factor chosen was the one for high calcium quicklime according to the GPG (pg. 3.20), 0.785 t CO₂/t quicklime.

Limestone and dolomite use (2A3)

Limestone in Cyprus is used only in cement and lime production - already accounted for in 2A1 and 2A2. Dolomite is used in environmental pollution control. Due to lack of other source for data, it is assumed that the consumption is equal to the annual imports. The emission factor used was the default proposed by the revised IPCC 1996 guidelines (workbook, pg. 2.7), 0.477 t CO₂/t dolomite consumed.

Other – ceramics production (2A7.2)

The CO₂ process emissions from ceramics production were estimated following the methodology below:

- The activity data (Table 4.6) and CO₂ process emissions from the 8 ETS installations were tabulated. The years for which activity data and CO₂ emissions are available are 2001-2011. For 2001-2004 data was obtained during the preparation of the first ETS national allocation plan of Cyprus and for 2005-2011 the data was obtained from the verified emissions reports submitted annually according to the ETS legislation.
- Dividing the total CO₂ process emissions of the ETS installations by the total production, the annual implied emission factor was estimated for the years 2005-2011.
- The activity data for the non-ETS installation for the years 2001-2011 was estimated by subtracting from the total annual production of ceramics obtained from the Department of Labour Inspection, the total annual production of the ETS installations collected from (a).
- The CO₂ process emissions of the non-ETS installation for 2001-2011 were estimated by multiplying the implied emission factor estimated in (b) for 2003 (0.15988 tCO₂/t, which was the highest of the available emission factors) by the annual production.
- For the years 1990-2000 the total annual ceramics production data was obtained from the Department of Labour Inspection. For the estimation of total CO₂ process emissions, the highest emissions factor of the estimated ETS annual implied emission factor was used (0.15988 tCO₂/t product in 2003).

The reports for the ETS are prepared annually by the installations according to the EU regulations that are based on the IPCC methodologies. The latest regulation that is in force is no. 601/2012. The reports are also verified by an accredited verifier according to the national legislation (law no. 110(I)/2011).

Table 4.6. Ceramics production (Gg)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total production (Gg)	355	343	300	354	311	315	301	282	261
ETS production (Gg)									
Non-ETS production (Gg)									

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total production (Gg)	298	276	278	332	378	484	504	491	512
ETS production (Gg)			271	314	364	470	493	484	500
Non-ETS production (Gg)			6.3	17.9	13.7	13.6	10.8	7.8	12.0

	2008	2009	2010	2011	2012				
Total production (Gg)	546	356	291	223	168				
ETS production (Gg)	533	338	282	211	162				
Non-ETS production (Gg)	13.0	17.8	9.3	11.5	6.3				

4.2.2. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

4.2.3. Source-specific QA / QC and verification

Cement production: the emissions estimated were compared to the verified emissions reported for ETS. Clinker production data was compared to the data reported by the statistical service and the data used by the department of labour inspection department for the estimation of air pollutants for the preparation of the air pollutants inventory for the purposes of Directive 2001/81/EC.

All the QA/QC and verification activities are presented in [section 1.6](#).

4.2.4. Source-specific recalculations

The changes in the emissions' estimates compared to the previous submission have been caused by the following: (a) clinker production data was corrected for 2005 and 2006, (b) method for estimating of cement emissions has been revised, (c) revised data on lime production, (d) change of the emission factor for lime production, (e) addition of emissions from limestone and dolomite use and (f) revision of emission factor for ceramics production. The impact of these changes to the total emissions of the source is presented in Table 4.7.

Table 4.7. Total impact of recalculations to the emissions from mineral products

CO2 emissions (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	728	687	737	808	839	805	863	830	785	792	811
NIR2014	759	716	768	841	874	839	899	864	818	824	847
% difference	4.3%	4.3%	4.2%	4.1%	4.1%	4.2%	4.2%	4.1%	4.2%	4.0%	4.4%

CO2 emissions (Gg)	2001	2002	2003	2004	2005*	2006*	2007	2008	2009	2010	2011
NIR2013	784	812	821	884	893	903	893	894	722	586	570
NIR2014	820	852	855	920	895	903	894	896	724	585	572
% difference	4.6%	5.0%	4.2%	4.1%	0.2%	0.0%	0.1%	0.2%	0.3%	-0.1%	0.4%

(a) Clinker production data was corrected for 2005 and 2006

The change in the clinker production data for 2005 and 2006 between NIR2013 and NIR2014 is presented in Table 4.8.

Table 4.8. Change in clinker production data for 2005 and 2006 between NIR2013 and NIR2014

Total clinker (kt)	2005	2006
NIR2013	1503	1541
NIR2014	1473	1542

(b) Method for the estimation of cement emissions has been revised

In previous submissions the detailed data available for the years 2005-2011 via the verified EU ETS reports of the plants was used. For the period 1997-2004, the data submitted by the installations for the preparation of the National Allocation Plan 2005-2007 was used, whereas for the period 1990-1996, the emissions were estimated using the EF of 1997. For this submission, to increase consistency, the emissions from all the years were estimated using the implied emission factor from the process emissions reported for the ETS in 2005. This has resulted to the change presented in Table 4.9. The emissions for the period 2005-2011 remain the same: the emissions reported for the ETS are used.

Table 4.9. Change in CO₂ emissions from cement production between NIR2013 and NIR2014

CO ₂ emissions (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	668	629	686	747	784	751	811	780	740	740	763
NIR2014	697	656	715	780	818	784	846	814	771	771	797
% difference	4.3%	4.3%	4.2%	4.4%	4.3%	4.4%	4.3%	4.4%	4.2%	4.2%	4.5%

CO ₂ emissions (Gg)	2001	2002	2003	2004	2005*	2006*	2007	2008	2009	2010	2011
NIR2013	745	766	751	808	822	821	812	818	673	555	546
NIR2014	778	799	784	842	822	821	812	818	673	555	546
% difference	4.4%	4.3%	4.4%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

* change also included the change in the activity data presented in (a)

(c) Revised data on lime production

The data used in the previous submission was for untreated lime. In this submission the data was revised to slaked lime. The change affected all the years. The change in the activity data is presented in Table 4.10.

Table 4.10. Change in lime production data

Lime production (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	4.6	4.4	4.1	5.5	7.2	4.3	4.6	5.9	4.3	6.0	5.5
NIR2014	7.3	6.6	5.5	6.1	7.4	6.0	5.6	5.7	6.6	6.9	7.4

Lime production (Gg)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	5.5	5.5	12.5	11.9	14.8	12.8	12.1	12.8	10.5	11.5	5.5
NIR2014	9.4	13.9	13.4	14.0	16.6	12.6	13.5	14.3	11.8	9.9	9.4

(d) Revision of emission factor for emissions from lime production

The emission factor from lime production was revised to be in accordance to the GPG. The resulting change in emissions is presented in Table 4.11.

Table 4.11. Change in the lime production emissions*

Gg CO ₂	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	3.66	3.44	3.27	4.37	5.66	3.43	3.63	4.67	3.43	4.72	4.35
NIR2014	5.75	5.16	4.35	4.77	5.84	4.69	4.36	4.47	5.16	5.42	5.84
% difference	57%	50%	33%	9%	3%	37%	20%	-4%	50%	15%	34%

Gg CO ₂	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	4.35	4.35	9.88	9.43	11.71	10.09	9.55	10.10	8.26	9.12	6.93
NIR2014	7.36	10.94	10.49	10.99	13.02	9.92	10.59	11.21	9.23	7.76	7.72
% difference	69%	152%	6%	17%	11%	-2%	11%	11%	12%	-15%	11%

* also includes changes caused by change of activity data described in (c)

(e) Addition of emissions from limestone and dolomite use

The previous submission did not include any estimates for gases in this source. Therefore, all the NEs reported in previous submissions have been replaced for this submission.

(f) Revision of emission factor for ceramics production

The change in the emissions from ceramics production due to the change in the EF is presented in Table 4.12. The change affected emissions after 2001.

Table 4.12. Change in emissions from ceramics production

Gg CO ₂	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	34.2	41.9	60.4	66.4	59.5	71.6	70.9	66.0	40.9	21.4	17.4
NIR2014	34.5	42.5	60.4	66.7	60.0	71.7	71.2	66.5	41.7	22.2	18.3
% difference	0.7%	1.5%	0.0%	0.5%	0.8%	0.2%	0.4%	0.8%	2.0%	3.8%	5.4%

4.2.5. Source-specific planned improvement

Cement production: It is expected that by the next submission sufficient data for the quality of the materials used in cement production will be collected to implement the detailed methodologies of the GPG for all years.

Limestone and dolomite use: Collect data for dolomite consumption to avoid the assumption that the consumption is equal to the imports

Ceramics production: improve methodology for the estimation of emissions to improve consistency.

4.3. Consumption of halocarbons and SF₆ (2F)

4.3.1. Source category description

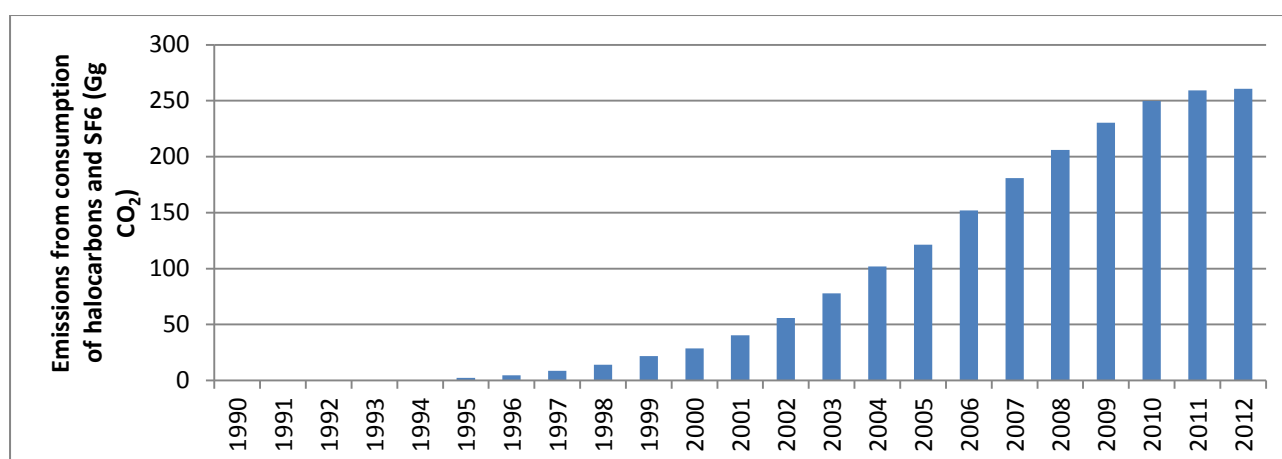
According to the IPCC Good Practice Guidance there are five categories accounting for emissions from the use of ozone depleting substances (ODS) substitutes. In order to obtain a reliable estimation of F-gases emissions, the collection of detailed data for all the activities (e.g. number of refrigerators, type and amount of refrigerant used by each market label, substitutions of refrigerants that took place the late years etc.) is required. The availability of official data in Cyprus is limited and therefore the estimations presented hereafter involve the application of country specific methodologies.

The total emissions by gas and source for the period 1990-2012 are presented in Table 4.13. The total emissions of this source are also presented in Figure 4.3. The first reporting year for this source is 1993.

Table 4.13. Emissions from consumption of halocarbons and SF6 1993-2012

	1993	1995	2000	2005	2010	2011	2012
HFC-32 (kg)	0.5	217	2240	9649	35588	39627	38545
HFC-125 (kg)	0.6	262	2714	12131	42606	47307	46742
HFC-134a (kg)	2.5	1049	12347	56018	74578	69331	69755
HFC143a (kg)	0.04	17	173	1264	2138	2223	3021
R227ea (kg)			67	134	115	114	119
R245ca (kg)			1741	1875	1238	1271	1276
Unspecified mix of HFCs (Gg CO ₂ eq.)			1.8	1.9	1.2	1.3	1.3
SF6 (kg)			0.4	3.0	3.5	3.6	3.7
Total (Gg CO ₂ eq.)	0.01	2.3	29	121	250	259	261

2F1. HFCs from Refrigeration and air conditioning equipment (Gg CO ₂ eq.)	0.01	2.30	23.8	114	244	253	255
2F2. HFCs from foam blowing (Gg CO ₂ eq.)			4.87	5.25	3.47	3.56	3.57
2F4. HFCs from Aerosols/metered dose inhalers (Gg CO ₂ eq.)				1.97	2.15	2.06	2.22
2F8. SF6 from Electrical Equipment (kg)			0.44	3.03	3.55	3.64	3.66

**Figure 4.3.** Total emissions from consumption of halocarbons and SF6 1993-2012

4.3.2. Methodological issues

Due to insufficient information for a long period of time, it was decided to use a country specific methodology for the estimation of all emissions from this source. The same approach has been used for the estimation of emissions from Foam blowing (2F2), Aerosols/ metered dose inhalers (2F4) and Electrical equipment (2F8) in the previous submission. The change in the methodology was considered necessary to eliminate the reduce uncertainty and to increase consistency.

The methodology applied consisted of the following steps:

- The average EU emissions from the source of Foam blowing (2F2) and the average emissions of Malta and Greece were estimated for Refrigeration and air conditioning equipment (2F1), Aerosols/ metered dose inhalers (2F4) and Electrical equipment (2F8) for the years for which data was available.
- The average emissions were divided by the population of the country to provide emissions per 100 000 inhabitants for the given source, and multiplied by the population of Cyprus to estimate the total emissions for the source for the given year.
- The total emissions were broken down into specific mixtures used according to the information provided by the national expert¹².

¹²Mr. Pavlos Pavlou

(d) The emissions were converted from Gg CO₂ eq. to kg using the GWPs for 100 years as proposed by the UNFCCC¹³.

Average emissions per 100,000 residents

The emissions per 100,000 residents estimated using the total emissions and the population data from the NIRs submitted in 2013 are presented in Table 4.14. For 2F1, 2F4 and 2F8 the average of Greece and Malta was used, whereas for 2F2 the EU average was used.

Table 4.14. Average emissions per 100,000 inhabitants used for the estimation of emissions (Gg CO₂ eq. / 100000 inhabitants)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
2F1	0.001	0.001	0.351	0.668	1.290	2.058	3.167	3.449	5.012	7.114
2F2									0.046	0.388
2F4									0.001	0.001
2F8								0.002	0.002	0.002

	2003	2004	2005	2006	2007	2008	2009	2010	2011	
2F1	10.068	13.001	15.319	19.007	22.271	24.866	27.468	29.074	29.408	
2F2	0.382	0.329	0.350	0.340	0.684	0.679	0.411	0.295	0.295	
2F4	0.001	0.374	0.601	0.873	0.732	1.112	0.532	0.583	0.543	
2F8	0.002	0.009	0.010	0.010	0.010	0.011	0.009	0.010	0.010	

Gas mixture contribution to total

The total emissions estimated using the average emissions per 100,000 inhabitants were converted to consumption of gas mixtures using the contribution of mixtures to the total presented in Table 4.15 and Table 4.16. For 2F2, 2F4 and 2F8 the contribution is constant (Table 4.15). For 2F1 the contribution is according to the bulk imports (Table 4.16).

Table 4.15. Contribution of each mixture to the total emissions of 2F2, 2F4 and 2F8

	227ea	365mcf*	R134a	R245ca	SF6
2F2. HFCs from foam blowing	4%	36%	40%	20%	
2F4. HFCs from Aerosols/metered dose inhalers	30%		70%		
2F8. SF6 from Electrical Equipment					100%

* reported as unspecified mix of HFCs

Table 4.16. Contribution of each mixture to the total emissions of 2F1

	1993-2004	2005	2006	2007	2008	2009	2010	2011	2012
HFC-32	6.1%	5.5%	9.2%	9.2%	9.9%	10.6%	9.5%	10.2%	9.8%
HFC-125	31.9%	29.8%	46.7%	46.6%	50.1%	54.0%	48.9%	52.3%	51.4%
HFC-134a	59.2%	60.5%	41.8%	42.3%	38.0%	32.6%	38.3%	34.3%	34.3%
HFC-143a	2.8%	4.2%	2.3%	1.9%	2.0%	2.7%	3.3%	3.3%	4.5%

Global warming potential

To convert the amount of each gas emitted from Gg CO₂ eq. (which is the result of the previous steps) to kg the GWP for each gas is necessary (Table 4.17). The GWP used are for 100 years as proposed by the UNFCCC¹⁴.

Table 4.17. GWP for HFC and SF6 used

	HFC-32	HFC-125	HFC-134a	HFC-143a	HFC-227ea	R245ca	SF6
GWP	650	2800	1300	3800	2900	560	23900

¹³ http://unfccc.int/ghg_data/items/3825.php

¹⁴ http://unfccc.int/ghg_data/items/3825.php

4.3.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

4.3.4. Sector-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

4.3.5. Sector-specific recalculations

The emissions' estimates for all source of 2F have been recalculated due to a change in the methodology. The change in the methodology was considered necessary to eliminate the reduce uncertainty and to increase consistency. The impact on the emissions for each source is presented in Table 4.18. The total impact is also presented in Figure 4.4.

Table 4.18. Impact of recalculations on 2F1, 2F2, 2F4 and 2F8

	1993	1994	1995	1996	1997	1998	1999
NIR2013							
2F1. Refrigeration and air-conditioning equipm							19356
2F2. Foam blowing							
2F4. Aerosols/ metered dose inhalers							
2F8. Electrical equipment							
TOTAL	0	0	0	0	0	0	19356
NIR2014							
2F1. Refrigeration and air-conditioning equipm	5	9	2303	4449	8712	14056	21866
2F2. Foam blowing							
2F4. Aerosols/ metered dose inhalers							
2F8. Electrical equipment							
TOTAL	5	9	2303	4449	8712	14056	21866

	2000	2001	2002	2003	2004	2005	2006
NIR2013							
2F1. Refrigeration and air-conditioning equipm	19328	18405	18697	19085	19638	20265	22140
2F2. Foam blowing						1895	1769
2F4. Aerosols/ metered dose inhalers		0.0039	0.0038	0.0036	1.21	1.97	2.91
2F8. Electrical equipment	0.44	0.46	0.48	0.49	2.86	3.03	3.20
TOTAL	19339	18416	18709	19096	19707	22234	23988
NIR2014							
2F1. Refrigeration and air-conditioning equipm	23815	35357	50776	72785	95298	113977	144055
2F2. Foam blowing	4874	4979	5037	5102	5174	5251	4903
2F4. Aerosols/ metered dose inhalers		4	4	4	1206	1967	2913
2F8. Electrical equipment	0.44	0.46	0.48	0.49	2.86	3.03	3.20
TOTAL	28699	40351	55828	77903	101746	121267	151947

	2007	2008	2009	2010	2011		
NIR2013							
2F1. Refrigeration and air-conditioning equipm	23728	24857	39133	55144	125347		
2F2. Foam blowing	1885	1422	1211	1251	1284		
2F4. Aerosols/ metered dose inhalers	2.50	3.90	1.92	1.90	1.95		
2F8. Electrical equipment	3.37	3.59	3.05	3.55	3.64		
TOTAL	25696	26369	40419	56482	126719		
NIR2014							
2F1. Refrigeration and air-conditioning equipm	172914	198159	224993	244162	253498		
2F2. Foam blowing	5225	3942	3357	3466	3558		
2F4. Aerosols/ metered dose inhalers	2500	3900	1917	2153	2060		

2F8. Electrical equipment	3.37	3.59	3.05	3.55	3.64		
TOTAL	180720	206087	230339	249866	259203		

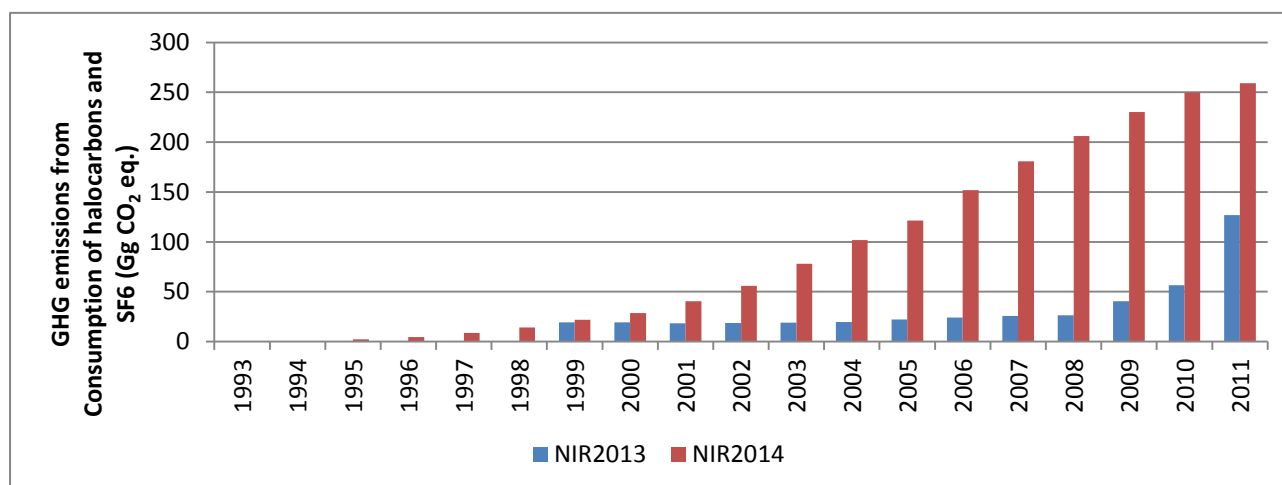


Figure 4.4. Impact of recalculations on actual emissions from consumption of halocarbons and SF6

4.3.6. Sector-specific planned improvement

Even though the estimates of the emission from consumption of halocarbons and SF6 show a great improvement compared to previous submissions, further work is needed to collect the information needed to implement the proposed methodologies of the IPCC guidelines. A lot work is still necessary to obtain data for equipment installed that use f-gases. The inventory of f-gases users is currently under development by the team of experts dealing with the implementation of the relevant legislation. The expected completion of this inventory is January 2015. Therefore the goal is by the 2016 submission to revise again the methodologies with more precise data and information for Cyprus.

4.4. Consumption of halocarbons and SF6 Potential emissions (2FP)

4.4.1. Source category description

Emissions from industrial processes can be estimated in two ways; as potential emissions, Tier 1 (a and b), and as actual emissions, Tier 2. In Tier 1 (a and b) methodology, potential emissions of a certain chemical are equal to the amount of virgin chemical consumed in the country minus the amount of chemical recovered for destruction or exported in the year under consideration. All chemicals consumed will eventually be emitted to the atmosphere over time if not destroyed, and in the long term (e.g., 50 yr), potential emissions will equal actual emissions.

The emissions reported include (a) the potential emissions from bulk imports and (b) the potential emissions from gases in products. The potential emissions of HFCs and SF6 are presented in Table 4.19 and Figure 4.5.

Table 4.19. Consumption of halocarbons and SF6 Potential emissions (2FP) 1994-2012

tCO ₂ eq.	1994	1996	1999	2000	2001	2002	2003	2004	2005	2006	2007
In bulk	25	10	20	30	55	14	20	22	164	91	1
In products	NA	NA	NA	NA	NA	NA	NA	671	630	569	738
TOTAL	25	10	20	30	55	14	20	693	794	660	739
HFC	25	10	20	30	55	14	20	693	794	660	739
SF6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

tCO ₂ eq.	2008	2009	2010	2011	2012						
In bulk	2	357	527	512	382						
In products	842	525	464	410	298						
TOTAL	844	882	991	922	680						
HFC	844	882	919	865	627						
SF6	NA	NA	72	57	53						

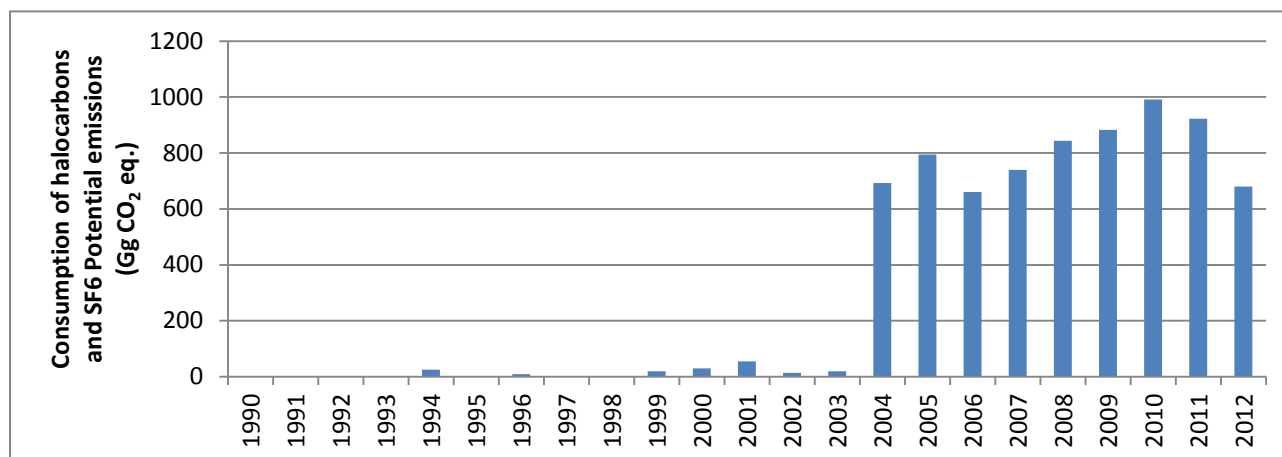


Figure 4.5. Consumption of halocarbons and SF6 Potential emissions (Gg CO₂ eq.)

In bulk

The emissions for HFCs are available for all the years after 1999; prior to that year, imports are available only for 1994 and 1996. For SF6 emissions are available only for 2010-2012 because no information is available for years prior to those. The time series could not be completed with any assumptions, because (a) there is a large change in the social conditions between 1990 and 2008 that affect the consumption of halocarbons and SF6 and (b) there is a change in the products consumed during this period.

In products

Detailed data on imports of equipment is available after 2004. This is the reason for the sudden increase in the total potential emissions after 2004. The imports after 2004 do not show a particular that could be used to estimate emissions prior to that year. However, there is a consultation with the Statistical Service in progress to obtain or estimate the necessary information and data.

4.4.2. Methodological issues

According to the revised IPCC 1996 guidelines, since net consumption of a chemical is the production plus imports minus exports, the calculation formula for the basic method (Tier 1) is as follows:

$$\text{Potential Emissions} = \text{Production} + \text{Imports} - \text{Exports} - \text{Destruction}$$

No production takes place in Cyprus. No information is available for any possible exports or destruction. Based on these, production, exports and destruction are assumed 0 for all the years. Therefore potential emissions are equal to imports.

Bulk imports

Information for bulk imports for the period 1994-2008 has been obtained from the Statistical Service. No information is available for the years 1990-1993, 1995 and 1997-1998. The codes of the products are 2903 30 80 (HFC/PFC/R134), 3824 90 99 (R404/R407/R410/R507) and 3824 71 00 (R408/R409). There is a high uncertainty associated with the data

collected after 2004, since according to the relevant legislation it is compulsory to report information on the imports only if the country of origin is a non-EU country. In the opposite case any information submitted is submitted voluntarily. The breakdown of the amount allocated from each import code to compound mixtures was based on estimations of the national expert on F-gases, Mr. Pavlos Pavlou. It was assumed that all 2903 30 80 is R134a, 3824 90 99 imports consist of 59.8% R404, 14.7% of R407 and 25.5% of R410 and 3824 71 00 it was assumed to be in 55% total R408. The bulk imports of the specific codes are presented in Table 4.20.

In 2009 bulk imports were 0 in imports statistics but data was available from the association of refrigeration. Therefore for 2009 - 2012 data provided voluntarily from the association of refrigeration was used and not the import statistics (Table 4.21). The composition of mixtures used to estimate the emission of each gas is presented in Table 4.22.

Table 4.20. Imports of bulk HFC mixtures (t), 1994-2008 (Statistical Service)

t	1994	1996	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
2903 30 80	19		13.32	21.19	40.68	4.66	11.87	14.13	122.09	68.76		
3824 90 99						2.09	2.08	1.92	3.72	1.43	0.57	
3824 71 00		13.56			0.12	1.86	1.85	33.86	52.61	17.35		2.14

Table 4.21. Imports of bulk HFC mixtures (t), 2009-2012 (importers)

Mixtures	2009 (t)	2010 (t)	2011 (t)	2012 (t)
R134a	18.1	60.3	56.98	48.3
R227ea		1.95	1.62	3.89
R404	92.2	77.8	72.93	30.91
R407	5	19.1	11.22	23.16
R408		0.01		
R409		0.14	0.029	
R410	11	33.2	38.67	32.61
R413	0.12			
R417	0.12			
R422d	0.12	1.75	7.33	6.75
R424a		1.75	7.9	7.92
R434a		6.4	5.6	10.4
R507	2	1	2.3	
SF6		3.03	2.4	2.2

Table 4.22. Composition of f-gas containing mixtures

Mixture	HFC-32	HFC-125	HFC-134a	HFC-143a	HFC-227ea	Other
R134a			100%			
R227ea					100%	
R404		44%	4%	52%		
R407	20%	40%	40%			
R408			55%			+45% R22
R410	50%	50%				
R413			88%			
R417		46.6%	50%			+9% R218, +3% R600
R422d		65.1%	31.5%			+3.4% R600
R424a		50.5%	47%			+3.4% isobutane
R434a	16%	63%		18%		+2.5% other gas
R507		50%	50%			+2.8% isobutane

Bulk imports in products

The imports of products used for the estimation of potential emissions from bulk imports of gases in products are presented in Table 4.23. The detailed import data is presented in Annex V. More types of equipment have been taken

into consideration compared to previous submissions. Data was only available for 2005 to 2011. As with the bulk imports, there is a high uncertainty associated with the data collected after 2004, since according to the relevant legislation it is compulsory to report information on the imports only if the country of origin is a non-EU country. In the opposite case any information submitted is submitted voluntarily.

Table 4.23. Equipment considered to estimate the compounds in products

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Tractors/trailers	2141	3222	431	669	7845	1430	497	2645	2079
Public transport	36	102	119	139	196	68	285	78	73
Motor vehicles - passenger transport	56439	42590	46152	61813	54935	29014	32304	24808	18098
Motor vehicles - transport of goods	7680	6295	5370	6537	8547	3263	4338	2421	1475
Refrigerators-freezers	21627	25588	20781	18915	23822	24281	19258	23196	17828
Household refrigerators	27132	29858	42041	43707	36671	24172	24963	23710	20226
Freezers (chest type)	4232	3391	3086	5291	6871	4790	4951	3153	1743
Freezers (upright)	2922	3477	3748	3884	1553	2833	8497	3090	1357
Refrigerated show-cases and counters	2923	4897	5404	6301	6170	4913	5130	6135	6068
Air-conditions	131714	149682	131188	169857	194208	137427	110312	97694	69462
Beverage/Vending machines	1090	712	1099	5148	4398	7755	791	615	448

The assumptions on the initial charge are presented in Table 4.24 and Table 4.25. Where the composition does not add up to 100% is because of other gases that do not have to be reported are used.

AnaFgas¹⁵ (Analysis of Fluorinated greenhouse gases in EU-27) is a bottom-up stock model to derive demand and emission scenarios for F-gases in relevant sectors and sub-sectors for the EU-27 Member States. It models demand for and emissions of HFCs, PFCs and SF₆ as well as HCFC-22 for the period 1995 to 2050 based on market data and estimates of the quantity of equipment or products sold each year containing these substances, and the amount of substances required in the EU to manufacture and/or maintain equipment and products over time. In most cases the charge assumed by the model is more accurate than the range proposed by the IPCC GPG. Therefore it was chosen in most cases, to use the charge assumed by the model AnaFgas.

Table 4.24. Initial charge assumptions

Initial charge (kg)	Charge	Source
Tractors/trailers	6.5	AnaFgas
Public transport	8	GPG
Motor vehicles - passenger transport	3	GPG
Motor vehicles - transport of goods	1.5	AnaFgas
Refrigerators-freezers	0.4	AnaFgas
Household refrigerators	0.12	AnaFgas
Freezers (chest type)	0.4	AnaFgas
Freezers (upright)	0.4	AnaFgas
Refrigerated show-cases and counters	0.4	AnaFgas
Air-conditions, kg	1.5	AnaFgas
Beverage/Vending machines	0.4	AnaFgas

¹⁵ Schwarz W, Gschrey B, Leisewitz A, Herold A, Gores S, Papst I, Usinger J, Oppelt D, Croiset I, Pedersen H, Colbourne D, Kauffeld M, Kaar K, Lindborg A. 2011. Preparatory study for a review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases - Final Report. Prepared for the European Commission in the context of Service Contract No 070307/2009/548866/SER/C4

Table 4.25. Composition of initial charge

	R134a		R404		R407		R410
	-2011	2012	-2011	2012	-2011	2012	
Tractors/trailers	100%	100%					
Public transport	100%	100%					
Motor vehicles - passenger transport	100%	100%					
Motor vehicles - transport of goods	100%	100%					
Refrigerators-freezers	40%	20%	40%	80%			
Household refrigerators	30%	30%	10%				
Freezers (chest type)	40%	20%	60%	20%			
Freezers (upright)	40%	20%	60%	20%			
Refrigerated show-cases and counters	40%	20%	60%	20%			
Air-conditions, kg					30%	30%	70%
Beverage/Vending machines	50%	50%					

4.4.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

4.4.4. Sector-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

4.4.5. Sector-specific recalculations

Recalculations took place because additional equipment was added, number of equipment previous reported was revised, equipment was added for 2004 and the assumed charge changed. The resulting change in the emissions is presented in Table 4.26 and Figure 4.6. The changes affect the emissions after 2004.

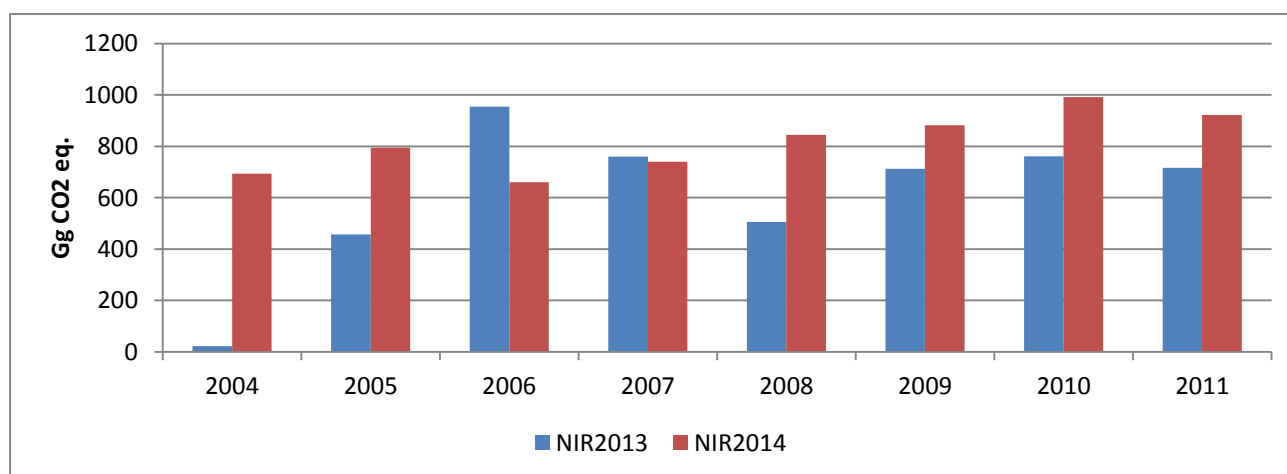


Figure 4.6. Impact of recalculations on emissions from consumption of halocarbons and SF6 Potential emissions (Gg CO₂ eq.)

Table 4.26. Impact of recalculations on emissions

Gg CO ₂ eq.	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013								
HFC	22	457	954	760	505	712	689	659
SF6							72	57
Total	22	457	954	760	505	712	761	716

NIR2014								
HFC	693	794	660	739	844	882	919	865
SF6							72	57
Total	693	794	660	739	844	882	991	922
% difference	3050%	74%	-31%	-3%	67%	24%	30%	29%

4.4.6. Sector-specific planned improvement

Even though the estimates of the potential emission from consumption of halocarbons and SF6 show a great improvement compared to previous submissions, further work is needed to collect the information needed to implement the proposed methodologies of the IPCC guidelines. A lot work is still necessary to obtain data for equipment installed that use f-gases, possible exports and destruction. The inventory of f-gases users is currently under development by the team of experts dealing with the implementation of the relevant legislation. The expected completion of this inventory is January 2015. Therefore the goal is by the 2016 submission to revise again the methodologies with more precise data and information for Cyprus.

Chapter 5: Solvent and other product use (CRF sector 3)

5.1. Overview of sector

Most solvents are part of a final product, e.g. paint, and will sooner or later evaporate to the atmosphere. This evaporation of solvent and other products containing volatile organic compounds represents a major source of NMVOC emissions that, once released into the atmosphere, will react with reactive molecules (mainly HO-radicals) or high energetic light to finally form CO₂. This sector also includes evaporative emissions of greenhouse gases arising from other types of product use (e.g. N₂O emissions from medical use).

According to the IPCC Guidelines, the following source categories are included in this sector:

- Paint application
- Degreasing and Dry Cleaning
- Chemical products, manufacture and processing
- Other, including use of other products as well as uses of solvents not listed above.

This category pertains mainly to NMVOC emissions resulting from the use of solvents and other products containing volatile compounds.

According to the Revised IPCC 1996 guidelines, “no methods for the calculation of greenhouse gases from solvent and other product use are included in the phase I version of the workbook”. Therefore an alternative country specific methodology is used to estimate the emissions from this sector.

5.1.1. Emissions trends

GHG emissions from solvent and other product use in 2012 were 73.29 Gg which corresponds to 0.8% of the total GHG emissions of Cyprus, without LULUCF. Table 5.1 presents CO₂, N₂O and NMVOC emissions from the sector Solvents and other products use. Figure 5.1 illustrates the trend of the emissions from this sector.

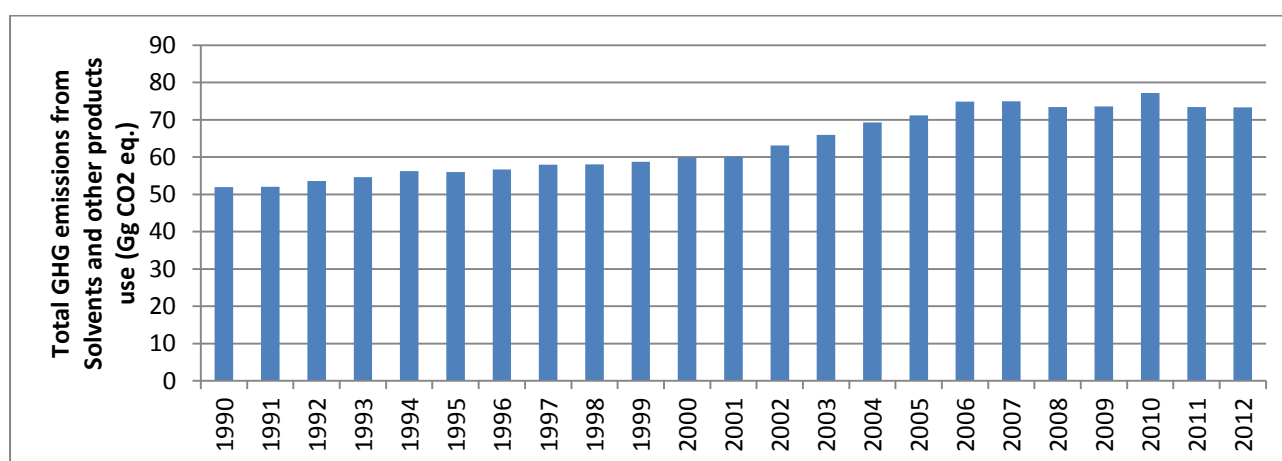


Figure 5.1. Total GHG emissions from Solvents and other products use for the period 1990-2012

Table 5.1. Total CO₂, N₂O and NMVOC emissions (in Gg) from Solvents and other products use for the period 1990-2012

Year	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	8.97	7.89	8.73	16.67	14.86	9.57	9.22
N ₂ O (Gg)	0.14	0.16	0.16	0.18	0.20	0.20	0.20
Total (Gg CO ₂ eq.)	51.96	55.94	59.80	71.15	77.17	73.36	73.29
NMVOC (Gg)	2.85	2.51	2.77	5.30	5.01	3.27	3.15
Gg CO ₂ eq.							
3A. Paint application	5.86	4.56	5.18	12.91	11.38	5.71	5.50
3B. Degreasing and dry cleaning	0.63	0.63	0.64	0.61	0.19	0.19	0.17
3D1. Use of N ₂ O in anaesthesia	0.01	0.01	0.02	0.02	0.02	0.02	0.02
3D3. N ₂ O from aerosol cans	0.13	0.14	0.15	0.16	0.18	0.18	0.19
3D5.1. Printing industry	0.63	0.63	0.72	0.74	0.76	1.03	0.82
3D5.2. Domestic and commercial use	1.85	2.07	2.20	2.41	2.53	2.65	2.73
3D5.3. Other non-specified	NE	NE	NE	NE	0.81	0.67	0.67

5.1.2. Methodology

CO₂ and N₂O have been estimated with country specific method and other emission factor. Further details on the method applied are given in section 5.2.

Key categories

The results of the key categories assessment are presented in [section 1.5](#).

Uncertainty

The uncertainty analysis is presented in [section 1.7](#).

5.1.3. Completeness

Table 5.2 gives an overview of the IPCC source categories included in this chapter and presents the status of emissions estimates from all sub-sources in Solvents and other products use.

Table 5.2. Solvents and other products use – completeness

Source	CO ₂	N ₂ O
3A. Paint application	✓	
3B. Degreasing and dry cleaning	✓	NE1
3C. Chemical products, manufacture and processing	NE1	
3D1. Use of N ₂ O for anaesthesia		✓
3D2. Fire extinguishers		NE1
3D3. N ₂ O from aerosol cans		✓
3D4. Other use of N ₂ O		NE1
3D5.1. Printing industry	✓	NE1
3D5.2. Other non-specified	✓*	NE1
3D5.3. Domestic and commercial use	✓	NE1

NO: Not occurring; NE1: Not estimated due to lack of method; NE2: Not estimated due to lack of activity data

* only for 2010-2012

5.2. Methodological issues

Carbon dioxide emissions

Carbon dioxide emissions for Paint Application (3A), Degreasing and Dry Cleaning (3B), Chemical Products Manufacture and Processing (3C), Printing (3D5.1), Domestic solvent use including fungicides (3D5.2) and Other product use (3D5.3), are calculated from NMVOC emissions, assuming that the carbon content of NMVOC is 85%¹⁶. NMVOC emissions are obtained from the Department of Labour Inspection that is the responsible for the preparation of the air pollutants inventory for Directive 2001/81/EC. The estimation of NMVOC emissions is based on the CONINAIR methodology. Therefore assuming also that oxidation of carbon is 99%, the equation applied for the estimation of the CO₂ emissions is the following:

$$\text{CO}_2 \text{ emissions (Gg)} = 85\% * \text{NMVOC emissions (Gg)} * 44/12 * 99\%$$

Nitrous oxide emissions

Concerning N₂O emissions from Use of N₂O for Anaesthesia (3D1) and N₂O from Aerosol Cans (3D3) the implied emission factor from the CRF tables of Greek NIR 2013 (Table 3.44-D) for the year 2013 is used. The implied emission factor is 0.0222 g N₂O/ capita for Use of N₂O for Anaesthesia (3D1) and 0.214 g N₂O/ capita for N₂O from Aerosol Cans (3D3).

5.3. Uncertainties and time-series consistency

The emissions estimates are associated with a high level of uncertainty due to the emission factors used and the methodologies applied. The same calculations have been applied to all the years of the period 1990-2012 to achieve time-series consistency, with the exception of 3D3.

5.4. Sector-specific QA / QC and verification

No source-specific QA / QC and verification. QA/QC and verification activities are presented in [section 1.6](#).

5.5. Sector-specific recalculations

The previous submission did not include any estimates for gases in this sector, other than NMVOCs. Therefore, all the results and information presented in this chapter are recalculations.

5.6. Sector-specific planned improvement

No other improvement is planned for this sector.

¹⁶ Based on the approach used in the Greek NIR of 2013, pg. 214

Chapter 6: Agriculture (CRF sector 4)

6.1. Overview of sector

In this chapter, GHG emissions estimates from the sector Agriculture are presented and the calculation methodologies per source category are described. According to the IPCC Guidelines, the following source categories are included in this sector: Enteric fermentation (4A), Manure management (4B), Rice cultivation (4C), Agricultural soils (4D), Prescribed burning of savannahs (4E), Field burning of agricultural residues (4F). In Cyprus, activities 4C (rice cultivation) and 4E (prescribed burning of savannahs) do not take place and are therefore reported as NO.

6.1.1. Emission trends

Emissions from Agriculture accounted for 8.8% of total emissions in 2012 (without LULUCF), and increased by 11.3% compared to 1990 levels. Agriculture in 1990 contributed 12% to the total emissions of the country without LULUCF. The peak of Agriculture emissions was in 2002 when an increase of 26% compared to 1990 was observed. Since 2002 a reduction in emissions was observed, due to the reduction of N₂O emissions from agricultural soils, because of the reduction in the use of synthetic nitrogen fertilisers. The reduction of the use of fertilisers was caused by the drought that was taking place during the same period that had an extreme in 2008. Further reduction was caused by the recent changes in manure management. Agriculture is responsible for methane and nitrous oxide emissions. In 2012 agriculture has contributed 23.6% to the total methane emissions and 82.8% to the total nitrous oxide emissions. The total emissions by gas and source from agricultural activities for the period 1990-2012 in Cyprus are presented in Table 6.1 and Figure 6.1.

GHG emissions from several agricultural sources have been recalculated according to:

- the recommendations of 2012 Technical review team of the EU¹⁷,
- the comments received during the QA/QC procedure of the EU,
- the findings and proposals of the KP support project team of the EU and
- the recommendations made by the UNFCCC review team¹⁸.

Table 6.1. GHG emissions per gas from Agriculture, for the period 1990 – 2012

Year	1990	1995	2000	2005	2010	2011	2012
CH ₄ (Gg)	12.0	14.2	14.2	14.6	15.1	15.0	14.7
N ₂ O (Gg)	1.6	1.8	1.8	1.7	1.6	1.6	1.6
Total (Gg CO ₂ eq.)	732.5	842.2	860.9	844.4	824.0	825.3	815.5

4A. Enteric fermentation	161	164	165	171	174	180	184
4B. Manure management	212	215	228	241	241	252	265
4C. Agricultural soils	356	353	399	403	398	407	420
4F. Field burning of agricultural residues	2.6	1.8	3.6	3.8	2.8	2.7	2.6

¹⁷ Draft report of the 2012 technical review of the greenhouse gas emission inventory of Cyprus to support the determination of annual emission allocations under Decision 406/2009/EC

¹⁸ UNFCCC review team, Provisional main findings and recommendations – Review of Cyprus' 2013 GHG inventory submission, sent via email on 28/9/2013

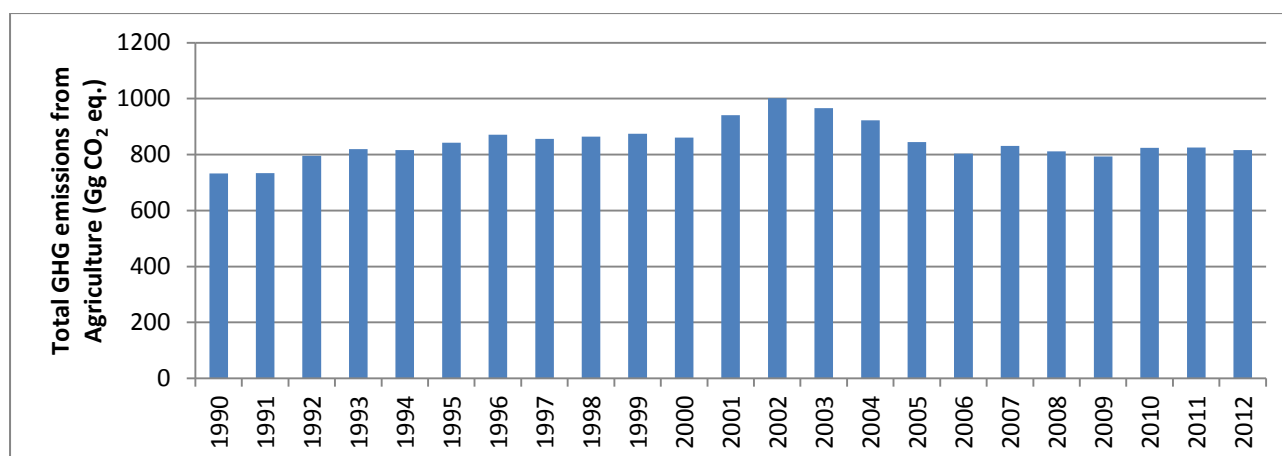


Figure 6.1. GHG emissions (in Gg CO₂ eq.) from Agriculture, for the period 1990 – 2012

6.1.2. Methodology

The calculation of GHG emissions from Agriculture is based on the methodologies and emission factors suggested by the IPCC Guidelines and the IPCC Good Practice Guidance. Data used for the estimation on emissions was obtained from the National Statistical Service. Tier 1 method with default revised IPCC 1996 emission factors are used for all calculations except enteric fermentation emissions from dairy cattle that are estimated using Tier 2. The methodologies and emission factors used are summarised in Table 6.2.

Table 6.2. Agriculture – methodologies and emission factors applied

Source category	CH ₄		N ₂ O	
	Method	EF	Method	EF
4A. Enteric fermentation – dairy cattle	T2	CS		
4A. Enteric fermentation – non-dairy cattle, sheep, goats, horses, mules and asses and swine	T1	D, OTH		
4B. Manure management	T1	D	T1	D
4C. Rice cultivation	NO			
4D. Agricultural soils	NE		T1, T1a	D
4E. Prescribed burning of savannahs	NO		NO	
4F. Field burning of agricultural residues	T1	D	T1	D

T1, T2, T1a: IPCC methodology Tier 1, 2 and 1a respectively; D: IPCC default methodology and emission factor; OTH: other EF

Key categories

The results of the key categories assessment are presented in [section 1.5](#).

Uncertainty

The uncertainty analysis is presented in [section 1.7](#).

6.1.3. Completeness

Table 6.3 gives an overview of the IPCC source categories included in this chapter and presents the status of emissions estimates from all sub-sources in agriculture. Methane emissions from agricultural soils are not estimated since appropriate methodologies have not been developed yet.

Table 6.3. Agriculture – Inventory completeness

Source category	CH ₄	N ₂ O
4A. Enteric fermentation	✓	
4B. Manure management	✓	✓
4C. Rice cultivation	NO	
4D. Agricultural soils	NE	✓
4E. Prescribed burning of savannahs	NO	NO
4F. Field burning of agricultural residues	✓	✓

NO: Not occurring

NE: Not estimated due to method unavailability

6.2. Enteric fermentation (CRF source category 4A)

6.2.1. Source category description

Methane is produced during the normal digestion of food by herbivorous animals and the amount emitted depends on the animal species, their digestive system and feed intake.

Enteric fermentation (CH₄ emissions) has been assessed as a key category according to the level and trend. Tier 1 methodology is applied and the default emission factors suggested by the IPCC Guidelines are used for the estimation of methane emissions from enteric fermentation for non-dairy cattle, sheep, goats, horses, mules and asses and swine. The emissions from dairy cattle are estimated using Tier 2 methodology. Poultry emissions were estimated using the implied emissions factor from the NIR2013 of Greece, since an emission factor is not available in the IPCC guidelines.

Methane emissions from enteric fermentation in 2012 account for 62.7% of total GHG emissions from Agriculture, 14.5% of the total methane emissions excluding LULUCF and 2% of the total emissions excluding LULUCF. Methane emissions from enteric fermentation are presented in Table 6.4 and Figure 6.2.

Table 6.4. CH₄ emissions from enteric fermentation for 1990 – 2012

CH ₄ emissions	1990	1995	2000	2005	2010	2011	2012
Total (Gg CH ₄)	7.69	8.59	8.49	8.67	8.92	9.14	9.21
Total (Gg CO ₂ eq.)	161.41	180.37	178.67	182.17	187.33	191.96	193.43
Gg CO ₂ eq.							
Dairy cattle	44.92	46.36	47.91	51.49	55.34	59.27	55.14
Non-dairy cattle	32.53	32.17	32.17	35.74	37.08	38.96	43.11
Sheep	48.72	49.56	47.88	46.20	42.84	42.00	42.34
Goats	21.53	21.53	21.00	20.79	22.05	23.10	25.20
Horses	2.08	2.08	2.08	2.08	2.08	2.08	2.08
Mules and asses	1.41	1.41	1.41	1.41	1.41	1.41	1.41
Swine	8.76	9.33	10.77	11.64	11.22	11.78	12.59

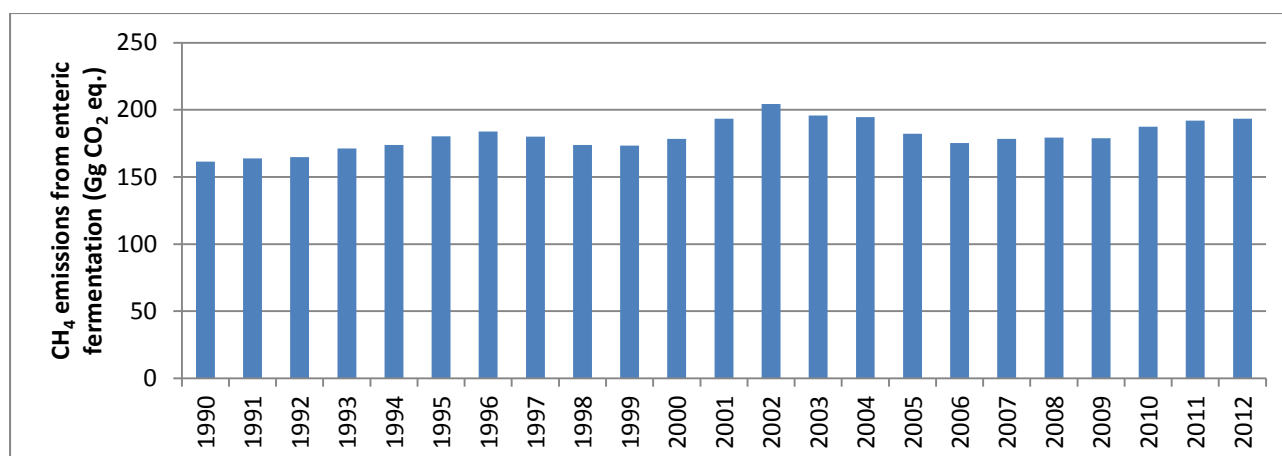


Figure 6.2. CH₄ emissions from enteric fermentation for 1990 – 2012

The changes from the previous submission are (a) the estimation of emissions from dairy cattle using Tier 2, (b) the estimation of emissions from mules and asses and (c) the estimation of emissions from poultry.

6.2.2. Methodological issues

Tier 1 methodology is applied and the default emission factors suggested by the IPCC Guidelines are used for the estimation of methane emissions from enteric fermentation for non-dairy cattle, sheep, goats, horses, mules and asses and swine. The emissions from dairy cattle are estimated using Tier 2 methodology. Poultry emissions were estimated using the implied emissions factor from the NIR2013 of Greece, since an emission factor is not available in the IPCC guidelines.

Activity data

The animal population used for the calculation of methane emissions from enteric fermentation is the annual average and it is presented in Table 6.5. The source of animal population is the Department of Agriculture, except mules and asses that is not available from national statistics and was obtained from FAOSTAT¹⁹.

Table 6.5. Animal population for 1990 – 2012 (in 1000s)

Year	Dairy cattle	Non-dairy cattle	Sheep	Goats	Horses	Swine	Poultry
1990	22.4	32.3	290.0	205.0	5.5	6.7	277.9
1991	23.1	31.9	295.0	205.0	5.5	6.7	296.2
1992	23.9	31.9	285.0	200.0	5.5	6.7	341.9
1993	25.6	35.5	275.0	198.0	5.5	6.7	369.4
1994	27.6	36.8	255.0	210.0	5.5	6.7	356.2
1995	29.5	38.6	250.0	220.0	5.5	6.7	374.1
1996	27.3	42.8	252.0	240.0	5.5	6.7	399.5
1997	25.5	36.9	245.0	302.0	5.5	6.7	414.8
1998	23.8	32.0	240.0	322.0	5.5	6.7	431.3
1999	24.1	30.2	233.0	346.0	5.5	6.7	418.5
2000	23.5	30.7	246.0	378.6	5.5	6.7	408.4
2001	24.4	29.2	296.6	427.1	5.5	6.7	451.3
2002	26.2	32.1	294.0	459.5	5.5	6.7	491.4
2003	26.6	33.0	264.6	407.9	5.5	6.7	488.1
2004	26.1	34.5	279.0	378.0	5.5	6.7	470.5
2005	24.6	33.2	268.9	329.3	5.5	6.7	429.7
2006	23.9	32.4	272.2	272.2	5.5	6.7	452.6

¹⁹ FAO estimate, <http://faostat.fao.org/site/573/DesktopDefault.aspx?PageID=573#ancor>

Year	Dairy cattle	Non-dairy cattle	Sheep	Goats	Horses	Swine	Poultry
2007	23.7	31.4	259.4	339.0	5.0	6.7	450.3
2008	23.6	32.7	267.3	318.4	5.0	6.7	464.9
2009	23.2	31.7	300.2	280.8	5.0	6.7	463.4
2010	23.4	32.1	328.9	307.4	5.0	6.7	463.7
2011	24.1	33.5	355.9	290.2	5.0	6.7	438.9
2012	24.2	35.4	349.8	307.4	5.0	6.7	394.9

Dairy cattle, Tier 2

Methane emissions from the enteric fermentation of dairy cattle are estimated according to the Tier 2 IPCC methodology, as it is described in the IPCC Good Practice Guidance (pg.4.26). The calculation of the CH₄ emission factor for is based on the following equation:

$$EF = GE * YM * 365 \text{ days/yr} / 55.65 \text{ MJ/kg CH}_4$$

where EF is the estimated emission factor for CH₄ (kg CH₄/head/yr), GE is the gross energy intake (MJ/head/day) and Ym is the methane conversion rate which is the fraction of the gross energy in feed converted to CH₄. The calculation of gross energy is based on the following equation (eqn 4.11 pg.4.20, GPG):

$$GE = \{[(NEm + NEmobilised + NEa + NEl + New + Nep) / (NEma/DE)] + [NEg / (NEga/DE)]\} / (DE / 100)$$

where NE_m is the net energy required for animal maintenance in MJ/day, NE_a is the net energy for animal activity in MJ/day, NE_l is the net energy for lactation in MJ/day, NE_p is the net energy required for pregnancy in MJ/day, NE_g is the net energy for growth in MJ/day, DE is the digestible energy expressed as a percentage of gross energy, NE_{ma}/DE is the ratio of net energy available in a diet for maintenance to digestible energy consumed and NE_{ga}/DE is the similar ratio for growth.

The dairy cattle population used for the calculation of methane emissions from enteric fermentation is presented in Table 6.6. Information for average weight (W), live body weight (BW), mature body weight (MW), daily weight gain (WG), % fat in milk, milk production and digestibility of feed has been obtained from the Department of Agriculture²⁰. The remaining parameters have the value of the default proposed by the IPCC GPG. Table 6.6 presents the values used for the calculations, while Table 6.7 presents the daily milk production and the % pregnant population. NEmobilised is assumed 0. The resulting Gross energy (GE) and the emissions factors (EFs) for the period 1990-2012 are presented in Table 6.8.

Table 6.6. Information for the application of Tier 2 methodology for dairy cattle

Parameter	Value	Source
Average weight (W), kg	650	Department of Agriculture
Net energy maintenance coefficient (C _f)	0.335	IPCC GCG (lactating cattle, Table 4.4, pg. 4.15)
Activity coefficient (C _a)	0	IPCC GCG (stall, Table 4.5, pg. 4.15)
Live body weight (BW), kg	650	Department of Agriculture
Growth coefficient	0.8	IPCC GPG (females, pg. 4.16)
Mature body weight of an adult animal (MW), kg	650	Department of Agriculture
Daily weight gain (WG), kg/day	1.15	Department of Agriculture
Fat in milk	0.4%	Department of Agriculture
Hours of work / day	0	Department of Agriculture
C _{pregnancy}	0.1	GPG, pg.4.19
Digestibility of feed, DE	60	Department of Agriculture
CH ₄ conversion rate (Ym)	0.06	GPG, pg.4.26, table 4-8

²⁰ Mr. George Papaioannou, Agricultural Officer, Department of Agriculture, tel. no. +357 22408566

Table 6.7. Daily milk production per dairy cow (kg) and per cent pregnant population of cows in Cyprus

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Milk production (kg/day/cow)	12.22	12.30	12.25	12.60	12.49	12.90	13.84	14.30	15.40	15.07	17.07	15.89
% pregnant population*	81.3	81.3	81.3	81.3	81.3	81.3	81.3	81.3	81.3	81.3	81.3	81.3

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Milk production (kg/day/cow)	14.77	16.71	15.86	16.41	17.01	16.65	17.64	17.95	17.64	17.42	17.34	
% pregnant population	81.3	81.3	81.3	80.3	80.7	79.4	77.6	76.3	76.3	72.2	72.2	

* no data available for 1990-2003, 2010 and 2011. 1990-2003 assumed that is equal to 2004, 2010 assumed equal to 2009 and 2011 assumed equal to 2012

Table 6.8. Gross energy (GE) and emissions factor (EF) for dairy cattle for the period 1990 – 2012

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GE (MJ/head/day)	242.5	242.6	242.6	242.9	242.8	243.3	244.2	244.7	245.8	245.5	247.5	246.3
EF (kg CH ₄ /head/yr)	95.5	95.5	95.5	95.6	95.6	95.7	96.1	96.3	96.7	96.6	97.4	96.9

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
GE (MJ/head/day)	245.2	247.2	246.3	246.9	247.5	247.1	248.1	248.5	248.1	247.9	247.8	
EF (kg CH ₄ /head/yr)	96.5	97.3	96.9	97.2	97.4	97.3	97.7	97.8	97.7	97.6	97.5	

Non-dairy cattle, sheep, goats, horses, mules and asses and swine; Tier 1

The methane emission factors used for enteric fermentation of non-dairy cattle, sheep, goats, horses, mules and asses and swine for the application of the Tier I methodology, are according to the Revised IPCC 1996 guidelines (Reference Manual pg. 4.10 - 4.11, Tables 4-3 and 4-4) and are presented in Table 6.9. Poultry emissions were estimated using the implied emissions factor from the NIR2013 of Greece, since an emission factor is not available in the IPCC guidelines. The animal populations used are presented in Table 6.6.

Table 6.9. Methane emission factor applied for enteric fermentation, according to animal

	Emission factor (kg CH ₄ /head)	Source
Non-dairy cattle	48	IPCC 1996, pg4.11@ref.manual, western Europe*
Sheep	8	IPCC 1996, pg4.10@ref.manual, developed
Goats	5	IPCC 1996, pg4.10@ref.manual, developed
Horses	18	IPCC 1996, pg4.10@ref.manual, developed
Mules and asses	10	IPCC 1996, pg4.10@ref.manual, developed
Swine	1.5	IPCC 1996, pg4.10@ref.manual, developed
Poultry	0.019	Implied emission factor from the NIR 2013 of Greece (for 2011)

* Milk production closer to North America but production system as west Europe

6.2.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

6.2.4. Source-specific QA/QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

6.2.5. Source-specific recalculations

The changes from the previous submission are (a) the estimation of emissions from dairy cattle using Tier 2, (b) the estimation of emissions from mules and asses and (c) the estimation of emissions from poultry. The total change from the previous submission is presented in Table 6.10. The recalculations have affected the whole reporting period, i.e. 1990-2012.

Table 6.10. Changes to the emissions from enteric fermentation between NIR2013 and NIR2014

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
NIR2013	160.7	163.2	164.1	170.3	173.2	179.8	182.7	178.8	172.1	171.2	176.1	191.6
NIR2014	161.4	163.8	164.7	171.2	173.7	180.4	183.7	180.1	173.8	173.3	178.4	193.4
% difference	0.46%	0.35%	0.40%	0.50%	0.32%	0.30%	0.58%	0.75%	1.00%	1.25%	1.28%	0.89%

Gg CO ₂ eq.	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011		
NIR2013	202.8	189.6	193.0	180.5	173.6	176.3	177.5	177.0	185.6	190.5		
NIR2014	204.3	195.8	194.5	182.2	175.2	178.3	179.3	178.9	187.3	192.0		
% difference	0.76%	3.23%	0.80%	0.94%	0.92%	1.13%	1.01%	1.04%	0.95%	0.78%		

(a) The estimation of emissions from dairy cattle

Emissions from dairy cattle were estimated using tier 1 methodology. For this submission they were estimated using Tier 2 methodology. The impact of this change is presented in Table 6.11.

Table 6.11. Changes to the emissions from enteric fermentation – dairy cattle between NIR2013 and NIR2014

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	47.1	48.6	50.2	53.9	57.9	61.9	57.4	53.5	50.0	50.0	49.4
NIR2014	44.9	46.4	47.9	51.5	55.3	59.3	55.1	51.5	48.4	48.8	48.1
% difference	-4.5%	-4.5%	-4.5%	-4.4%	-4.4%	-4.3%	-3.9%	-3.7%	-3.3%	-2.4%	-2.6%

Gg CO ₂ eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	51.2	55.0	51.6	54.8	51.6	50.3	49.4	49.6	48.7	49.2	50.5
NIR2014	49.6	53.2	54.4	53.1	50.2	48.9	48.4	48.5	47.6	48.0	49.3
% difference	-3.2%	-3.4%	5.3%	-3.1%	-2.8%	-2.6%	-2.0%	-2.3%	-2.2%	-2.3%	-2.4%

(b) The estimation of emissions from mules and asses

Population for mules and asses was available and the emissions were estimated for the first time. These emissions were reported as NE in previous submissions.

(c) The estimation of emissions from poultry

The IEF from the NIR2013 of Greece was used to estimate the emissions from poultry. These emissions were reported as NE in previous submissions.

6.2.6. Source-specific planned improvements

No source specific improvements are planned.

6.3. Manure management (CRF source category 4B)

6.3.1. Source category description

Animal waste management in Cyprus²¹

Most small-scale pig farms in Cyprus use mechanical separation for the treatment of their waste (Other AWMS). The separated liquid is sent to evaporation lagoons or is used for irrigation, and the solid fraction is used as soil improver. Nine large pig farms have installed a combination of anaerobic / aerobic treatment plants (Anaerobic digestion). The treated liquid fraction is used for irrigation or washing the housing areas or placed in evaporation lagoons. The waste from cattle, sheep, goats, horses, mules and asses are collected and left to dry before applied on land for soil improver (Solid storage and dry lot). Poultry waste is characterised by high content of solids (almost dry) and it is collected, left to dry and then used as soil improver (Solid storage and dry lot).

Manure management is responsible for methane and nitrous oxide emissions. Methane is produced during the anaerobic decomposition of manure, while nitrous oxide is produced during the storage and treatment of manure before its use as fertilizer.

Emissions from manure management in 2012 accounted for 2.89% of the total national emissions without LULUCF. CH₄ and N₂O from manure management in 2012 accounted for 37% and 30% of GHG emissions from Agriculture respectively, and 9% and 25% of total national emissions without LULUCF respectively. CH₄ emissions in 2012 increased by 29% compared to 1990 levels, while N₂O emissions increased by 29% compared to 1990 levels. CH₄ and N₂O emissions from manure management for the period 1990 – 2012 are presented in Table 6.12 and Figure 6.3.

Table 6.12. CH₄ and N₂O emissions from manure management for 1990 – 2012

	1990	1995	2000	2005	2010	2011	2012
CH ₄ (Gg)	4.19	5.45	5.65	5.87	6.11	5.88	5.45
N ₂ O (Gg)	0.40	0.44	0.55	0.52	0.49	0.49	0.49
Total (Gg CO ₂ eq.)	212.06	251.64	289.87	283.37	281.59	274.74	267.50
CH ₄ (Gg CO ₂ eq.)							
dairy	8.94	9.22	9.53	10.23	11.00	11.76	10.90
non-dairy	8.81	8.71	8.71	9.68	10.04	10.55	11.68
sheep	1.71	1.73	1.68	1.62	1.50	1.47	1.48
goats	0.77	0.77	0.76	0.75	0.79	0.83	0.91
horses	0.24	0.24	0.24	0.24	0.24	0.24	0.24
mules	0.16	0.16	0.16	0.16	0.16	0.16	0.16
swine	58.37	62.21	71.81	77.58	74.80	78.56	83.90
poultry	9.08	8.36	9.43	11.18	10.60	10.96	11.67
N ₂ O (Gg CO ₂ eq.)							
Solid storage & dry lot	117.1	127.8	161.1	150.8	144.5	142.8	146.3
other AWMS	6.89	9.28	10.13	9.38	8.83	8.36	6.77
anaerobic digestion	NO	NO	NO	0.32	0.77	0.74	0.89

²¹ Kythreotou, N., G. Florides, S.A. Tassou, 2010. Production and management of biodegradable waste in Cyprus a paper published in the proceedings of SEEP2010 Conference Proceedings, June 29th – July 2nd 2010, Bari, Italy

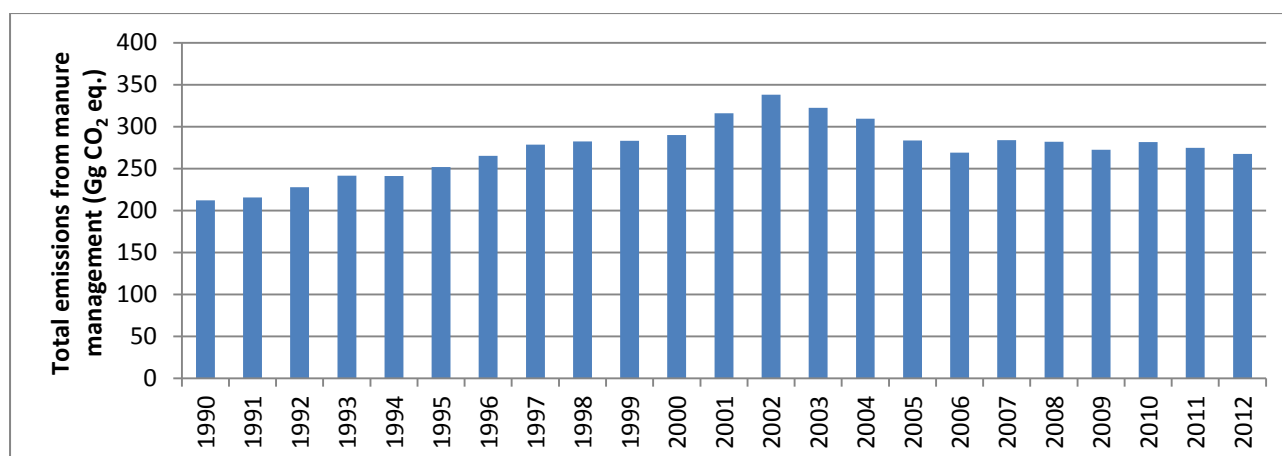


Figure 6.3. Total emissions from manure management for 1990 – 2012

The changes from the previous submission are (a) the estimation of emissions from mules and asses, (b) changes in the waste management systems applied (anaerobic digestion separated from other technologies), (c) the nitrogen excretion rates per animal for non-dairy cattle and goats were revised and (d) the kgN₂O-N/kg N ex factor for other animal waste management systems was revised.

The changes in CH₄ emissions between 1990 and 1991 (+6.6%), 1991 and 1992 (+15.4%), 1992 and 1993 (+8.0%), 1995 and 1996 (+6.8%), 2000 and 2001 (+10.5%), 2001 and 2002 (+8.9%), as well as 2004 and 2005 (-8.7%) have been caused by the respective changes in the animal population. There is no other reason for these changes, since the same emission factors and methodology are used for the whole reporting period.

6.3.2. Methodological issues

The amount of methane emitted by a population of animals is calculated by multiplying the emission rate per animal by the number of animals. Tier 1 methodology is a simplified approach that relies on default emission factors drawn from previous studies. The Livestock population used has been already presented in Table 6.6.

CH₄ emissions

The EFs for manure management were chosen according to the manure management practices that are applied in Cyprus for the particular specie²². The following emission factors were used for the estimation of methane from manure management (Table 6.13):

- For sheep, goats, horses, mules and asses, and poultry, EFs for temperate developed countries were used (0.28, 0.18, 2.1, 1.14 and 0.117 kg CH₄/head/yr respectively), as indicated in Table 4-5 of the revised IPCC1996 guidelines reference manual (pg. 4.12).
- For dairy and non-dairy cattle, EFs for temperate Eastern Europe were used (19 and 13 kg CH₄/head/yr respectively), as indicated in Table 4-6 of the reference manual (pg. 4.13).
- For swine, EF for temperate Eastern Europe were used (10 kg CH₄/head/yr), as indicated in Table 4-6 of the reference manual (pg. 4.13).

²² The choice for the EFs was based on discussions with Mr. Antis Athanasiades the responsible officer for manure management at the Department of Environment (aathanasiades@environment.moa.gov.cy, +35722408935).

Table 6.13. Emission factors used for the estimation of methane emissions from manure management

Animal	kg CH ₄ /head/yr	Source
Dairy cattle	19	Table 4-6, pg.4.13, Revised IPCC 1996 guidelines, reference manual – eastern Europe, temperate
Non-dairy cattle	13	Table 4-6, pg.4.13, Revised IPCC 1996 guidelines, reference manual – eastern Europe, temperate
Sheep	0.28	Table 4-5, pg.4.12, Revised IPCC 1996 guidelines, reference manual – developed countries, temperate
Swine	10	Table 4-6, pg.4.13, Revised IPCC 1996 guidelines, reference manual – western Europe, temperate*
Horses	2.1	Table 4-5, pg.4.12, Revised IPCC 1996 guidelines, reference manual – developed countries, temperate
Mules and asses	1.14	Table 4-5, pg.4.12, Revised IPCC 1996 guidelines, reference manual – developed countries, temperate
Poultry	0.117	Table 4-5, pg.4.12, Revised IPCC 1996 guidelines, reference manual – developed countries, temperate

* the region of west Europe has been chosen, because there is no default value proposed by the IPCC for near East and Mediterranean region (as for Nex).

N₂O emissions

To estimate the N₂O emissions from manure management three steps were applied, according to the Tier 1 methodology: (a) estimation of annual nitrogen excretion per animal type (kg N ex/year), (b) allocation of waste to waste management system used, (c) estimation of annual nitrogen excretion per waste management system (kg N ex/year), and (d) estimation of N₂O emissions using kgN₂O-N/kg Nex factors per technology. These steps are summarised in the equation below:

$$E = \sum_S \left(\sum_T (N_T \cdot Nex_T \cdot MS_{(T,S)}) \right) \cdot EF_S$$

where E is N₂O emissions, T is the animal species index, S is the manure management system index, N_T is the livestock population, Nex_T the annual average N excretion per head of species, MS_(T,S) the fraction of total annual excretion for each livestock species that is managed in system S, EF_S is the N₂O emission factor for system S.

(a) Estimation of annual nitrogen excretion per animal type (kg N ex/year)

The annual nitrogen excretion per animal type using the nitrogen excretion rates (kg N ex/animal/year) shown in Table 6.14. These are the defaults proposed by the IPCC methodologies. The coefficients for non-dairy and goats have changed compared to the previous submission. The animal population used is presented in Table 6.6.

Table 6.14. Nitrogen excretion rate (kg N ex/animal/year) used

Animal	Nitrogen excretion rate (kg N ex/animal/year)	Source
Dairy Cattle	100	Revised IPCC 1996 default, western Europe, workbook pg. 4.10
Non-Dairy Cattle	70	
Sheep	12	Revised IPCC 1996 default, near east & Mediterranean, workbook pg. 4.10
Goats	40	Revised IPCC 1996 default, near east & Mediterranean, workbook pg. 4.10 (others)
Horses	40	
Mules and asses	40	
Swine	16	Revised IPCC 1996 default, near east & Mediterranean, workbook pg. 4.10
Poultry	0.6	

Table 6.15. Waste management per technology contribution

Animal	1990-2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Dairy Cattle													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	97%
Anaerobic digestion	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	3%
Non-Dairy Cattle													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	97%
Anaerobic digestion	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	3%
Sheep													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Goats													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Horses													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Mules and asses													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Swine													
Other AWMS*	100%	97%	94%	91%	88%	85%	82%	79%	76%	73%	70%	70%	60%
Anaerobic digestion	0%	3%	6%	9%	12%	15%	18%	21%	24%	27%	30%	30%	40%
Poultry													
Solid storage and dry lot	100%	100%	100%	100%	100%	100%	98%	96%	94%	92%	90%	90%	90%
Anaerobic digestion	0%	0%	0%	0%	0%	0%	2%	4%	6%	8%	10%	10%	10%

* mechanical separation of waste to liquid and solid fractions

(b) Allocation of waste to waste management system used

The distribution of waste to the waste management systems has been estimated based on the information presented in Table 6.15. Other AWMS for pigs has been revised for this submission, to exclude anaerobic digestion that is reported separately.

(c) Estimation of annual nitrogen excretion per waste management system (kg N ex/year)

The annual nitrogen excretion per waste management system is estimated by multiplying the % of waste allocated to a particular system by the annual nitrogen excretion per animal type estimated in step (a).

(d) Estimation of N₂O emissions using kgN₂O-N/kg N ex factors per technology.

The total annual nitrogen excretion per waste management system (regardless animal type) is then multiplied by the kgN₂O-N/kg N ex coefficient, to estimate the N₂O emissions. The kgN₂O-N/kg N ex coefficients used are presented in Table 6.16.

Table 6.16. kgN₂O-N/kg N ex coefficients per technology used

Animal	kgN ₂ O-N/kg N ex	Source
Solid storage and dry lot	0.02	IPCC GPG, pg. 4.43
Other AWMS	0.005	Revised IPCC 1996 workbook, pg. 4.14
Anaerobic digestion	0.001	IPCC GPG, pg. 4.43

6.3.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

6.3.4. Source-specific QA/QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

6.3.5. Source-specific recalculations

The changes in the emissions' estimates compared to the previous submission are the following: (a) the estimation of emissions from mules and asses, (b) changes in the waste management systems applied (anaerobic digestion separated from other technologies), (c) the nitrogen excretion rates per animal for dairy cattle, non-dairy cattle and goats were revised and (d) the kgN₂O-N/kg N ex factor for other animal waste management systems was revised.

The total impact of these changes is shown in Table 6.17.

Table 6.17. Changes to the emissions from manure management between NIR2013 and NIR2014

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013, Gg CO ₂ eq.	216	219	232	247	245	256	267	273	273	271	276
NIR2014, Gg CO ₂ eq.	212	215	228	241	241	252	265	278	282	283	290
% difference	-1.9%	-1.7%	-1.8%	-2.3%	-1.7%	-1.5%	-0.6%	2.1%	3.2%	4.3%	5.2%

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013, Gg CO ₂ eq.	299	319	305	297	276	265	273	274	269	277	273
NIR2014, Gg CO ₂ eq.	316	338	323	309	283	269	284	282	273	282	275
% difference	5.6%	6.0%	5.8%	4.0%	2.8%	1.5%	4.0%	3.1%	1.4%	1.8%	0.6%

(a) Estimation of emissions from mules and asses

Population for mules and asses was available and the emissions were estimated for the first time. These emissions were reported as NE in previous submissions.

(b) Changes in the waste management systems applied (anaerobic digestion separated from other technologies)

In previous submissions, the amount of waste treated by anaerobic digestion was included in other AWMS. Due to the different kgN₂O-N/kg N ex coefficients per technology (anaerobic digestion 0.001, other AWMS 0.005), there was a change in the N₂O emissions estimated for all the animals except sheep, goats and horses.

(c) Nitrogen excretion rates per animal for non-dairy cattle and goats were revised

The nitrogen excretion rates per animal for non-dairy cattle and goats were revised to be in line with the IPCC guidelines. The non-dairy cattle factor was 50, whereas in this submission is 70, while the factor for goats was 15.5 whereas in NIR 2014 is 40.

(d) kgN₂O-N/kg N ex factor for other animal waste management systems was revised

The kgN₂O-N/kg N ex factor used in NIR2013 was 0.001, whereas for NIR2014 0.005 was used. 0.001 was used for anaerobic digestion.

6.3.6. Source-specific planned improvements

The possibility of applying Tier 2 methodology for the estimation of methane emissions from the manure management is under examination.

6.4. Rice cultivation (CRF source category 4C)

Not occurring.

6.5. Agricultural soils (CRF source category 4D)

6.5.1. Source category description

Agricultural soils constitute the largest anthropogenic source of nitrous oxide emissions. N₂O is produced naturally in soils through the microbial processes of nitrification and denitrification. Agricultural activities add nitrogen to soils, increasing the amount of N₂O released in the atmosphere. Anthropogenic N₂O emissions from agriculture are produced either directly from nitrogen inputs to soils or indirectly, after the removal of nitrogen from soils. The N₂O emissions sources examined are the following:

- Pasture, range and paddock (animal production)
- Direct N₂O emissions
- Indirect N₂O emissions

Total emissions from agricultural soils in 2012 contributed 43% to the emissions from agriculture and 3.8% to the total emissions of the country (excluding LULUCF). The total emissions from soils in 2012 reduced by 0.6% compared to 1990.

Direct N₂O emissions from agricultural soils in 2012 accounted for 23.5% of total GHG emissions from Agriculture and for 2% of total national emissions without LULUCF. Direct emissions in 2012 decreased by 1.2% compared to 1990 levels. Indirect N₂O emissions in 2012 accounted for 20% of total GHG emissions from agriculture and for 1.7% of total national emissions (without LULUCF). Indirect emissions in 2012 increased by 0.1% compared to 1990 levels. Emissions from agricultural soils for the period 1990 – 2011 are presented in Table 6.18 and Figure 6.4.

The large fluctuations that exist between years (e.g. 2004/2005 and 2010/2011) are a result of the variations in the activity data (i.e. fertiliser input and crop production). The reduction of N₂O emissions from agricultural soils is mainly due to the reduction in the use of synthetic nitrogen fertilisers. The decrease in the use of synthetic nitrogen fertilisers could probably be attributed to the improvement of fertilizer management by the farmer due the impact of initiatives to promote good practice in fertilizer use. Additionally, the annual changes in the amount of fertilisers used and the agricultural production are the basic factors that account for the fluctuation of emissions during the period 1990 – 2012.

Table 6.18. N₂O emissions from agricultural soils for 1990 – 2012

	1990	1995	2000	2005	2010	2011	2012
N ₂ O (Gg)	1.15	1.31	1.26	1.22	1.14	1.15	1.14
N ₂ O (Gg CO ₂ eq.)	356	407	392	378	354	358	354
Gg CO ₂ eq.							
synthetic fertilizers	68.10	77.35	42.16	37.09	23.43	27.88	26.75
animal manure	113.66	129.59	158.39	151.97	151.00	147.76	147.47
N-fixing crops	0.82	0.56	0.18	0.16	0.18	0.32	0.31
crop residue	13.93	17.82	7.99	11.44	8.55	9.91	9.21
histosols	0.41	0.41	0.41	4.16	9.32	9.78	9.02
sewage sludge	0.01	0.13	0.37	0.80	0.84	0.82	0.80
atmospheric deposition	28.78	32.79	35.43	33.69	32.28	32.03	31.87
leaching & run-off	130.64	148.76	146.90	138.70	128.87	129.40	128.44

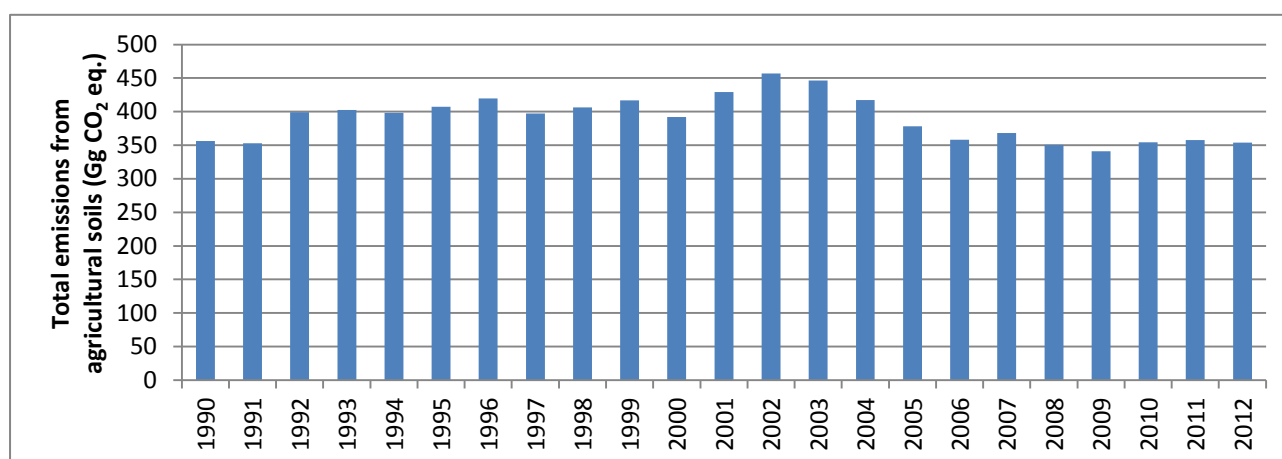


Figure 6.4. Total emissions from agricultural soils for 1990 – 2012

The changes in this submission compared to previous submissions have been mainly caused by changes in the methodologies. Namely the changes in this source are the following: (a) estimation of N₂O emissions from histosols for the first time, (b) the dry matter fraction of residue for all crops except potatoes, C and N fraction of N-fixing crops have been revised to be in line with the IPCC methodologies, (c) fraction of crop residue burnt was revised and (d) estimation of N₂O from application of sewage sludge on land for the first time.

6.5.2. Methodological issues

Direct Soil Emissions (4D1)

Direct N₂O emissions from agricultural soils derive from: the use of synthetic fertilisers (4D1.1), animal manure used as fertilisers (4D1.2), cultivation of N-fixing crops (4D1.3), crop residues that remain in soils (4D1.4) and organic soils cultivation (4D1.5). Emissions have also been estimated for application of sewage sludge on land (4D1.6.1).

Use of synthetic fertilisers (4D1.1)

N₂O emissions from the use of synthetic fertilisers were estimated using Tier 1a methodology suggested by the IPCC Good Practice Guidance. $\text{Frac}_{\text{GASF}}$ is assumed 0.1 kg NH₃-N+NO_x-N/kg fertiliser nitrogen applied, as proposed by the revised IPCC 1996 guidelines (Table 4-17, pg. 4.35, workbook). The fraction of N input converted to N₂O (EF1) is assumed 0.0125 kg N₂O-N/kg nitrogen input, as proposed by the IPCC guidelines.

No changes have been made to previously submitted data, methodologies or emission factors.

Table 6.19. Synthetic fertiliser applied excluding NH₃ and NO_x and nitrogen input from synthetic fertiliser for the period (in kt) 1990-2012

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Synthetic fertilisers applied excluding NH ₃ and NO _x (kt)	11.2	11.0	13.8	13.0	12.9	12.7	12.5	9.6	9.6	9.7	6.9	7.0
Nitrogen input from synthetic fertilisers (kt)	0.14	0.14	0.17	0.16	0.16	0.16	0.16	0.12	0.12	0.12	0.09	0.09

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Synthetic fertilisers applied excluding NH ₃ and NO _x (kt)	7.2	8.1	7.0	6.1	6.0	4.9	4.1	3.9	3.8	4.6	4.4	
Nitrogen input from synthetic fertilisers (kt)	0.09	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.05	0.06	0.05	

Animal manure used as fertilisers (4D1.2)

N₂O emissions from animal manure used as fertilisers were estimated using Tier 1a methodology suggested by the IPCC Good Practice Guidance. The data used is the animal population as shown in Table 6.6. Using nitrogen excretion factors as listed in Table 6.14, total nitrogen excretion by livestock was calculated from livestock numbers. No manure is used as fuel in Cyprus therefore the percentage of the manure-N used as fuel ($\text{Frac}_{\text{FUEL}}$) is assumed 0. It is also assumed that no animals are grazing (Pasture range and Paddock) therefore fraction of livestock nitrogen excreted and deposited onto soil during grazing ($\text{Frac}_{\text{GRAZ}}$) is also assumed 0. Fraction of total nitrogen excretion that is emitted as NO_x or NH₃ (kg N/kg N) is assumed 0.2 as proposed by the IPCC guidelines as default. The fraction of N input converted to N₂O (EF1) is assumed 0.0125 kg N₂O-N/kg nitrogen input, as proposed by the IPCC guidelines. The total nitrogen excretion by animals in country (N_{ex}) and the manure nitrogen used as fertiliser in Cyprus, corrected for NH₃ and NO_x emissions and excluding manure produced during grazing (F_{AW}) are presented in Table 6.20.

No changes have been made to previously submitted data, methodologies or emission factors.

Table 6.20. Total nitrogen excretion by animals in country (Gg N) and manure nitrogen used as fertiliser, corrected for NH₃ and NO_x emissions and excluding manure produced during grazing (Gg N/yr) 1990-2012

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total nitrogen excretion by animals in country (N _{ex}), Gg N	23.3	23.5	24.3	25.4	25.6	26.6	28.1	30.2	30.7	31.2	32.5	35.7
Manure nitrogen used as fertiliser* (F_{AW}), Gg N/yr	18.6	18.8	19.4	20.3	20.4	21.3	22.5	24.1	24.6	25.0	26.0	28.6

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Total nitrogen excretion by animals in country (N _{ex}), Gg N	38.2	35.7	34.2	31.2	28.8	31.4	30.7	29.4	30.9	30.2	30.1	
Manure nitrogen used as fertiliser* (F_{AW}), Gg N/yr	30.5	28.6	27.4	24.9	23.0	25.1	24.6	23.5	24.7	24.1	24.1	

* corrected for NH₃ and NO_x emissions and excluding manure produced during grazing

Cultivation of N-fixing crops (4D1.3)

N₂O emissions from cultivation of N-fixing crops were estimated using Tier 1a methodology suggested by the IPCC Good Practice Guidance. Nitrogen input from N-fixing crops (F_{BN} , kg N/yr) is calculated from dry biomass production of pulses in Cyprus, $Crop_{BF}$. No soybean is produced in Cyprus. Dry matter for peas is assumed 0.87 and for dry beans 0.855 as proposed by the IPCC as default in the GPG (pg. 4.58). The resulting dry biomass production of pulses and soybean in country, $Crop_{BF}$ is presented in Table 6.20. The fraction of nitrogen in N-fixing crop (kg N/kg of dry biomass) $Frac_{NCRBF}$ is assumed 0.03 as proposed by the IPCC guidelines as default. The fraction of N input converted to N₂O (EF1) is assumed 0.0125 kg N₂O-N/kg nitrogen input, as proposed by the IPCC guidelines. The resulting total nitrogen input in N-fixing crops (F_{BN}) is also presented in Table 6.21.

Changes in the resulting emissions have been caused compared to NIR 2013, by the revision of the dry matter for peas and dry beans.

Table 6.21. Crop production of pulses in Cyprus 1990-2012 in t and estimated total nitrogen input in N-fixing crops (F_{BN}) in t

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Crop BF (t)												
Peas	1436	1044	809	1044	783	897	957	1044	957	113	70	87
Dry beans	3078	2856	3480	2535	2223	2195	2394	2394	2078	855	941	898
F_{BN} (t)	135	117	129	107	90	93	101	103	91	29	30	30

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Crop BF (t)												
Peas	91	800	760	79	80	77	87	96	113	62	91	
Dry beans	855	2138	2139	812	855	898	842	853	864	1707	1613	
F_{BN} (t)	28	88	87	27	28	29	28	28	29	53	51	

Crop residues that remain in soils (4D1.4)

N₂O emissions from cultivation of N-fixing crops were estimated using Tier 1a methodology suggested by the IPCC Good Practice Guidance. The estimation of these emissions soil requires data for dry biomass production of pulses and soybean ($Crop_{BF}$ in kg/yr) and dry biomass production of other crops ($Crop_0$ in kg/yr). No soybean is produced in Cyprus. The dry matter (dm) fraction of residue used to estimate dry biomass production for each crop is presented in Table 6.22. Crop production of pulses is presented in Table 6.20 and production of other crops is presented in Table 6.23.

Table 6.22. Dry matter (dm) fraction of residue used

	Dry matter (dm) fraction of residue	Source
Wheat	0.85	GPG table 4.16 pg. 4.58
Barley	0.85	GPG table 4.16 pg. 4.58
Oats	0.92	GPG table 4.16 pg. 4.58
Dry bean	0.87	GPG table 4.16 pg. 4.58
Peas	0.885	GPG table 4.16 pg. 4.58
Potatoes	0.45	No value in GPG, revised IPCC 1996 value was used; reference manual, table 4-17 pg 4.85

Table 6.23. Crop production of other crops in Cyprus 1990-2012 in t dry biomass

Crop ₀ (t)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Wheat	8840	4760	8925	9945	6800	10453	11050	9775	9775	11900
Barley	83300	50575	145350	164050	130900	113745	108800	30600	45900	95795
Oats	92	74	133	92	138	160	175	258	294	368
Potatoes	83655	80843	87930	89550	60750	93464	102600	36675	62141	72675

Crop ₀ (t)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Wheat	8500	8925	10965	12138	8441	7862	56808	9105	2101	12487
Barley	31960	99025	109140	127500	85842	51243	49616	44206	2972	34078
Oats	322	350	368	377	3018	598	868	749	343	524
Potatoes	52650	54450	66825	57375	59243	68625	57375	69975	51750	49500

Crop ₀ (t)	2010	2011	2012							
Wheat	16645	16754	18734							
Barley	38383	38837	40783							
Oats	705	723	750							
Potatoes	36900	49752	38165							

The fraction of nitrogen in N-fixing crops (FracNCRBF) used is the default proposed by the IPCC guidelines (IPCC96, pg.4.35 workbook) and has the value of 0.03 kg N/kg of dry biomass. The fraction of nitrogen in non-N-fixing crops (FracNCR0) used is the default proposed by the IPCC guidelines (IPCC96, pg.4.35 workbook) and has the value of 0.015 kg N/kg of dry biomass. The fraction of crop residue that is removed from the field as crop (FracR) used is the default proposed by the IPCC guidelines (IPCC96, pg.4.35 workbook) and has the value of 0.015 kg N/kg of dry biomass.

The fraction of crop residue that is burned rather than left on field (FracBURN) used is the default proposed by the IPCC guidelines as follows: the fraction used was the 0.25 which is proposed for the developing countries in 1990 and linearly decreased to 0.1 in 2008 which the value proposed for the developed countries. There are no supporting documents to support this choice, only the fact that in 1990 it was a widespread practice to burn crop residues, which was banned by law in 2003. FracBURN has changed compared to the previous submission; therefore the respective emissions from the source have changed. The fraction of N input converted to N₂O (EF1) is assumed 0.0125 kg N₂O-N/kg nitrogen input, as proposed by the IPCC guidelines. The resulting total nitrogen input in N-fixing crops (F_{BN}) is also presented in Table 6.24.

Table 6.24. Total nitrogen input from crop residues that remain in soil (F_{CR}) in kt

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
F _{BN} (kt)	2.29	1.80	3.17	3.46	2.64	2.93	3.03	1.12	1.67	2.49	1.31	2.29

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
F _{BN} (kt)	2.65	2.88	2.32	1.88	2.43	1.85	0.88	1.46	1.40	1.63	1.51	

Organic soils cultivation (4D1.5)

This source is reported for the first time. Area of organic soil cultivation was available for 2002-2012 when the cultivation of organic products was first regulated by law. To complete the time series to 1990, it was assumed that area cultivated was the same as in 2002; i.e. 1990-2002 have the same area cultivated. The organic soils area cultivated (F_{OS}) used is presented in Table 6.25. The fraction of N input converted to N₂O (EF2) is assumed 5 kg N₂O-N/ha/year, as proposed by the IPCC guidelines.

Table 6.25. Organic soils area cultivated (F_{OS}) in ha

	1990-2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
F _{OS} (ha)	167	301	862	1709	2103	2335	2826	3703	3826	4015	3705

Application of sewage sludge on land (4D1.6.1)

This source is reported for the first time. The treated sewage sludge applied to land data was obtained from the national statistics and the relevant reports from the Department of Environment²³. Data was available for all wastewater treatment plants for the years 2004 and 2005. Data for the public waste water treatment plants was available for 2004-2012. All data was available in tonnes of dry matter. The sewage sludge used in agriculture during 1990-2003 and 2006-2012, was estimated using (a) the ratio of the public treatment plants compared to all treatment plants for 2004 and 2005 and (b) the percentage of the population served by a sewer system data for 1997 to 2004. The resulting data is presented in Table 6.25. Nitrogen content per kg dry sludge was assumed 3% for all years and was obtained from S. Perikenti²⁴. The resulting nitrogen in sewage sludge applied on land is presented in Table 6.26. The fraction of N input converted to N₂O (EF6) is assumed 0.01 kg N₂O-N/kg sewage-N produced, as proposed by the IPCC guidelines.

Table 6.26. Organic soils area cultivated (F_{OS}) in ha and nitrogen in sewage sludge in t

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Dry sludge (t)	97	97	97	97	492	887	1281	2082	2082	2242	2563	2883
Nitrogen in sewage sludge (t)	2.9	2.9	2.9	2.9	14.8	26.6	38.4	62.5	62.5	67.3	76.9	86.5

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Dry sludge (t)	3684	4485	6372	5459	6074	6339	6303	7003	5778	5620	5454	
Nitrogen in sewage sludge (t)	110.5	134.5	191.2	163.8	182.2	190.2	189.1	210.1	173.3	168.6	163.6	

Indirect Soil Emissions (4D3)

Indirect N₂O emissions from agricultural soils are caused by:

- Atmospheric deposition: Volatilisation of nitrogen included in synthetic fertilisers, animal manure (used as fertilizer) and sewage sludge (used also as fertilizer) as NO_x and NH₃, followed by atmospheric deposition as NO_x, HNO₃ and NH₄⁺ on soils and surface waters and subsequent N₂O formation.
- Leaching: leaching and runoff of nitrogen contained in applied fertilisers (synthetic, animal manure and sewage sludge).

For both sources, the Tier 1a methodology suggested by IPCC Good Practice Guidance was applied. The estimates for both of these sources have been revised because of revised Ne.

Atmospheric deposition

Emissions from atmospheric deposition were estimated using data for synthetic fertiliser N applied to soil, N_{FERT} and total N excretion by livestock (N_{ex}) already estimated for previous sources. The Fraction of Total Manure N Excreted that Volatilises (Frac_{GASM}) and Fraction of Synthetic Fertiliser N Applied that Volatilises (Frac_{GASFS}) are the default values according to the IPCC guidelines (0.1 and 0.2 kgN/kgN respectively). The resulting total N volatilised is presented in Table 6.27. The emission factor for indirect N₂O emissions from N used in agriculture (EF4) used was the default proposed by the IPCC guidelines (GPG, Table 4.18, pg. 4.73) of 0.01 kg N₂O-N/kgNH₄-N&NO_x-N deposited.

²³ Perikenti, S. 2011&2013. Questionnaire according to Commission Decision 94/741/EC for the report of the Member States on the transposition and implementation of Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, amended by Directive 91/692/EEC. Department of Environment

²⁴ Environment Officer responsible for sewage treatment plants, email dated 18/10/2013

Table 6.27. Total Nitrogen volatilised (Gg N/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total Nitrogen volatilised (Gg N/year)	5.90	5.92	6.40	6.52	6.55	6.73	7.00	7.10	7.21	7.32	7.27	7.93

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Total Nitrogen volatilised (Gg N/year)	8.43	8.04	7.62	6.91	6.42	6.82	6.60	6.31	6.60	6.54	6.50	

Leaching

Emissions from atmospheric deposition were estimated using data for synthetic fertiliser N applied to soil, N_{FERT} and total N excretion by livestock (N_{ex}) already estimated for previous sources. The Fraction of nitrogen leached and runoff (Fr_{LEACH}) used is 0.3 and the default value according to the IPCC guidelines. The resulting total N leached is presented in Table 6.28. The emission factor for indirect N_2O emissions from leaching and runoff (EF5) used was the default proposed by the IPCC guidelines (GPG, Table 4.18, pg. 4.73) of 0.025 kg N_2O -N/kgN leached and runoff.

Table 6.28. Total Nitrogen leached and runoff (Gg N/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total Nitrogen leached and runoff (Gg N/year)	10.7	10.7	11.9	12.0	12.0	12.2	12.6	12.2	12.4	12.6	12.1	13.1

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Total Nitrogen leached and runoff (Gg N/year)	13.8	13.4	12.6	11.4	10.6	11.1	10.6	10.1	10.5	10.6	10.5	

6.5.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

6.5.4. Source-specific QA/QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

6.5.5. Source-specific recalculations

The changes in this submission compared to previous submissions have been mainly caused by changes in the methodologies. Namely the changes in this source are the following: (a) estimation of N_2O emissions from histosols for the first time, (b) the dry matter fraction of residue for all crops except potatoes have been revised to be in line with the IPCC methodologies, (c) fraction of crop residue burnt was revised and (d) estimation of N_2O from application of sewage sludge on land for the first time. The total impact of these changes is shown in Table 6.29.

Table 6.29. Changes to the emissions from agricultural soils between NIR2013 and NIR2014

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013, Gg CO ₂ eq.	285	285	325	327	325	330	337	311	314	315	288
NIR2014, Gg CO ₂ eq.	356	353	399	403	398	407	420	397	406	417	392
% difference	25.1%	23.9%	22.9%	23.2%	22.7%	23.5%	24.7%	27.7%	29.5%	32.4%	36.0%

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013, Gg CO ₂ eq.	311	328	327	308	280	271	267	256	252	259	265
NIR2014, Gg CO ₂ eq.	429	457	446	417	378	358	368	350	341	354	358
% difference	38.2%	39.1%	36.4%	35.6%	35.2%	32.3%	38.1%	36.7%	35.5%	36.8%	34.9%

(a) Estimation of N₂O emissions from histosols for the first time

N₂O emissions from histosols were estimated for the first time. These emissions in previous submissions were reported as NE.

(b) The dry matter fraction of residue

The dry matter (DM) fraction of residue for all the crops except potatoes were revised to be in line with the IPCC methodologies. Table 6.30 presents the factors used in NIR 2013 compared to those used in the current submission. The impact in the emissions of N-fixing crops (4D13) and Crop residue (4D14) is presented in Table 6.31.

Table 6.30. Dry matter according to crop, change between NIR2013 and NIR2014

	Dry matter	
	NIR 2013	NIR 2014
Wheat	0.83	0.85
Barley	0.83	0.85
Oats	0.83	0.92
Peas	1	0.87
Dry bean	1	0.855

Table 6.31. Change in emissions of N-fixing crops (4D13) and Crop residue (4D14)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N-fixing crops (4D13)											
NIR2013, Gg CO ₂ eq.	0.0	0.3	0.6	0.7	0.9	1.1	1.4	1.7	1.7	0.7	0.8
NIR2014, Gg CO ₂ eq.	0.82	0.71	0.78	0.65	0.55	0.56	0.61	0.63	0.55	0.18	0.18
Crop residue (4D14)*											
NIR2013, Gg CO ₂ eq.	0.0	0.9	3.2	5.0	5.1	6.7	8.2	4.1	6.2	9.6	5.5
NIR2014, Gg CO ₂ eq.	13.9	11.0	19.3	21.1	16.1	17.8	18.4	6.8	10.2	15.1	8.0

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
N-fixing crops (4D13)											
NIR2013, Gg CO ₂ eq.	0.8	0.9	2.7	2.9	1.0	1.2	1.3	1.3	1.3	1.4	2.6
NIR2014, Gg CO ₂ eq.	0.18	0.17	0.54	0.53	0.16	0.17	0.18	0.17	0.17	0.18	0.32
Crop residue (4D14)*											
NIR2013, Gg CO ₂ eq.	10.8	13.4	16.7	14.3	11.0	16.6	12.0	5.6	10.3	10.4	12.3
NIR2014, Gg CO ₂ eq.	13.9	16.2	17.5	14.1	11.4	14.8	11.3	5.3	8.9	8.6	9.9

* changes in emissions from crop residue have also been caused by change in the fraction of residue burnt (see (c))

(c) Revision of fraction of crop residue burnt

The change in the fraction of crop residue burnt is presented in Table 6.30. The fraction of crop residue that is burned rather than left on field (FracBURN) used is the default proposed by the IPCC guidelines as follows: the fraction used was the 0.25 which is proposed for the developing countries in 1990 and linearly decreased to 0.1 in 2008 which the value proposed for the developed countries. There are no supporting documents to support this choice, only the fact that in 1990 it was a widespread practice to burn crop residues, which was banned by law in 2003. For the previous submission FracBURN was assumed to linearly decrease from 1 in 1990 to 0.1 in 2008. Again, there were no supporting documents to support this choice; however, it was considered more appropriate to start from the default proposed for developing countries instead of assuming that all crop residues are burnt. The change caused to the emissions from Crop residue (4D14) is presented in Table 6.32.

Table 6.32. Change in fraction of crop residue burnt

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50
NIR2014	0.25	0.24	0.23	0.23	0.22	0.21	0.20	0.19	0.18	0.18	0.17

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.10	0.10	0.10
NIR2014	0.16	0.15	0.14	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.10

(d) Estimation of N₂O from application of sewage sludge on land for the first time

N₂O emissions from application of sewage sludge on land were estimated for the first time. The source has not been previously mentioned in the NIR.

6.5.6. Source-specific planned improvements

There are no planned improvements for this source.

6.6. Prescribed burning of savannahs (CRF source category 4E)

Not occurring.

6.7. Field burning of agricultural residues (CRF source category 4F)**6.7.1. Source category description**

The generation of crop residues is a result of the farming practices used. Disposal practices for residues include ploughing them back into the ground, composting, landfilling and burning on-site. Burning of agricultural residues is responsible for emissions of CH₄, N₂O, CO and NO_x.

CH₄ and N₂O emissions from field burning of agricultural residues in 2011 accounted for 0.09% of total GHG emissions from Agriculture and for 0.01% of total national emissions (without LULUCF). Total emissions from field burning of agricultural residues for the period 1990-2012 are presented in Table 6.33 and Figure 6.5.

The emissions have been recalculated based on the revised Dry matter (dm) fraction of residue, C and N fraction of residue.

Table 6.33. Total emissions from Field burning of agricultural residues (4F)

	1990	1995	2000	2005	2010	2011	2012
CH ₄ (t)	104	109	33	34	23	25	26
N ₂ O (t)	1.46	1.41	0.57	0.51	0.47	0.52	0.53
Total (Gg CO ₂ eq.)	2.63	3.63	4.63	5.63	6.63	7.63	8.63
Gg CO ₂ eq.							
wheat	0.295	0.291	0.189	0.131	0.223	0.224	0.250
barley	1.589	1.808	0.406	0.489	0.293	0.296	0.311
oats	0.002	0.003	0.005	0.006	0.006	0.006	0.006
dry bean	0.143	0.085	0.029	0.019	0.016	0.032	0.030
peas	0.041	0.021	0.001	0.001	0.001	0.001	0.001
potatoes	0.565	0.526	0.237	0.232	0.100	0.134	0.103

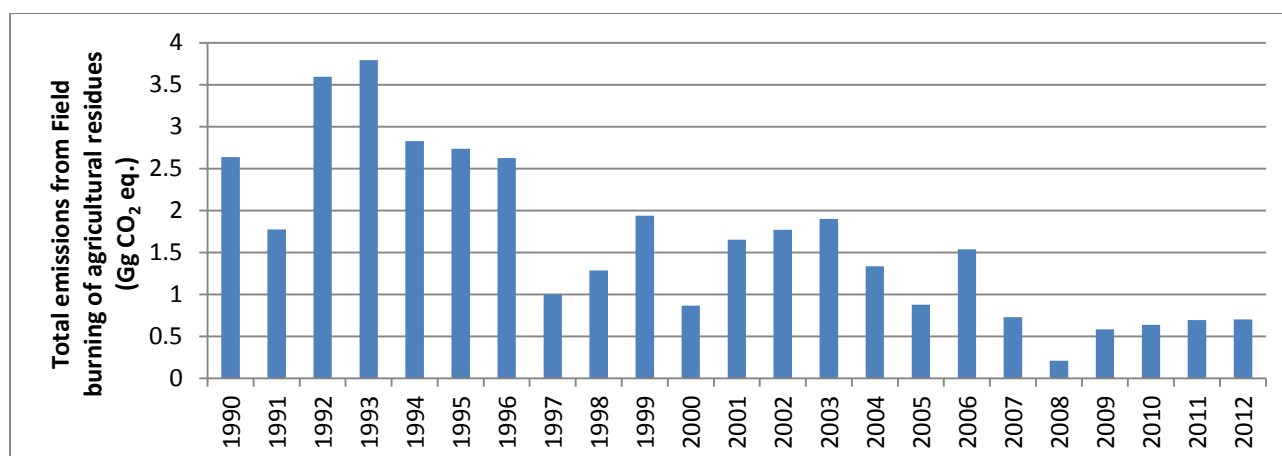


Figure 6.5. Total emissions from Field burning of agricultural residues for 1990 – 2012

6.7.2. Methodological issues

Crop production and cultivated area are presented in Table 6.34 and Table 6.35 respectively. Ratios of residue to crop production, dry matter content of residue and carbon and nitrogen contents of residue are according to the IPCC guidelines with some exceptions, as presented in Table 6.36. The fraction of crop residue that is burned (FracBURN) used (Table 6.37) is the default proposed by the IPCC guidelines as follows: the fraction used was the 0.25 which is proposed for the developing countries in 1990 and linearly decreased to 0.1 in 2008 which the value proposed for the developed countries. There are no supporting documents to support this choice, only the fact that in 1990 it was a widespread practice to burn crop residues, which was banned by law in 2003. Fraction oxidised is assumed 0.9 as proposed by the IPCC guidelines.

Table 6.34. Crop production by crop (t)

Crop	1990	1991	1992	1993	1994	1995	1996	1997	1998
Wheat	10400	5600	10500	11700	8000	12297	13000	11500	11500
Barley	98000	59500	171000	193000	154000	133818	128000	36000	54000
Oats	100	80	145	100	150	174	190	280	320
Dry bean	3600	3340	4070	2965	2600	2567	2800	2800	2430
Peas	1650	1200	930	1200	900	1031	1100	1200	1100
Potatoes	185900	179650	195400	199000	135000	207699	228000	81500	138092

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Wheat	14000	10000	10500	12900	14280	9930	9249	66833	10712
Barley	112700	37600	116500	128400	150000	100990	60286	58372	52007
Oats	400	350	380	400	410	3280	650	943	814
Dry bean	1000	1100	1050	1000	2500	2502	950	1000	1050
Peas	130	80	100	105	920	873	91	92	89
Potatoes	161500	117000	121000	148500	127500	131650	152500	127500	155500

Year	2008	2009	2010	2011	2012				
Wheat	2472	14690	19582	19711	22040				
Barley	3496	40092	45156	45690	47980				
Oats	373	570	766	786	815				
Dry bean	985	998	1010	1997	1886				
Peas	100	110	130	71	105				
Potatoes	115000	110000	82000	110559	84812				

Table 6.35. Cultivated area by crop (ha)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Wheat	5100	4900	5000	5000	3300	3500	3700	5250	5800	6600	6150	5400
Barley	52330	43790	60000	64000	60000	57500	55000	37500	53000	52000	45000	50200
Oats	100	100	110	140	200	220	240	270	290	340	330	370
Dry bean	1080	1100	980	800	750	825	900	485	265	430	430	430
Peas	160	150	125	110	70	75	80	82	80	100	70	70
Potatoes	8000	8690	9625	8080	7500	8313	9125	7000	7500	6800	6500	5715

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Wheat	5900	7225	7450	5264	5389	5287	4990	5761	5761	10590	11841	
Barley	51300	65007	58448	52517	48914	34019	30680	22444	22444	24954	26205	
Oats	400	513	808	4368	4919	4,250	3034	2950	2950	369	383	
Dry bean	430	287	285	358	376	296	179	163	163	190	179	
Peas	85	97	92	20	27	21	40	61	61	63	93	
Potatoes	6360	5511	5380	6190	4290	6290	5110	4970	4970	4458	3420	

Table 6.36. Ratios of residue to crop production, dry matter content of residue and carbon and nitrogen contents of residue

	residue/crop ^a	dry matter	C fraction	N fraction
Wheat	1.3	0.85 ^a	0.4853 ^a	0.028 ^a
Barley	1.2	0.85 ^a	0.4567 ^a	0.0043 ^a
Oats	1.3	0.92 ^a	0.45 ^c	0.007 ^a
Peas	1.5	0.87 ^a	0.45 ^c	0.0142 ^a
Dry bean	2.1	0.855 ^a	0.45 ^c	0.0230 ^d
Potatoes	0.4	0.45 ^b	0.4226 ^a	0.0110 ^a

^a GPG, pg. 4.58^b revised IPCC1996 guidelines was used because there is no value proposed in GPG (reference guidebook pg. 4.85)^c no data proposed in GPG or revised IPCC1996 guidelines therefore the value used by Greece is used from NIR2013^d no value proposed in GPG or revised IPCC1996 guidelines therefore assumed the same as N fractions for soybeans**Table 6.37.** Crop residue that is burned (FracBURN)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
FracBURN	0.25	0.24	0.23	0.23	0.22	0.21	0.20	0.19	0.18	0.18	0.17	0.16

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
FracBURN	0.15	0.14	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.10	0.10	

6.7.3. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

6.7.4. Source-specific QA/QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

6.7.5. Source-specific recalculations

The emissions have been recalculated based on the revised Dry matter (dm) fraction of residue, C and N fraction of residue. The impact on the emissions of this source is shown in Table 6.38.

Table 6.38. Change in emissions from Field Burning of Agricultural Residues caused by recalculations (4F)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	17.19	12.68	21.07	19.95	14.88	13.97	13.28	6.28	6.79	7.60	3.67
NIR2014	2.63	1.77	3.59	3.79	2.83	2.73	2.62	1.00	1.28	1.94	0.87
% difference	-84.7%	-86.0%	-82.9%	-81.0%	-81.0%	-80.4%	-80.2%	-84.1%	-81.1%	-74.5%	-76.4%

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	5.95	5.87	6.50	4.46	2.33	2.76	1.36	0.40	0.77	0.80	1.01
NIR2014	1.65	1.77	1.90	1.34	0.88	1.54	0.73	0.21	0.58	0.64	0.69
% difference	-72.3%	-69.9%	-70.8%	-70.0%	-62.3%	-44.3%	-46.4%	-47.0%	-24.1%	-20.7%	-31.6%

6.7.6. Source-specific planned improvements

There are no planned improvements for this source.

Chapter 7: LULUCF (CRF sector 5)

7.1. Overview of sector

The LULUCF sector differs from the other sectors in that it contains both sources and sinks of carbon dioxide. Removals are reported as negative figures and emissions are reported as positive figures according to the guidelines. CO₂ is the main greenhouse gas emitted and removed to / from the atmosphere following carbon stocks changes in different carbon pools. Non-CO₂ greenhouse gases (CH₄ and N₂O) and indirect GHG (NO_x and CO) are released in relatively small quantities when biomass is burnt. Emissions / removals from the Forest Land category are the result of the balance mainly in biomass increment from forest growth and biomass loss due to fellings and wildfires.

LULUCF is the most incomplete sector of the national GHG inventory of Cyprus. The system for the collection of data has not yet completed to collect the necessary activity data for the complete reporting of emissions. Therefore, the only emissions reported for LULUCF by Cyprus are the removals from Forest land remaining forest land (source 5A1) including biomass burning from wildfires (5A1, 5(V)) and emissions from Harvest wood products (under 5G). Some recalculations have taken place due to new data on area of forests and wildfires.

7.1.1. Emissions trends

The emissions from LULUCF changed from -139 Gg CO₂ eq. to -20 Gg CO₂ in 2012. The emissions of the period are presented in Table 7.1 and Figure 7.1. The reduction in absorption of CO₂ during the recent years has been caused by the increase in wildfires and the area burnt.

Table 7.1. Total emissions from LULUCF, 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CO ₂ (Gg)	-141.6	-151.5	-154.7	-83.0	-77.0	-92.4	-45.8
CH ₄ (Gg)	0.013	0.013	0.021	0.094	0.096	0.081	0.125
N ₂ O (Gg)	0.008	0.007	0.012	0.055	0.056	0.047	0.073
Total (Gg CO ₂ eq.)	-139.0	-148.9	-150.4	-64.2	-57.7	-76.0	-20.6

5A1 - carbon stock change	-169.1	-175.2	-181.3	-181.4	-181.7	-182.0	-182.2
5(V) - wildfires in forest land	15.2	14.9	25.0	114.9	122.4	104.5	161.6
5G - harvested wood products	14.9	11.4	6.0	2.3	1.6	1.5	1.3

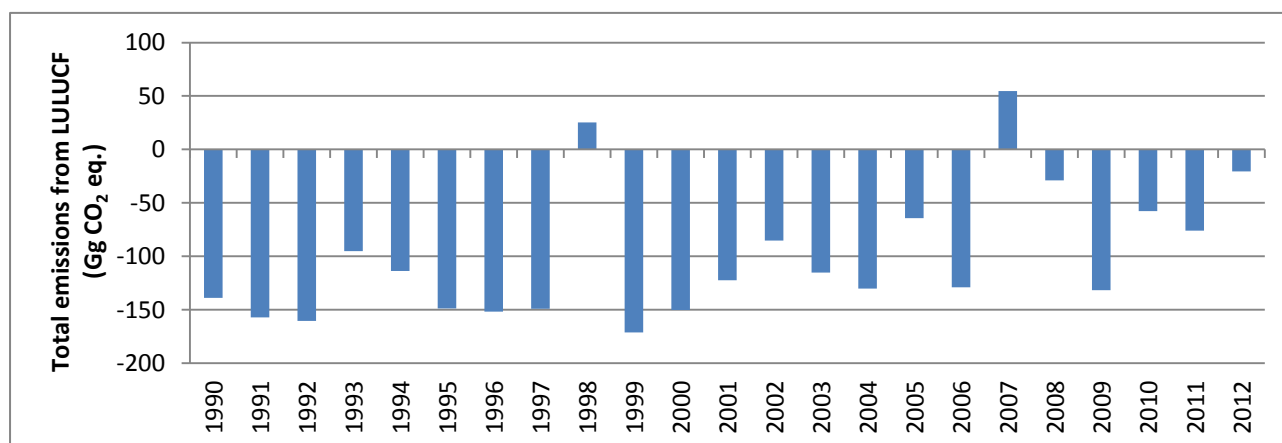


Figure 7.1. Total emissions from LULUCF, 1990 – 2012

7.1.2. Methodology

Emissions were estimated using the methodologies proposed by the IPCC guidelines.

7.1.3. Completeness

The emissions have been estimated only for Forest land remaining forest land – carbon stock change (5A1), wildfires in forest land (5(V)) and harvested wood products (5G). It is expected that by the submission of 2015, the emissions will be reported sufficiently.

7.2. Forest Land (5A)

Emissions have been estimated only for forest land remaining forest land (5A1). Land converted to forest land (5A2) was included in the forest land remaining forest land (5A1).

7.2.1. Information on approaches used for representing land areas and on land-use databases used for the inventory preparation

Not available.

7.2.2. Land-use definitions and the classification systems used and their correspondence to the LULUCF categories

Not applied.

7.2.3. Methodological issues

Activity data for calculation of carbon stock change (area) with the resulting carbon stock change in living biomass (gains) and the areas burnt during wildfires (for 5V biomass burning) are presented in Table 7.2.

Table 7.2. Area of forest land remaining forest land, calculated carbon stock change in living biomass (gains) and areas burnt during wildfires, for the period 1990 – 2012

	1990	1991	1992	1993	1994	1995	1996	1997
Area(kha)	161.1	162.3	163.4	164.6	165.8	166.9	168.1	169.3
Coniferous	160.1	161.3	162.4	163.6	164.8	165.9	167.1	168.3
Broadleaved	1	1	1	1	1	1	1	1
Carbon stock change in living biomass (gains), Gg	46.11	46.44	46.78	47.11	47.44	47.78	48.11	48.45
Area burnt during wildfires (ha)	314	32	9	1344	1021	309	285	397

	1998	1999	2000	2001	2002	2003	2004	2005
Area(kha)	170.4	171.6	172.8	172.8	172.8	172.8	172.8	172.9
Coniferous	169.4	170.6	171.8	171.8	171.8	171.7	171.7	171.7
Broadleaved	1	1	1.00	1.026	1.052	1.078	1.104	1.13
Carbon stock change in living biomass (gains), Gg	48.78	49.11	49.45	49.45	49.46	49.46	49.47	49.47
Area burnt during wildfires (ha)	4056	4	517	1099	1874	1274	974	2274

	2007							
Area(kha)	172.9							
Coniferous	171.7							
Broadleaved	1.13							
Carbon stock change in living biomass (gains), Gg	49.47							
Area burnt during wildfires (ha)	4529							

The assumptions, constants and sources of data used for the estimation of the emissions are the following:

- Data on forest area was available for 1990, 2000, 2005, 2007 and projections for 2010, from the Department of Forestry. Data for the remaining years except 2011 and 2012 was completed based on the assumption that the changes between the years were linear. For the years 2011 and 2012, the area reported in the annual report of the department of forests as area that was converted to forest was used to estimate the total forest area.
- The area of broadleaved forests was assumed constant at 1 kha for 1990 to 2004 and at 1.13 kha for 2005 to 2008, based on the available data for 1990, 2000, 2005, 2007 and projections for 2010, from the Department of Forestry.
- The annual growth rate (tdm/ha) for coniferous and broadleaved was assumed constant at 0.57 and 0.53 respectively, as this was reported by the Department of Forestry in the report “inventory of productive forests 1991-92”, in 1994.
- Carbon Fraction of Dry Matter and Biomass conversion/ expansion ratio were assumed constant for all years at 0.5 and 0.95 t dm/m³ respectively, as recommended by IPCC 1996 guidelines.

The emission factors used for the estimation of methane and nitrous oxide are based on the ratio to annual C released of 0.012 and 0.007 respectively, according to the revised IPCC 1996 guidelines (pg. 5.18). The estimated emission factors are presented in Table 7.3 for the period 1990-2012.

Table 7.3. Estimated emission factors for methane and nitrous oxide for emissions per kha burnt during a wildfire

	1990	1991	1992	1993	1994	1995	1996	1997	1998
CH ₄ (t/kha burnt)	41.1	4.2	1.2	176.0	133.7	40.4	37.2	51.9	530.7
N ₂ O (t/kha burnt)	24.0	2.5	0.7	102.7	78.0	23.6	21.7	30.3	309.6

	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH ₄ (t/kha burnt)	0.6	67.6	145.4	250.7	172.3	133.2	314.3	138.7	638.7
N ₂ O (t/kha burnt)	0.3	39.4	84.8	146.2	100.5	77.7	183.3	80.9	372.6

	2008	2009	2010	2011	2012				
CH ₄ (t/kha burnt)	412.0	129.1	337.6	288.3	446.3				
N ₂ O (t/kha burnt)	240.3	75.3	196.9	168.2	260.3				

7.2.4. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

7.2.5. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

7.2.6. Source-specific recalculations

A mistake was identified in the calculations of area for 1991-1999 and 2001-2004. The area used for the estimation of emissions for NIR2013 in comparison to the area used for the current submission is presented in Table 7.4. A mistake was also identified in the area burnt: the area for the years 2002-2010 included only the national forests burnt, whereas data is available for privately owned forests burnt (Table 7.5). The impact of these two changes on the emissions is presented in Table 7.6 and Figure 7.2.

Table 7.4. Changes in area between NIR2013 and NIR2014

Area (kha)	1991	1992	1993	1994	1995	1996	1997	1998	1999
NIR 2013	162.27	163.43	164.59	165.75	166.91	168.07	169.23	170.39	171.61
NIR 2014	162.28	163.44	164.61	165.77	166.94	168.11	169.27	170.44	171.60

Area (kha)	2001	2002	2003	2004					
NIR 2013	172.76	172.75	172.74	172.73					
NIR 2014	172.79	172.80	172.82	172.83					

Table 7.5. Changes in area burnt between NIR2013 and NIR2014

Area (kha)	2002	2003	2004	2005	2006	2007	2008	2009	2010
NIR 2013	69	311	135	95	260	1397	119	77	276
NIR 2014	1874	1274	974	2274	993	4529	2903	904	2323

Table 7.6. Changes in total emissions between NIR2013 and NIR2014 in 5A1

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NIR 2013	-153.8	-168.7	-171.0	-107.7	-124.5	-160.2	-162.6	-158.4	17.1
NIR 2014	-153.9	-168.7	-171.1	-107.8	-124.6	-160.3	-162.7	-158.5	17.0
% difference	0.07%	0.02%	0.05%	0.09%	0.12%	0.05%	0.04%	0.05%	-0.75%

	1999	2000	2001	2002	2003	2004	2005	2006	2007
NIR 2013	-179.8	-156.3	-127.7	-177.8	-165.8	-174.4	-176.5	-168.1	-109.5
NIR 2014	-179.9	-156.4	-127.8	-89.2	-118.1	-132.6	-66.5	-130.8	51.4
% difference	0.04%	0.03%	0.06%	-49.84%	-28.75%	-23.97%	-62.33%	-22.20%	-146.9%

	2008	2009	2010	2011					
NIR 2013	-175.2	-177.4	-167.1	-77.9					
NIR 2014	-31.5	-134.6	-59.3	-77.5					
% difference	-82.03%	-24.13%	-64.51%	-0.53%					

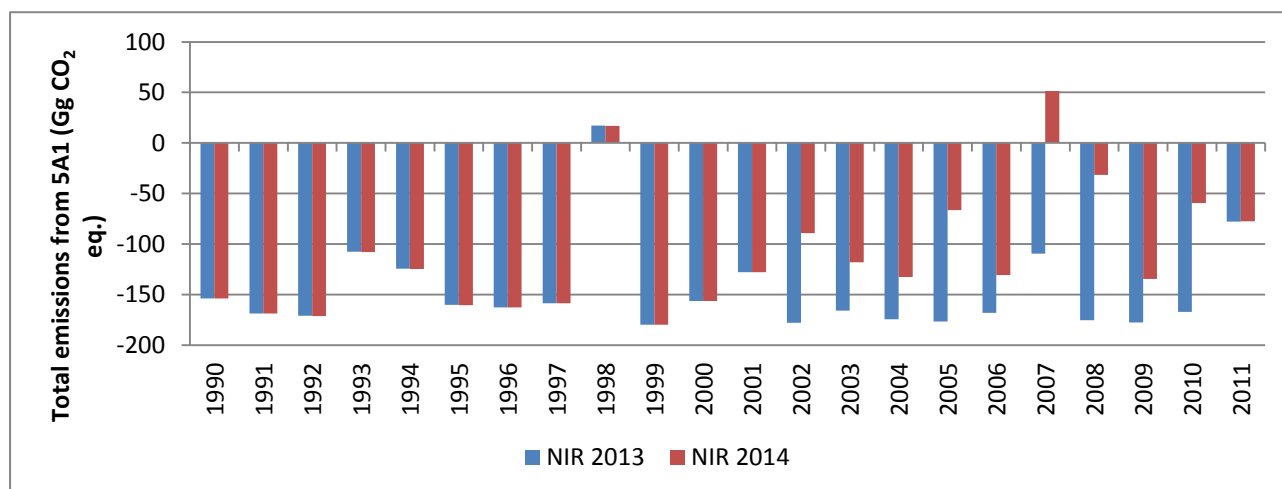


Figure 7.2. Change in emissions from 5A1, 1990 – 2011

7.3. Other (5G) – Harvest wood product

The emissions reported under Other (5G), are for harvested wood products.

7.3.1. Information on approaches used for representing land areas and on land-use databases used for the inventory preparation

Not available.

7.3.2. Land-use definitions and the classification systems used and their correspondence to the LULUCF categories

Not applied.

7.3.3. Methodological issues

The activity data for volume of harvested wood products was obtained from the statistical service for 1990-2011 and from the annual report of the Department of Forestry for 2002-2012. The data is presented in Table 7.4 in 1000 m³ round wood of Total timber production. Only CO₂ emissions were estimated. Carbon Fraction of Dry Matter is considered 0.5 as the default in the revised IPCC 1996 guidelines.

Table 7.7. Total timber production (1000 m³ round wood), for the period 1990 – 2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total timber production (1000 m ³ round wood)	63	49	45	53	46	48	45	40	
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total timber production (1000 m ³ round wood)	36	25	22	16	12	10	10	7	13
	2008	2009	2010	2011	2012				
Total timber production (1000 m ³ round wood)	10.1	12.3	6.7	6.2	5.6				

7.3.4. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

7.3.5. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

7.3.6. Source-specific recalculations

No recalculations have been performed.

7.1. Sector-specific planned improvements

The system for the estimation of emissions from LULUCF has been in development since the summer of 2013. Between July 2013 and January 2014, two meetings have taken place with all the involved governmental Departments and several meetings with specific Departments such as the Department of Forests. In January 2014 a meeting has also taken place in Ispra with experts from the JRC to assist Cyprus in the preparation of the GHG inventory for the LULUCF sector.

During this period several data sets have been collected, assessed and compared regarding land uses in Cyprus. The proposal of the LULUCF inventory expert which was agreed by all the involved Departments was to use the available information from the Corine Land Cover Maps that are prepared from the nature protection sector of the Department of the Environment. Corine Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. It provides comparable digital maps of land cover for each country for much of Europe. Corine stands for Coordination of Information on the Environment.

Currently, there are two such maps available for Cyprus, one for the year 2000 and one for 2006. The 2012 map is expected to be completed soon.

So far, LULUCF areas in Cyprus for the period 2000 – 2012 have been estimated (Table 7.8). **This information is for the whole of the country and not only the areas under the effective control of the Republic of Cyprus.** The land uses contribution to the total is also presented schematically in Figure 7.3.

Table 7.8. LULUCF areas in Cyprus (hectares), for the period 2000 – 2012

End of Year	2000	2001	2002	2003	2004	2005	2006
Broadleaved Forest	762.77	761.48	760.19	758.90	757.61	756.32	755.03
Coniferous Forest	163760.48	162102.81	160445.15	158787.48	157129.82	155472.15	153814.48
Annual Cropland	292933.68	292378.70	291823.72	291268.73	290713.75	290158.77	289603.78
Woody Cropland	154026.62	153551.30	153075.99	152600.68	152125.37	151650.05	151174.74
Grass Grassland	42950.40	42683.73	42417.06	42150.40	41883.73	41617.06	41350.39
Woody Grassland	189523.86	190824.70	192125.54	193426.38	194727.23	196028.07	197328.91
Wetland	4018.78	4023.19	4027.60	4032.02	4036.43	4040.84	4045.25
Settlements Land	68404.15	70057.08	71710.01	73362.94	75015.86	76668.79	78321.72
Other Land	7709.77	7707.50	7705.24	7702.98	7700.72	7698.46	7696.19
Total Land Area	924090.51	924090.51	924090.51	924090.51	924090.51	924090.51	924090.51

End of Year	2007	2008	2009	2010	2011	2012	
Broadleaved Forest	753.74	752.45	751.16	749.87	748.58	747.29	
Coniferous Forest	152156.82	150499.15	148841.49	147183.82	145526.15	143868.49	
Annual Cropland	289048.80	288493.82	287938.83	287383.85	286828.87	286273.88	
Woody Cropland	150699.43	150224.12	149748.80	149273.49	148798.18	148322.87	
Grass Grassland	41083.72	40817.06	40550.39	40283.72	40017.05	39750.39	
Woody Grassland	198629.75	199930.59	201231.43	202532.27	203833.11	205133.95	
Wetland	4049.67	4054.08	4058.49	4062.90	4067.32	4071.73	
Settlements Land	79974.65	81627.58	83280.51	84933.43	86586.36	88239.29	
Other Land	7693.93	7691.67	7689.41	7687.15	7684.89	7682.62	
Total Land Area	924090.51	924090.51	924090.51	924090.51	924090.51	924090.51	

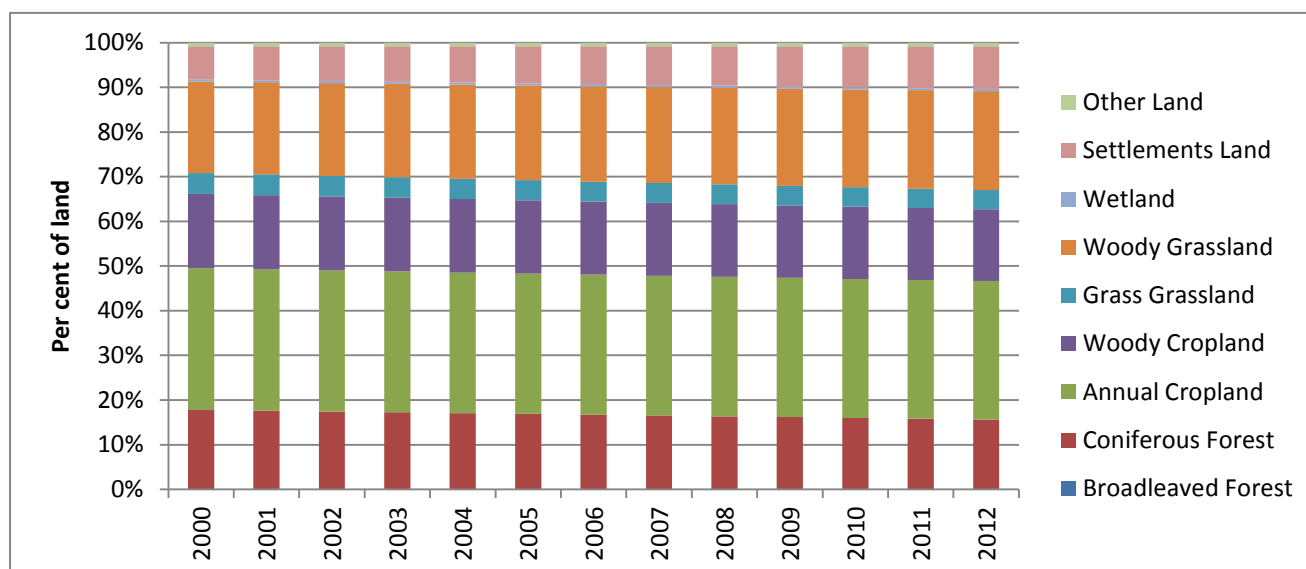


Figure 7.3. Land uses in Cyprus – per cent of total

Implemented Methodology

The data used to arrive to LULUCF categories was taken from the Corine Land Area Maps of 2000 and 2006. Also correlations were drawn from the Corine Land Change Maps of 2000-2006. It was assumed that the land changed linearly between 2000 and 2006 and this was extrapolated to 2012. The overall raw data for 2000 and 2006 is shown in Table 7.9 (Corine Land Cover categories).

Table 7.9.Correlation of CLC to IPCC categories

CLC codes	Level 3	IPCC categories	Sum of AREA for 2000 (m ²)	Sum of AREA for 2006 (m ²)
111	Continuous urban fabric	SL	5666279,48	5666280,09
112	Discontinuous urban fabric	SL	414368615,01	485473911,8
121	Industrial or commercial units	SL	130210658,58	143443982,7
122	Road and rail networks and associated land	SL	3240896,20	5568318,44
123	Port areas	SL	4316312,30	4316312,06
124	Airports	SL	25065902,39	25287240,56
131	Mineral extraction sites	SL	28240666,88	25652039,19
132	Dump sites	SL	3201723,71	3532122,84
133	Construction sites	SL	11806912,89	5341817,64
141	Green urban areas	SL	10807546,76	10045761,56
142	Sport and leisure facilities	SL	47116000,82	68889423,99
211	Non-irrigated arable land	Annual CL	2405083699,70	2384315583
212	Permanently irrigated land	Annual CL	192217904,04	188715973,3
221	Vineyards	Woody CL	141350814,29	140665202,5
222	Fruit trees and berry plantations	Woody CL	165652114,81	155812831,6
223	Olive groves	Woody CL	65034250,59	65155856,75
231	Pastures	Grass GL	11629387,85	11671498,3
241	Annual crops associated with permanent crops	Annual CL	332035232,39	322329686,2
242	Complex cultivation	Woody CL	741077163,78	731848154,2
243	Land principally occupied by agriculture, with significant areas of natural vegetation	Woody CL	409804253,1	418265365,3
311	Broad leaved forest	Broadleaved forest	7627699,91	7550305,03
312	Coniferous forest	Coniferous forest	1534404344,47	1533709783
313	Mixed forest	Coniferous forest (see point 2 below)	3569926,64	3569926,34
321	Natural grassland	Grass GL	296869535,03	281667076,8
323	Sclerophyllous vegetation	Woody GL	1597289720,76	1576800337
324	Transitional woodland/shrub	Woody GL	297948911,18	395617795,6
331	Beaches, dunes and sand plains	OL	51611558,45	51611557,99
332	Bare rock	OL	25486093,13	25486091,78
333	Scarcely vegetated areas	Grass GL	121005057,29	120165345,4
334	Burnt areas	Woody CL, Woody GL, Coniferous Forest, Annual Cropland (see point 3 below)	116978104,93	2412670,87
411	Inland marshes	WL	5201519,37	5201519,26
421	Salt marshes	WL	19552263,47	19552263,47
511	Water courses	WL	0,00	264741,3
512	Water bodies	WL	15434013,46	15434013,39
	Total Land Area		9240905083,65	9241040789,35

The assumptions and corrections used are the following:

1. Firstly, all Corine Land Categories were categorized into IPCC LULUCF categories, as shown above, as Forest Land (Broadleaved and Coniferous), Cropland (Annual and Woody), Grassland (Grass and Woody), Wetland, Settlements Land and Other Land.
2. Mixed forest category was allocated to Coniferous forest which is the most abundant in Cyprus.
3. Burnt areas category was appropriated accordingly using the Corine Land Change 2000-2006 data into Woody Cropland and Woody Grassland for 2000 and into Coniferous Forest, Woody Grassland and Annual Cropland for

2006. For 2000, since there is no previous data available, it was checked to see what the burnt areas turned into by 2006. It was found that 14.83% became “land principally occupied by agriculture with significant areas of natural vegetation”, CLC Code 243, and was categorized into Woody Cropland and 85.17% was turned into “transitional woodland/shrub”, CLC Code 324, and was categorized into Woody Grassland. For 2006, we looked into CLC land categories of 2000. It was found that the area that was categorized as burnt in 2006, in 2000 was found to be CLC Code 211, “non-irrigated arable land”, CLC Code 312, “coniferous forest”, CLC Code 323, “sclerophyllous vegetation” and CLC Code 324, “transitional woodland/shrub” as presented in Table 7.10. Therefore the total burnt area of 2006 was distributed using the percentage found above for 2000.

Table 7.10. Burnt areas of 2006 categorized for LULUCF according to 2000 status

Burnt areas of 2006	These areas in 2000	Burnt areas of 2006 allocated according to 2000 status		
CLC Code 334	CLC Code 211	Non-irrigated arable land	28.044%	Annual Cropland
	CLC Code 312	Coniferous forest	35.858%	Coniferous Forest
	CLC Code 323	Sclerophyllous vegetation	15.195%	Woody Grassland
	CLC Code 324	Transitional woodland/shrub	20.903%	Woody Grassland

- Then, the total land area was corrected to the 2000 value by subtracting the difference found in the total (135705.7 m²) to the Other Land category of 2006. Following this, the categories were summed and divided by 10000 to get to the following overall categories in hectares (Table 7.11).

Table 7.11. LULUCF Categories for years 2000 and 2006

		LULUCF Categories in 2000 (hectares)	LULUCF Categories in 2006 (hectares)
FL	Broadleaved forest	762.77	755.03
	Coniferous forest	163760.48	153814.48
CL	Annual Cropland	292933.68	289603.78
	Woody Cropland	154026.62	151174.74
GL	Grass Grassland	42950.40	41350.39
	Woody Grassland	189523.86	197328.91
WL	Wetland	4018.78	4045.25
SL	Settlement Land	68404.15	78321.72
OL	Other Land	7709.77	7696.19
Total Land Area		924090.51	924090.51

- Having established the LULUCF categories for 2000 and 2006, it was assumed that land change per year was linear and data was computed for land area in hectares for the years 2000 to 2006. The estimates for 2007-2012 were made using the linear trend between 2000 and 2006. The result is the areas presented in Table 7.8.

Planned steps for 2014

- Determination of land uses and land use changes for the period 1990-1999
- Revision of 2007-2012 estimates according to the results of the CLC 2012
- Collection of the necessary information to apply the IPCC 2006 and GPG for forest methodologies to estimate the emissions.
- Where information for Cyprus is not available, countries with similar climate, economic situation and ecosystems such as Greece, Malta, Italy and Spain will be studied to obtain the necessary data.

Chapter 8: Waste (CRF sector 6)

8.1. Overview of sector

Disposal and treatment of industrial and municipal wastes can produce emissions of GHG. Solid wastes can be disposed of through landfilling, recycling, incineration or waste-to-energy. Incineration and waste-to-energy technologies are not implemented for the management of municipal solid waste in Cyprus. This chapter will deal with CH₄ emissions resulting from solid waste disposal on land and treatment of liquid wastes and N₂O from human sewage. The most important gas produced in this source category is methane (CH₄). Emissions from incineration are reported as NO as no incineration takes place in Cyprus.

8.1.1. Emissions trends

Emissions from the Waste Sector in 2012 contributed 10.8% of the total emissions without LULUCF and increased by 50% since 1990. In 2012, 93.6% of the emissions is from solid waste disposal on land and the remaining 6.4% from wastewater handling. 74.8% of the total methane emissions and 3.8% of the nitrous oxide emissions of the country are from the sector of waste. The emissions from waste have changed considerably between 1990 and 2012 due to changes that are taking place in the waste and wastewater management practices of the country. The amount of solid waste disposed to shallow unmanaged disposal sites decreased from 33% in 1990 to 0% in 2012, therefore all the emissions from solid waste disposal on land is from managed disposal sites. Recycling and composting have been reducing the amount of waste disposal on land since 2010. The emissions from industrial wastewater have increased since there is an increase in the amount of waste treated by anaerobic digestion. Additionally, approximately 78% of the population was served by a sewer and tertiary aerobic treatment systems in 2012. Since the amount of wastewater collected in septic tanks has reduced from 65% in 1990 to 16% in 2012.

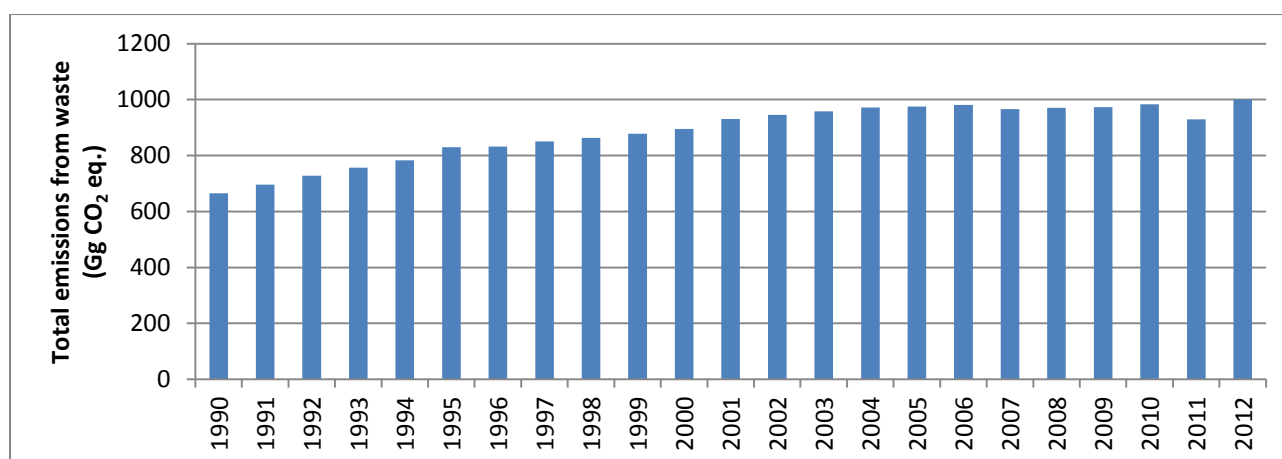


Figure 8.1. Total GHG emissions (in Gg CO₂ eq) from waste for the period 1990 – 2012

Table 8.1. Total GHG emissions (in Gg CO₂ eq) from waste for the period 1990 – 2012

Year	1990	1995	2000	2005	2010	2011	2012
CH ₄ (Gg)	30.9	38.6	41.6	45.5	45.7	43.1	46.5
N ₂ O (Gg)	0.05	0.06	0.07	0.07	0.07	0.08	0.08
Total (Gg CO ₂ eq.)	665	830	895	975	984	930	1001
Gg CO ₂ eq.							
Solid waste disposal on land	542	693	758	852	902	856	936
Wastewater handling	124	137	137	124	82	74	64

8.1.2. Methodology

Table 8.2. Waste– methodologies and emission factors applied

	CO ₂		CH ₄		N ₂ O	
	Method	EF	Method	EF	Method	EF
6A. Solid waste disposal on land	NA	NA	T1	D		
6B. Wastewater handling			D	D	CR,D	CR,D

T1: IPCC methodology Tier 1; D: IPCC default methodology and emission factor; CR: CORINAIR methodology

Key categories

The results of the key categories assessment are presented in [section 1.5](#).

Uncertainty

The uncertainty analysis is presented in [section 1.7](#).

8.1.3. Completeness

Table 4.4 gives an overview of the IPCC source categories included in this chapter and presents the status of emissions estimates from all sub-sources in the sector of waste.

Table 8.4. Waste – completeness

	CO ₂	CH ₄	N ₂ O
6A1. Managed waste disposal on land	NE1	✓	
6A2. Unmanaged waste disposal on land	NE1	✓	
6B1. Industrial wastewater		✓	✓
6B2. Domestic and commercial wastewater		✓	✓

NE1: Not estimated due to lack of method

8.2. Land disposal of solid waste (6A)

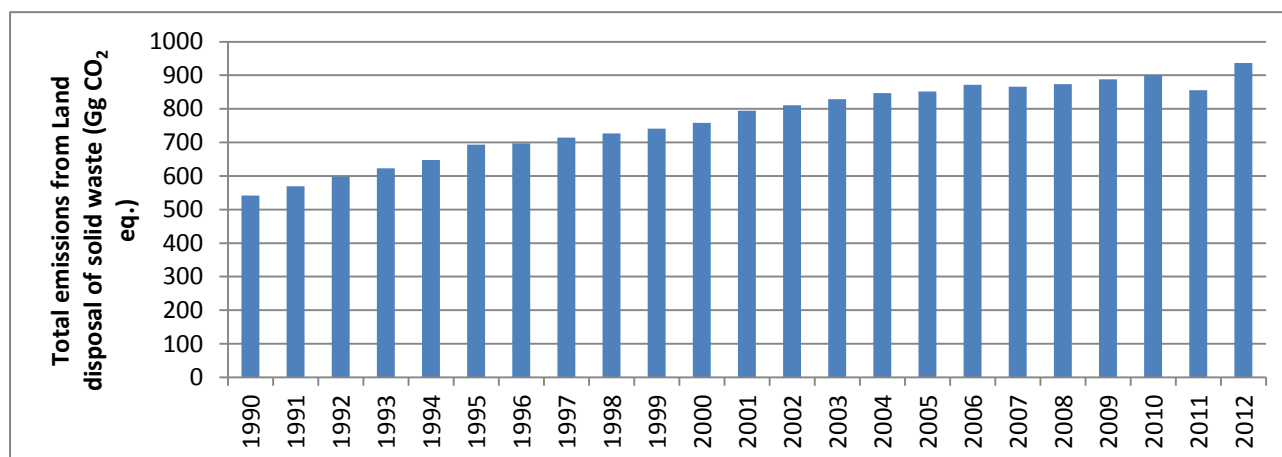
Solid waste disposal on land is responsible for methane emissions. Methane is emitted during the anaerobic decomposition of organic waste disposed solid waste disposal sites. The main characteristic of this process is that organic waste decomposes at a diminishing rate over time and takes many years to decompose completely. Other factors that affect the decomposition rate are the type of waste disposed, the characteristics of the disposal sites and the climate conditions. Methane emissions were calculated using the Tier 1 method proposed by the revised IPCC 1996 guidelines.

Carbon dioxide emissions occur during the flaring of biogas released from the decomposition of waste. These emissions should not be included in the total GHG emissions of this source as they are of biogenic origin. However, recovery and flaring of biogas does not occur in Cyprus and is therefore reported as NO.

CH₄ emissions from solid waste disposal on land in 2012 accounted for 94% of total GHG emissions from Waste, 10% of total national emissions without LULUCF and 72% of the total CH₄ emissions without LULUCF. All solid waste disposal on land emissions is considered managed in 2012, compared to 87% in 1990. All unmanaged waste disposal is considered shallow. The emissions between 1990 and 2012 increased by 73%. CH₄ emissions from managed and unmanaged solid waste disposal sites are presented in Table 8.5 and Figure 8.2.

Table 8.5. Total GHG emissions (in Gg CO₂ eq) by gas from Land disposal of solid waste for the period 1990 – 2012

Year	1990	1995	2000	2005	2010	2011	2012
6A1. Managed waste disposal on land (Gg CH ₄)	21	28	31	34	40	38	45
6A2. Unmanaged waste disposal on land (Gg CH ₄)	4.32	5.21	5.54	6.34	3.24	3.09	NO
Total (Gg CO ₂ eq.)	542	693	758	852	902	856	936

**Figure 8.2.** Total GHG emissions from Land disposal of solid waste for the period 1990 – 2012

The emissions from this source have been recalculated due to the following changes: (a) change in the method used to estimate total waste generation for the years that data is not available, (b) change in the assumptions used to estimate waste composition for the years that data is not available which resulted in changes to the % DOC of the waste and (c) change of the DOC assimilated coefficient to be in line with the IPCC guidelines.

8.2.1. Methodological issues

The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines) outline two methods to estimate CH₄ emissions from solid waste disposal sites, the default method (Tier 1) and the First Order Decay (FOD) method (Tier 2). The main difference between the two methods is that the FOD method produces a time-dependent emission profile that better reflects the true pattern of the degradation process over time whereas the default method is based on the assumption that all potential CH₄ is released in the year the waste is disposed of. According to the GPG, the default method will give a reasonable annual estimate of actual emissions if the amount and composition of deposited waste have been constant or slowly varying over a period of several decades. Due to in unavailability of the necessary data to implement the Tier 2 methodology, the Tier 1 methodology was implemented for the estimation of emissions from land disposal of solid waste.

The default method is based on the following equation (equation 5.3, GPG pg. 5.7):

$$\text{CH}_4 \text{ emissions (Gg/yr)} = [(\text{MSW}_T * \text{MSW}_F * L_0) - R] * (1 - \text{OX})$$

where MSW_T is the total MSW generated (Gg/yr), MSW_F is the fraction of MSW disposed at SWDS, R is the recovered CH₄ (Gg/yr), OX is the oxidation factor (fraction) and L₀ is the methane generation potential which is estimated by:

$$L_0 \text{ (Gg CH}_4\text{/Gg waste)} = \text{MCF} * \text{DOC} * \text{DOCF} * F * 16 / 12$$

where MCF is the methane correction factor (fraction), DOC is the degradable organic carbon [fraction (Gg C/Gg MSW)], DOCF is the fraction DOC dissimilated and F is the fraction by volume of CH₄ in landfill gas.

There is no proposed methodology by the IPCC for the estimation of CO₂ emissions from solid waste disposal on land and therefore these have not been estimated.

Total municipal solid waste (MSW_T)

Data on total MSW production and annual per capita production are available for the period 1996-2012 from the National Statistical Service. The data for the period 1990-1995 was obtained using the linear trend equation of 1996-2008 that was obtained from plotting the annual per capita production against time as shown in Figure 8.3. The years 2009 to 2012 were excluded from the trend, because during those years there are considerable changes in (a) the economy of the country and (b) the waste management practices of the country, which resulted in a decrease of the waste production. The total municipal solid waste production (MSW_T) was then estimated by multiplying the annual per capita production by the total population at the end of the year. The total population used, the annual per capita production and the resulting total municipal solid waste production for the whole reporting period, are presented in Table 8.6.

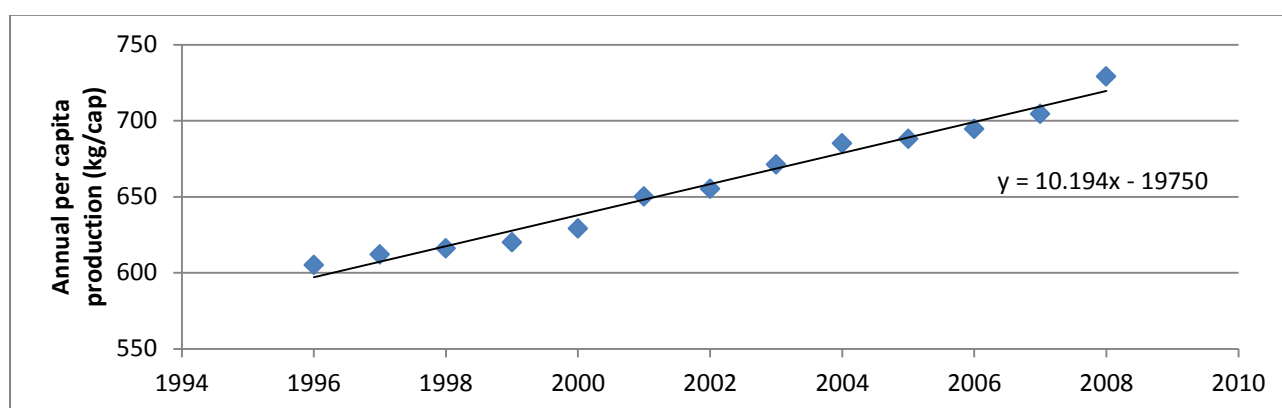


Figure 8.3. Plot used to estimate the annual per capita production for 1990-1995 (kg/cap)

Table 8.6. Total population, annual per capita production (kg/cap), total MSW production (1000t)

	Total population	Annual per capita production (kg/cap)	Total MSW production (1000t)
1990	587100	536.1	314.7
1991	603100	546.3	329.4
1992	619200	556.4	344.6
1993	632900	566.6	358.6
1994	645400	576.8	372.3
1995	656300	587.0	385.3
1996	666300	605.0	400.1
1997	675200	612.0	410.5
1998	682900	616.0	418.2
1999	690500	620.0	425.8
2000	697500	629.0	436.1
2001	705500	650.0	456.1
2002	713700	655.0	464.6
2003	722900	671.0	481.4
2004	733000	685.0	498.1
2005	744000	688.0	507.9
2006	757900	694.4	521.0
2007	776400	704.3	539.8
2008	796900	728.9	572.7
2009	819100	729.9	589.1
2010	839800	697.0	577.4
2011	862000	683.0	579.7
2012	865900	663.0	572.4

Fraction of MSW disposed at SWDS (MSW_F)

Data on MSW disposed at SWDS is available for the period 1996-2012 from the National Statistical Service. For the period 1990-1995 it was assumed that the fraction of waste disposed to SWDS is the same as 1996. The MSW_F and the corresponding mass of MSW disposed to disposal sites are presented in Table 8.7. In Table 8.7 data on other waste management practices are also presented for years that data is available.

Table 8.7. Fraction of MSW disposed at SWDS (MSW_F), mass of MSW disposed to disposal sites (1000t) and other practices

	Composting (1000t)	Recycling (1000t)	MSW to disposal sites (1000t)	MSW to disposal sites
1990			305.97	97.2%
1991			320.29	97.2%
1992			334.98	97.2%
1993			348.66	97.2%
1994			361.94	97.2%
1995			387.00	97.2%
1996		11.12	389.00	97.2%
1997		12.54	398.00	96.9%
1998		12.17	406.00	97.1%
1999		12.76	413.00	97.0%
2000		13.11	423.00	97.0%
2001		14.10	442.00	96.9%
2002		14.61	450.00	96.9%
2003		14.73	466.63	96.9%
2004		16.48	481.59	96.7%
2005		18.61	489.30	96.3%
2006		21.50	499.49	95.9%
2007		27.59	512.19	94.9%
2008		42.09	530.59	92.7%
2009		49.39	539.67	91.6%
2010	26.31	61.09	489.97	84.9%
2011	47.92	72.22	459.54	79.3%
2012	50.99	70.10	451.29	78.8%

Composition of MSW disposed at SWDS

Data on the composition of waste to disposal sites is available for the period 1996 to 2011. For the period 1990-1995 it is assumed that the composition is the same as 1996 and for the year 2012 that the composition is the same as 2011. The breakdown on the organic matter to food waste and non-food/garden waste has been provided from the Statistical service and is assumed constant for all the years: 86% of organic matter is food waste and the remaining 14% is non-food/garden waste. The resulting composition of MSW disposed at SWDS is presented in Table 8.8.

Table 8.8. Composition of MSW disposed at SWDS

	Paper, paper pulp and products	Textiles and fabrics	Plastic	Glass	Metal	Wood	Food waste	Non-food /garden	Inert materials	Other
1990	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1991	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1992	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1993	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1994	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1995	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1996	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.5%	6.1%	1.4%	2.7%
1997	26.8%	6.2%	11.4%	2.2%	3.4%	2.2%	37.6%	6.1%	1.4%	2.6%
1998	26.6%	6.2%	11.3%	2.3%	3.4%	2.2%	37.6%	6.1%	1.4%	2.7%
1999	26.6%	6.2%	11.3%	2.4%	3.4%	2.2%	37.6%	6.1%	1.4%	2.6%
2000	26.5%	6.2%	11.3%	2.5%	3.5%	2.2%	37.6%	6.1%	1.4%	2.6%
2001	26.6%	6.2%	11.2%	2.4%	3.5%	2.2%	37.6%	6.1%	1.4%	2.6%
2002	26.6%	6.2%	11.2%	2.4%	3.5%	2.3%	37.6%	6.1%	1.5%	2.6%
2003	26.4%	6.2%	12.0%	2.4%	3.5%	2.2%	37.0%	6.0%	1.5%	2.6%
2004	26.2%	6.2%	12.8%	2.4%	3.6%	2.3%	36.5%	5.9%	1.6%	2.5%
2005	26.1%	6.0%	13.4%	2.4%	3.6%	1.9%	36.6%	6.0%	1.3%	2.8%
2006	25.1%	6.2%	14.2%	2.6%	3.4%	1.9%	36.4%	5.9%	1.4%	2.8%
2007	22.7%	6.9%	14.3%	2.8%	3.4%	1.9%	37.2%	6.0%	1.6%	3.2%
2008	21.7%	6.5%	15.7%	2.5%	3.3%	1.9%	37.7%	6.1%	1.4%	3.2%
2009	21.1%	6.5%	15.8%	2.5%	2.9%	2.0%	38.5%	6.3%	1.4%	2.9%
2010	22.5%	6.8%	16.7%	2.5%	2.3%	2.3%	37.1%	6.0%	1.5%	2.3%
2011	22.7%	7.5%	16.6%	1.9%	2.0%	2.5%	36.0%	5.9%	1.6%	3.2%
2012	22.7%	7.5%	16.6%	1.9%	2.0%	2.5%	36.0%	5.9%	1.6%	3.2%

Degradable organic carbon (DOC)

Degradable organic carbon is the organic carbon that is accessible to biochemical decomposition, and should be expressed as Gg C per Gg waste. It is based on the composition of waste and can be calculated from a weighted average of the carbon content of various components of the waste stream. The following equation, as presented in the IPCC Guidelines, estimates DOC using default carbon content values (equation 5.4, GPG pg. 5.9):

$$\text{DOC} = (0.4 * A) + (0.17 * B) + (0.15 * C) + (0.3 * D)$$

where A is the fraction of MSW that is paper and textiles, B is the fraction of MSW that is garden waste, park waste or other non-food organic putrescibles, C is the fraction of MSW that is food waste and D is the fraction of MSW that is wood or straw.

The carbon content values for these fractions used are the default proposed by the revised IPCC 1996 Guidelines (Table 6-3, Reference Manual). The resulting degrading organic carbon is presented in Table 8.7.

Fraction of degradable organic carbon dissimilated (DOC_F)

DOC_F is an estimate of the fraction of carbon that is ultimately degraded and released from SWDS, and reflects the fact that some organic carbon does not degrade, or degrades very slowly, when deposited in SWDS. The IPCC Guidelines provide a default value of 0.77 for DOC_F.

Estimation of CH₄ from waste disposal on land

Landfill gas consists mainly of CH₄ and carbon dioxide (CO₂). The CH₄ fraction F value used is according to the default proposed by the IPCC guidelines, i.e. 0.5. The oxidation factor (OX) reflects the amount of CH₄ from SWDS that is oxidised in the soil or other material covering the waste. The oxidation factor used is according to the defaults proposed by the IPCC guidelines; i.e. 0. This means that no CH₄ is oxidised. No methane is recovered from SWDS in Cyprus therefore recovery (R) is assumed 0.

The value for the methane conversion factor for managed disposal sites is assumed to be 1, and is according to the default IPCC1996 guidelines (pg 6.8 workbook). The amount of waste disposed at managed disposal sites is presented in Table 8.7.

No data is available on the depth of the unmanaged disposal sites. According to the consultations with the Ministry of Interior, all unmanaged disposal sites should be assumed to have depth smaller than 5m, and therefore be assumed shallow. The value for the methane conversion factor for shallow unmanaged disposal sites is assumed to be 0.4, and is according to the default IPCC1996 guidelines (pg 6.8 workbook). The amount of waste disposed at unmanaged disposal sites is presented in Table 8.9.

Table 8.9. DOC, waste disposed at managed and unmanaged disposal sites

	DOC	% of waste to managed disposal sites	% of waste to shallow unmanaged disposal sites
1990	20.5%	66.5%	33.5%
1991	20.5%	67.1%	32.9%
1992	20.5%	67.7%	32.3%
1993	20.5%	67.8%	32.2%
1994	20.5%	67.9%	32.1%
1995	20.5%	68.1%	31.9%
1996	20.5%	68.2%	31.8%
1997	20.6%	68.4%	31.6%
1998	20.5%	68.5%	31.5%
1999	20.5%	68.7%	31.3%
2000	20.5%	68.8%	31.2%
2001	20.5%	69.0%	31.0%
2002	20.5%	69.1%	30.9%
2003	20.3%	68.7%	31.3%
2004	20.1%	68.5%	31.5%
2005	19.9%	68.3%	31.7%
2006	19.6%	71.2%	28.8%
2007	19.0%	71.0%	29.0%
2008	18.5%	70.9%	29.1%
2009	18.5%	70.8%	29.2%
2010	19.0%	83.1%	16.9%
2011	19.2%	83.0%	17.0%
2012	19.2%	100.0%	0.0%

8.2.2. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

8.2.3. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

8.2.4. Source-specific recalculations

The emissions from this source have been recalculated due to the following changes: (a) change in the method used to estimate total waste generation for the years that data is not available, (b) change in the assumptions used to estimate waste composition for the years that data is not available which resulted in changes to the % DOC of the waste and (c) change of the DOC assimilated coefficient to be in line with the IPCC guidelines. The overall impact to the emissions of the source is presented in Table 8.10.

Table 8.10. Change in emissions from solid waste disposal on land caused by recalculations

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	433	454	475	496	515	533	550	563	575	586	601
NIR2014	542	569	598	623	648	693	698	715	727	741	758
% difference	25.2%	25.5%	26.0%	25.7%	25.9%	29.9%	26.8%	27.0%	26.4%	26.4%	26.2%

Gg CO ₂ eq.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	578	588	599	615	622	620	615	622	630	590	542
NIR2014	794	811	829	847	852	872	866	874	888	902	856
% difference	37.5%	37.9%	38.4%	37.6%	37.0%	40.7%	40.8%	40.6%	40.9%	52.8%	58.0%

(a) Waste generation

The method used to estimate total waste generation for the years that data is not available has been revised compared to the previous submission. The change in the total waste generation data used for the estimation of emissions and other relevant changes are presented in Table 8.11.

Table 8.11. Changes in solid waste generation data

	1990	1991	1992	1993	1994	1995	1996	1997
Annual per capita production (kg/cap)								
NIR2013	528	539	549	560	571	582	592	603
NIR2014	536	546	556	567	577	587	605	612
Total MSW production (1000t)								
NIR2013	310	325	340	355	368	382	395	407
NIR2014	315	329	345	359	372	385	400	411
MSW to disposal sites								
NIR2013	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98
NIR2014	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
MSW to disposal sites (1000t)								
NIR2013	306	320	335	349	363	376	389	398
NIR2014	306	320	335	349	362	387	389	398

	1998	1999	2000	2001	2002	2003	2004	2005
Annual per capita production (kg/cap)								
NIR2013	614	621	631	652	657	673	684	684
NIR2014	616	620	629	650	655	671	685	688
Total MSW production (1000t)								
NIR2013	419	426	438	457	466	483	500	505
NIR2014	418	426	436	456	465	481	498	508
MSW to disposal sites								
NIR2013	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.97
NIR2014	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96
MSW to disposal sites (1000t)								
NIR2013	406	413	423	442	450	467	482	489
NIR2014	406	413	423	442	450	467	482	489

	2006	2007	2008	2009	2010	2011		
Annual per capita production (kg/cap)								
NIR2013	694	704	729	730	691	660		
NIR2014	694	704	729	730	697	683		
Total MSW production (1000t)								
NIR2013	521	540	573	589	572	560		
NIR2014	521	540	573	589	577	580		
MSW to disposal sites								
NIR2013	0.96	0.95	0.93	0.92	0.86	0.80		
NIR2014	0.96	0.95	0.93	0.92	0.85	0.79		
MSW to disposal sites (1000t)								
NIR2013	499	512	531	540	490	449		
NIR2014	499	512	531	540	490	460		

(b) Waste composition and % DOC

The waste composition data of waste going to disposal sites and the resulting %DOC have also been revised. In the previous submission breakdown of organic matter was not available, therefore an average DOC of food and non-food/garden waste used. For this submission the necessary data has been obtained and it was possible to use the default IPCC DOC value for each category. Moreover, the waste composition data for 2011 was not available at the time of the preparation of the inventory and it was therefore assumed the same as 2010. This has been revised, since data is now available for 2011. The changes in the waste composition data are presented in Table 8.12 and the resulting change in the DOC in Table 8.13.

Table 8.12. Changes in waste composition data

	1990-1996	1997	1998	1999	2000	2001
NIR2013						
paper, paper pulp and products	28.50%	28.50%	28.50%	28.50%	28.50%	26.65%
textiles & fabrics	6.70%	6.70%	6.70%	6.70%	6.70%	6.25%
plastic	12.10%	12.10%	12.10%	12.10%	12.10%	11.27%
glass	1.20%	1.20%	1.20%	1.20%	1.20%	2.45%
metal	2.30%	2.30%	2.30%	2.30%	2.30%	3.22%
wood						2.26%
organic matter	41.60%	41.60%	41.60%	41.60%	41.60%	43.87%
other	7.60%	7.60%	7.60%	7.60%	7.60%	2.57%
NIR2014						
paper, paper pulp and products	26.8%	26.8%	26.6%	26.6%	26.5%	26.6%
textiles & fabrics	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%
plastic	11.4%	11.4%	11.3%	11.3%	11.3%	11.2%
glass	2.2%	2.2%	2.3%	2.4%	2.5%	2.4%
metal	3.4%	3.4%	3.4%	3.4%	3.5%	3.5%
wood	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
food waste	37.5%	37.6%	37.6%	37.6%	37.6%	37.6%
non-food /garden	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
inert materials	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
other	2.7%	2.6%	2.7%	2.6%	2.6%	2.6%

	2002	2003	2004	2005	2006	2007
NIR2013						
paper, paper pulp and products	26.64%	26.44%	26.29%	26.61%	25.13%	22.69%
textiles & fabrics	6.24%	6.25%	6.21%	5.95%	6.17%	6.85%
plastic	11.25%	13.10%	13.11%	13.83%	14.23%	14.34%
glass	2.45%	2.45%	2.44%	2.35%	2.58%	2.78%
metal	3.21%	3.22%	3.14%	3.54%	3.42%	3.42%
wood	2.26%	2.26%	2.26%	1.91%	1.95%	1.91%
organic matter	43.83%	42.15%	42.46%	42.29%	42.35%	43.21%
other	2.56%	2.57%	2.52%	2.22%	2.82%	3.21%
NIR2014						
paper, paper pulp and products	26.6%	26.4%	26.2%	26.1%	25.1%	22.7%
textiles & fabrics	6.2%	6.2%	6.2%	6.0%	6.2%	6.9%
plastic	11.2%	12.0%	12.8%	13.4%	14.2%	14.3%
glass	2.4%	2.4%	2.4%	2.4%	2.6%	2.8%
metal	3.5%	3.5%	3.6%	3.6%	3.4%	3.4%
wood	2.3%	2.2%	2.3%	1.9%	1.9%	1.9%
food waste	37.6%	37.0%	36.5%	36.6%	36.4%	37.2%
non-food /garden	6.1%	6.0%	5.9%	6.0%	5.9%	6.0%
inert materials	1.5%	1.5%	1.6%	1.3%	1.4%	1.6%
other	2.6%	2.6%	2.5%	2.8%	2.8%	3.2%

	2008	2009	2010	2011		
NIR2013						
paper, paper pulp and products	21.66%	21.08%	22.77%	22.77%		
textiles & fabrics	6.48%	6.55%	7.35%	7.35%		
plastic	15.73%	15.84%	17.56%	17.56%		
glass	2.50%	2.53%	2.45%	2.45%		
metal	3.30%	2.90%	1.77%	1.77%		
wood	1.87%	2.03%	2.27%	2.27%		
organic matter	43.82%	44.75%	42.02%	42.02%		
other	3.24%	2.94%	2.33%	2.33%		
NIR2014						
paper, paper pulp and products	21.7%	21.1%	22.5%	22.7%		
textiles & fabrics	6.5%	6.5%	6.8%	7.5%		
plastic	15.7%	15.8%	16.7%	16.6%		
glass	2.5%	2.5%	2.5%	1.9%		
metal	3.3%	2.9%	2.3%	2.0%		
wood	1.9%	2.0%	2.3%	2.5%		
food waste	37.7%	38.5%	37.1%	36.0%		
non-food /garden	6.1%	6.3%	6.0%	5.9%		
inert materials	1.4%	1.4%	1.5%	1.6%		
other	3.2%	2.9%	2.3%	3.2%		

Table 8.13. Changes in DOC values

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%
NIR2014	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.6%	20.5%	20.5%	20.5%

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	20.9%	20.8%	20.5%	20.5%	20.4%	19.9%	19.3%	18.8%	18.8%	19.5%	19.5%
NIR2014	20.5%	20.5%	20.3%	20.1%	19.9%	19.6%	19.0%	18.5%	18.5%	19.0%	19.2%

(c) DOC assimilated coefficient

The value of the DOC assimilated coefficient was changed from 0.55 to the default value proposed by the IPCC guidelines of 0.77.

8.2.5. Source-specific planned improvement

The information for the unmanaged waste disposal sites is not yet sufficient to distribute correctly the waste to deep and shallow. Further work is needed to collect the necessary information.

8.3. Wastewater handling (6B)

Handling of domestic and industrial wastewater under anaerobic conditions produces CH₄. The issues concerning emissions from wastewater handling systems are considered separately because the types of activity data and emission factors needed for each are different. The emissions from these sources are presented in Table 8.14 and Figure 8.3.

Table 8.14. Total emissions from wastewater handling 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CH ₄ (Gg)	5.10	5.59	5.54	4.91	2.79	2.39	1.92
N ₂ O (Gg)	0.053	0.062	0.067	0.067	0.075	0.077	0.077
Total (Gg CO ₂ eq.)	123.6	136.7	137.2	123.7	81.8	74.0	64.3

Gg CO₂ eq.

Industrial wastewater	1.25	1.31	1.29	2.53	3.01	3.03	3.03
Domestic and commercial	106.1	116.5	115.5	100.9	55.8	47.4	37.7
Human sewage	16.20	18.86	20.44	20.32	22.94	23.54	23.65

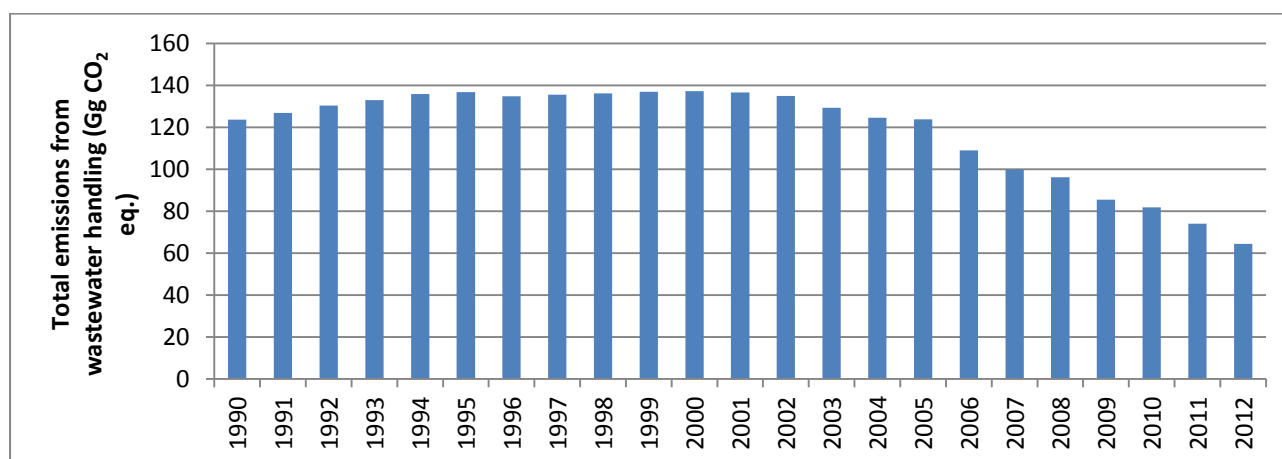


Figure 8.3. Total emissions from wastewater handling 1990-2012

8.3.1. Industrial wastewater (6B1)

The principal factor that determines methane generation potential of wastewater is the amount of organic material in the wastewater stream. For industrial wastewater, this is indicated by the Chemical Oxygen Demand (COD). COD indicates the total amount of carbon, biodegradable and non-biodegradable, that is available for oxidation. According to IPCC guidelines, industrial production should be grouped according to their methane production potential. The main groups are paper and pulp manufacture, slaughterhouses, alcohol, beer, starch, organic chemicals and others (vegetable oil production, textiles, rubber, petroleum refineries, fruits and vegetables). The industrial activities taking place in Cyprus are predominately food and drink industries.

Even though the actual industrial production has decreased considerably during 1990-2012, emissions from industrial wastewater increased by 143% during the same period (Table 8.15). This increase has been caused by the increase in the amount of waste treated by anaerobic digestion and therefore the methane produced. This is also the reason that there is a stepwise change in the emissions (Figure 8.4). Emission estimates from this source have been revised due to availability of new data for 2011 and the identification of a mistake in the methodology for the estimation of CH₄ emissions.

Table 8.15. Total emissions from industrial wastewater 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CH ₄ (t)	44.0	44.0	44.0	106.3	129.8	129.8	129.8
N ₂ O (t)	1.04	1.24	1.17	0.96	0.93	0.99	0.99
Total (Gg CO ₂ eq.)	1.25	1.31	1.29	2.53	3.01	3.03	3.03

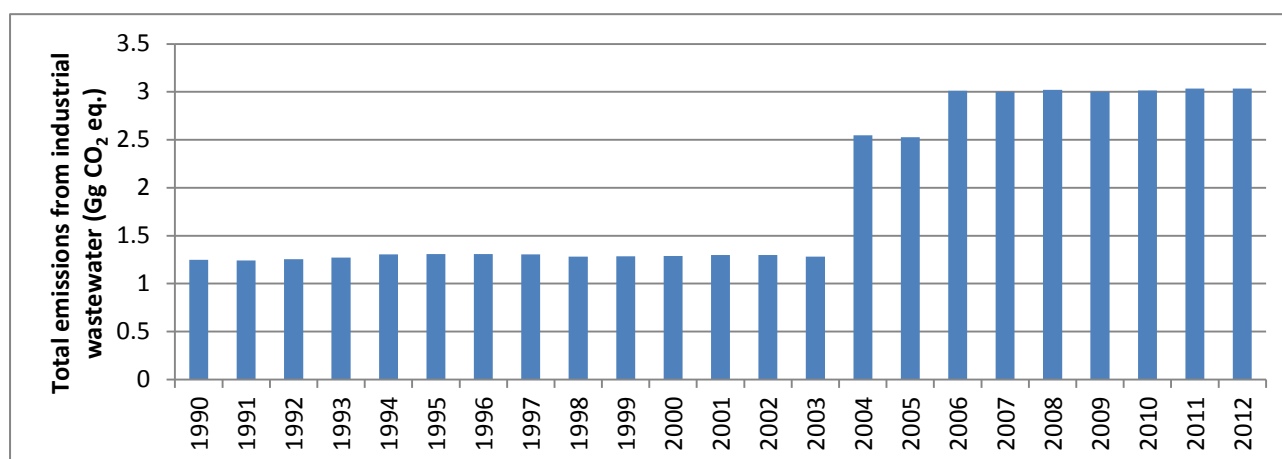


Figure 8.4. Total emissions from industrial wastewater 1990-2012

8.3.1.1. Methodological issues

Methane emissions

According to the IPCC guidelines, to estimate total emissions from wastewater, the selected emissions factors are multiplied by the associated organic wastewater production and summed. The amount of CH₄ recovered and thus not emitted into the atmosphere for each handling method should be subtracted: no methane recovery take place in Cyprus therefore recovery is assumed 0. The sum of the emissions for each handling method provides the total CH₄ emissions from industrial wastewater. In equation form, the estimate of total CH₄ emissions from wastewater handling is as follows (equation 12, revised IPCC1996 guidelines reference manual pg. 6.22)

$$WM = \sum_i (TOW_i \times EFi - MRI)$$

where WM is the total methane emissions from wastewater in kg CH₄, TOW_i is the total organic waste for wastewater type i in kg COD/yr, EFi is the emission factor for wastewater type i in kg CH₄/kg DC and MRI is the total amount of methane recovered or flared from wastewater type i (for Cyprus is zero) in kg CH₄.

To estimate total organic wastewater (TOW_{ind}) for a particular industry the following equation should be used (equation 8, revised IPCC1996 guidelines reference manual pg. 6.19):

$$TOW_{ind} \text{ (kg COD/yr)} = W \times O \times D_{ind} \times (1 - DS_{ind})$$

where TOW_{ind} is the total industrial organic wastewater in kg COD/yr, W is the wastewater consumed in m³/tonne of product, O is the total output by selected industry in tonnes/yr, D_{ind} is the industrial degradable organic component in kg COD/m³ wastewater and DS_{ind} is the fraction of industrial degradable organic component removed as sludge.

According to the IPCC guidelines (revised IPCC1996 guidelines workbook pg. 6.21) the fraction of degradable organic component removed in sludge is zero. Therefore the sludge is not considered any further.

To estimate the emission factor for industrial wastewater, the following equation is proposed by the IPCC guidelines (Equation 10, revised IPCC1996 guidelines reference manual pg. 6.21):

$$EF_i = B_{oi} \times \sum (WS_{ix} \times MCF_x)$$

where EF_i is the emission factor (kg CH₄ /kg DC) for wastewater type (e.g. industry, domestic, etc.), B_{oi} is the maximum methane producing capacity (kg CH₄/kg DC) for wastewater type i , WS_{ix} is the fraction of wastewater type i treated using wastewater handling system x and MCF_x is the methane conversion factors of each wastewater system x . since no country specific data is available, MCF is considered 0 for aerobic systems, and 1.0 for anaerobic (revised IPCC1996 guidelines reference manual pg. 6.21).

In words, the methodology applied for the estimation of methane emissions from industrial wastewater is the following:

- Collection of data for industrial production (Table 8.16).
- Wastewater production was estimated by multiplying the industrial production by the wastewater generation coefficients in Table 8.17 (good practice guide, p.5.22).
- Total organic wastewater in kg COD/year per industrial product was then estimated by multiplying the wastewater production by the COD coefficient of each industrial product in Table 8.17 (good practice guide, p.5.22). Degradable carbon (DC) in G_g is the sum of the COD of each industrial product divided by 1000000 (Table 8.18).
- The wastewater generated was categorised to anaerobic and aerobic treatment according to the assumptions of Table 8.19. The assumptions were prepared in collaboration with the head of pollution prevention unit of the department of environment, Dr Chrystalla Stylianou.
- Methane conversion factor was assumed 0 for aerobic treatment and 1 for anaerobic treatment, according to the revised IPCC 1996 guidelines (pg. 6.21, reference manual). Maximum producing capacity was assumed 0.25 kg CH₄ / kg according to the revised IPCC 1996 guidelines (pg. 6.14, workbook). The resulting methane emission factor estimated according to waste stream is presented in Table 8.20.
- The MCF for each waste streams was multiplied by the annual organic wastewater generation (kg COD/ year) of the respective waste stream to estimate the annual emissions of methane per waste stream. The total CH₄ emissions is the sum of the CH₄ emitted per waste stream.

Data for industrial production

Detailed statistics on industrial production in Cyprus do not exist. Therefore data on industrial consumption is used instead. Another issue associated with the national statistics on industrial activity, is that the sales of industrial products for the year $x-2$ (which in this case is 2012) are completed and published in the summer after the inventory has to be submitted (which in this case is summer 2014). Therefore, the 2012 "production" is assumed to be equal to the 2011 "production". The industrial production data used is presented in Table 8.16.

Table 8.16. Industrial production 1990-2012

Gg product	1990	1991	1992	1993	1994	1995	1996	1997	1998
Alcohol	1.0	1.0	1.0	1.0	1.0	1.1	0.9	1.0	1.0
Beer	33.1	34.8	36.6	36.1	35.6	35.2	33.1	33.3	36.5
Soft drinks	46.6	50.5	54.7	55.4	56.2	56.9	57.5	58.3	59.3
Dairy products	60.7	64.6	68.8	71.2	73.9	76.7	81.1	81.4	86.3
Meat & poultry	64.4	63.1	67.7	76.0	80.9	81.0	88.0	97.0	93.7
Refinery	635.3	763.2	727.1	781.2	896.8	827.9	760.0	1042.7	1082.6
Soaps & detergents	12.1	12.9	13.8	10.9	9.8	9.5	9.0	7.1	7.2
Vegetable oils	21.7	24.9	28.6	27.5	26.5	25.7	28.1	26.3	22.7
Vegetables, fruits & juices	47.9	34.9	34.0	38.0	52.1	56.3	53.0	52.5	48.0

Wine	49.4	52.8	56.5	56.3	56.0	55.8	54.3	42.0	30.9
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Gg product	1999	2000	2001	2002	2003	2004	2005	2006	2007
Alcohol	2.1	2.6	3.9	3.8	2.5	1.9	1.3	1.2	1.0
Beer	40.5	40.9	40.4	38.3	36.7	37.1	37.7	37.4	39.8
Soft drinks	60.0	60.9	62.7	62.3	62.1	60.5	66.6	58.3	62.5
Dairy products	84.1	83.3	89.5	92.4	93.2	93.9	96.3	99.5	97.8
Meat & poultry	69.5	80.5	87.8	90.0	92.4	93.4	95.5	94.0	94.5
Refinery	1140.4	1134.8	1115.1	1045.5	931.9	269.2	0.0	0.0	0.0
Soaps & detergents	7.2	7.0	7.8	8.1	6.2	7.4	6.1	6.2	6.3
Vegetable oils	23.2	21.8	20.1	21.3	19.4	19.6	19.3	19.1	18.1
Vegetables, fruits & juices	49.0	49.9	51.6	48.7	44.2	42.1	37.6	34.4	35.4
Wine	43.2	37.4	34.5	37.5	35.5	31.7	29.8	26.5	20.2

Gg product	2008	2009	2010	2011	2012				
Alcohol	0.9	0.7	0.7	0.6	0.6				
Beer	42.7	35.7	34.3	32.2	32.2				
Soft drinks	62.9	59.4	57.9	54.6	54.6				
Dairy products	112.1	104.1	106.0	109.3	109.3				
Meat & poultry	102.1	99.1	105.6	103.6	103.6				
Refinery	0.0	0.0	0.0	0.0	0.0				
Soaps & detergents	6.8	6.9	7.1	6.7	6.7				
Vegetable oils	18.2	16.3	16.9	16.4	16.4				
Vegetables, fruits & juices	40.6	40.4	45.5	56.5	56.5				
Wine	15.9	12.4	11.1	14.2	14.2				

Wastewater production

Wastewater production was estimated by multiplying the industrial production by the wastewater generation coefficients in Table 8.17 (good practice guide, p.5.22).

Table 8.17. Wastewater generation coefficient (m³ /t product) and COD concentration (kg COD/m³) according to industrial product

	Wastewater (m ³ /t)	COD (kg/m ³)
Alcohol	24	11
Beer	6	3
Soft drinks	2	2
Dairy products	7	3
Meat& poultry	13	4
Refinery	0.6	1.0
Soaps& detergents	3.0	0.9
Vegetable oils	3.1	0.9
Vegetables, fruits & juices	20.0	5.0
Wine	23.0	1.5

Total organic wastewater

Total organic wastewater in kg COD/year per industrial product was then estimated by multiplying the wastewater production by the COD coefficient of each industrial product in Table 8.17 (good practice guide, p.5.22). Degradable carbon (DC) in Gg is the sum of the COD of each industrial product divided by 10⁶ (Table 8.18).

Table 8.18. Degradable carbon (Gg), 1990-20112

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Gg DC	12.61	11.55	11.95	12.85	14.63	15.07	15.03	15.22	14.39	13.97	14.57	15.49

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Gg DC	15.38	14.53	13.71	13.07	12.53	12.42	13.50	12.86	13.68	14.75	14.75	

Categorisation of wastewater treatment to aerobic and anaerobic

The wastewater generated was categorised to anaerobic and aerobic treatment according to the assumptions of Table 8.19. The assumptions were prepared in collaboration with the head of pollution prevention unit of the department of environment, Dr Chrystalla Stylianou.

Table 8.19. Treatment of waste by anaerobic treatment according to industrial production, 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998
alcohol	2.0%	2.1%	2.1%	2.0%	1.9%	1.9%	2.2%	2.1%	2.0%
beer	20%	19%	18%	18%	19%	19%	20%	20%	18%
soft drinks	1.00%	0.92%	0.85%	0.84%	0.83%	0.82%	0.81%	0.80%	0.79%
dairy products	0	0	0	0	0	0	0	0	0
meat & poultry	0	0	0	0	0	0	0	0	0
refinery	0	0	0	0	0	0	0	0	0
soaps & detergents	0	0	0	0	0	0	0	0	0
vegetable oils	0	0	0	0	0	0	0	0	0
veg., fruits & juices	1.0%	1.4%	1.4%	1.3%	0.9%	0.9%	0.9%	0.9%	1.0%
wine	0	0	0	0	0	0	0	0	0

	1999	2000	2001	2002	2003	2004	2005	2006	2007
alcohol	1.0%	0.8%	0.5%	0.5%	0.8%	1.1%	1.5%	1.8%	2.1%
beer	16%	16%	16%	17%	18%	18%	18%	18%	17%
soft drinks	0.78%	0.76%	0.74%	0.75%	0.75%	0.77%	0.70%	0.80%	0.75%
dairy products	0	0	0	0	0	0	0	5.00%	5.09%
meat & poultry	0	0	0	0	0	5.00%	4.89%	4.97%	4.95%
refinery	0	0	0	0	0	0	0	0	0
soaps & detergents	0	0	0	0	0	0	0	0	0
vegetable oils	0	0	0	0	0	0	0	0.5%	0.5%
veg., fruits & juices	1.0%	1.0%	0.9%	1.0%	1.1%	1.1%	1.3%	1.4%	1.4%
wine	0	0	0	0	0	0	0	0	0

	2008	2009	2010	2011	2012				
alcohol	2.3%	2.8%	2.8%	2.8%	2.8%				
beer	15%	19%	19%	19%	19%				
soft drinks	0.74%	0.78%	0.78%	0.78%	0.78%				
dairy products	4.44%	4.78%	4.78%	4.78%	4.78%				
meat & poultry	4.57%	4.71%	4.71%	4.71%	4.71%				
refinery	0	0	0	0	0				
soaps & detergents	0	0	0	0	0				
vegetable oils	0.5%	0.6%	0.6%	0.6%	0.6%				
veg., fruits & juices	1.2%	1.2%	1.2%	1.2%	1.2%				
wine	0	0	0	0	0				

Methane emission factor

Methane conversion factor was assumed 0 for aerobic treatment and 1 for anaerobic treatment, according to the revised IPCC 1996 guidelines (pg. 6.21, reference manual). Maximum producing capacity was assumed 0.25 kg CH₄ / kg

according to the revised IPCC 1996 guidelines (pg. 6.14, workbook). The resulting methane emission factor estimated according to waste stream is presented in Table 8.20.

The aggregate MCF for all waste streams was multiplied by the total annual organic wastewater generation (kg COD/year) to estimate the annual emissions of methane.

Table 8.20. Methane emission factor estimated according to waste stream (kg CH₄/kg COD), 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
alcohol	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.002
beer	0.050	0.048	0.045	0.046	0.046	0.047	0.050	0.050	0.045	0.041
soft drinks	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
dairy products	0	0	0	0	0	0	0	0	0	0
meat & poultry	0	0	0	0	0	0	0	0	0	0
refinery	0	0	0	0	0	0	0	0	0	0
soaps & detergents	0	0	0	0	0	0	0	0	0	0
vegetable oils	0	0	0	0	0	0	0	0	0	0
veg., fruits & juices	0.002	0.003	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.002
wine	0	0	0	0	0	0	0	0	0	0

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
alcohol	0.002	0.001	0.001	0.002	0.003	0.004	0.004	0.005	0.006	0.007
beer	0.040	0.041	0.043	0.045	0.045	0.044	0.044	0.042	0.039	0.046
soft drinks	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
dairy products	0	0	0	0			0.012	0.013	0.011	0.012
meat & poultry	0	0	0	0	0.012	0.012	0.012	0.012	0.011	0.012
refinery	0	0	0	0	0	0	0	0	0	0
soaps & detergents	0	0	0	0	0	0	0	0	0	0
vegetable oils	0	0	0	0	0.00	0.00	0.001	0.001	0.001	0.001
veg., fruits & juices	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003
wine	0	0	0	0	0	0	0	0	0	0

	2010	2011	2012							
alcohol	0.007	0.007	0.007							
beer	0.048	0.048	0.048							
soft drinks	0.002	0.002	0.002							
dairy products	0.012	0.012	0.012							
meat & poultry	0.011	0.011	0.011							
refinery	0	0	0							
soaps & detergents	0	0	0							
vegetable oils	0.001	0.001	0.001							
veg., fruits & juices	0.003	0.003	0.003							
wine	0	0	0							

Estimation of N₂O emissions

The nitrous oxide emissions were estimated by multiplying the total annual industrial wastewater production (Table 8.21) by the default emission factor of 0.25 g N₂O/m³ wastewater according to CORINAIR.

Table 8.21. Total industrial wastewater production (1000 m3/year), 1990-2012

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Alcohol	24	24	23	24	25	26	22	23	24	50
Beer	208	219	231	227	225	222	208	210	230	255
Soft drinks	93	101	109	111	112	114	115	117	119	120
Dairy products	425	452	481	499	517	537	568	570	604	589
Meat & poultry	837	820	880	987	1052	1052	1145	1261	1218	903
Refinery	381	458	436	469	538	497	456	626	650	684
Soaps & detergents	36	39	41	33	29	29	27	21	22	22
Vegetable oils	67	77	89	85	82	80	87	82	70	72
Veg., fruits & juices	959	698	680	759	1041	1127	1060	1050	961	980
Wine	1136	1215	1300	1295	1289	1283	1250	965	711	993

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Alcohol	61	94	92	59	46	32	28	24	21	17
Beer	257	255	242	231	234	238	236	251	269	225
Soft drinks	122	125	125	124	121	133	117	125	126	119
Dairy products	583	626	647	652	657	674	696	684	785	729
Meat & poultry	1047	1142	1170	1202	1214	1242	1222	1228	1327	1289
Refinery	681	669	627	559	161	0	0	0	0	0
Soaps & detergents	21	23	24	19	22	18	19	19	21	21
Vegetable oils	68	62	66	60	61	60	59	56	56	50
Veg., fruits & juices	999	1031	974	884	842	751	687	708	812	808
Wine	860	793	863	817	730	685	609	465	366	285

	2010	2011	2012							
Alcohol	18	14	14							
Beer	216	203	203							
Soft drinks	116	109	109							
Dairy products	742	765	765							
Meat & poultry	1373	1347	1347							
Refinery	0	0	0							
Soaps & detergents	21	20	20							
Vegetable oils	52	51	51							
Veg., fruits & juices	911	1129	1129							
Wine	254	327	327							

8.3.1.2. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

8.3.1.3. Sector-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

8.3.1.4. Sector-specific recalculations

Emission estimates from this source have been revised due to (a) availability of new data on industrial production for 2011 and (b) correction of the methodology for the estimation of CH₄ emissions to be in line with the IPCC guidelines. The impact of these changes to the emissions from industrial wastewater is presented in Table 8.22.

Table 8.22. Change in emissions between NIR2013 and NIR2014

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NIR2013									
CH ₄ (t)	756	675	671	721	815	842	899	901	788
N ₂ O (t)	1.04	1.03	1.07	1.12	1.23	1.24	1.23	1.23	1.15
Total (Gg CO ₂ eq.)	16.2	14.5	14.4	15.5	17.5	18.1	19.3	19.3	16.9
NIR2014									
CH ₄ (t)	44.02	44.02	44.02	44.02	44.02	44.02	44.02	44.02	44.02
N ₂ O (t)	1.04	1.03	1.07	1.12	1.23	1.24	1.23	1.23	1.15
Total (Gg CO ₂ eq.)	1.25	1.24	1.26	1.27	1.30	1.31	1.31	1.31	1.28
% difference of total	-92.3%	-91.4%	-91.3%	-91.8%	-92.5%	-92.8%	-93.2%	-93.2%	-92.4%

	1999	2000	2001	2002	2003	2004	2005	2006	2007
NIR2013									
CH ₄ (t)	666	682	719	750	752	885	847	1006	973
N ₂ O (t)	1.17	1.17	1.21	1.21	1.15	1.02	0.96	0.92	0.89
Total (Gg CO ₂ eq.)	14.4	14.7	15.5	16.1	16.1	18.9	18.1	21.4	20.7
NIR2014									
CH ₄ (t)	44.02	44.02	44.02	44.02	44.02	106.26	106.26	129.82	129.82
N ₂ O (t)	1.17	1.17	1.21	1.21	1.15	1.02	0.96	0.92	0.89
Total (Gg CO ₂ eq.)	1.29	1.29	1.30	1.30	1.28	2.55	2.53	3.01	3.00
% difference of total	-91.0%	-91.2%	-91.6%	-91.9%	-92.1%	-86.5%	-86.0%	-85.9%	-85.5%

	2008	2009	2010	2011					
NIR2013									
CH ₄ (t)	987	1075	1150	1150					
N ₂ O (t)	0.95	0.89	0.93	0.93					
Total (Gg CO ₂ eq.)	21.0	22.8	24.4	24.4					
NIR2014									
CH ₄ (t)	129.82	129.82	129.82	129.82					
N ₂ O (t)	0.95	0.89	0.93	0.99					
Total (Gg CO ₂ eq.)	3.02	3.00	3.01	3.03					
% difference of total	-85.6%	-86.9%	-87.7%	-87.6%					

(a) Availability of new data on industrial production for 2011

Detailed statistics on industrial production in Cyprus do not exist. Therefore data on industrial consumption is used instead. Another issue associated with the national statistics on industrial activity, is that the sales of industrial products for the year x-2 (which in this case is 2012) are completed and published in the summer after the inventory has to be submitted (which in this case is summer 2014). Therefore, the 2012 "production" is assumed to be equal to the 2011 "production". This assumption was applied for the preparation of the NIR 2013. Since "industrial production" data is now available for 2011, the emissions are re-estimated using the data. The difference in activity data is presented in Table 8.23.

Table 8.23. Change in activity data for 2011 between NIR2013 and NIR2014

	NIR2013 (2011)	NIR2014 (2011)
alcohol (tn)	732	590
beer (tn)	34283	32225
soft drinks (tn)	57933	54614
dairy products (tn)	105959	109294
meat & poultry	105582	103619
refinery	0	0
soaps & detergents	7143	6690
vegetable oils (tn)	16856	16414
vegetables, fruits & juices (tn)	45529	56468
wine (tn)	11064	14218

(b) Correction of the methodology for the estimation of CH₄ emissions

The following mistake in the application of the IPCC methodology for the estimation of CH₄ emissions was identified: the total organic content of the wastewater was multiplied by the sum of MCF of all the waste streams. This mistake was corrected. The change in CH₄ emissions between the current and the previous submission is presented in Table 8.24.

Table 8.24. Change in CH₄ emissions between NIR2013 and NIR2014

CH ₄ (t)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	756	675	671	721	815	842	899	901	788	666	682
NIR2014	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
% difference of total	94.2%	93.5%	93.4%	93.9%	94.6%	94.8%	95.1%	95.1%	94.4%	93.4%	93.5%

CH ₄ (t)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	719	750	752	885	847	1006	973	987	1075	1150	1150
NIR2014	44.0	44.0	44.0	44.0	106.3	106.3	129.8	129.8	129.8	129.8	129.8
% difference of total	93.9%	94.1%	94.1%	95.0%	87.4%	89.4%	86.7%	86.8%	87.9%	88.7%	88.7%

8.3.1.5. Sector-specific planned improvement

Improvement of activity data for wastewater production and management – the inventory team is in communication with the statistical service and other involved authorities to improve the industrial production and management data for the whole time series. The necessary resources and methods are investigated by the statistical service to collect the necessary data and information. It is expected that this will be completed by January 2015.

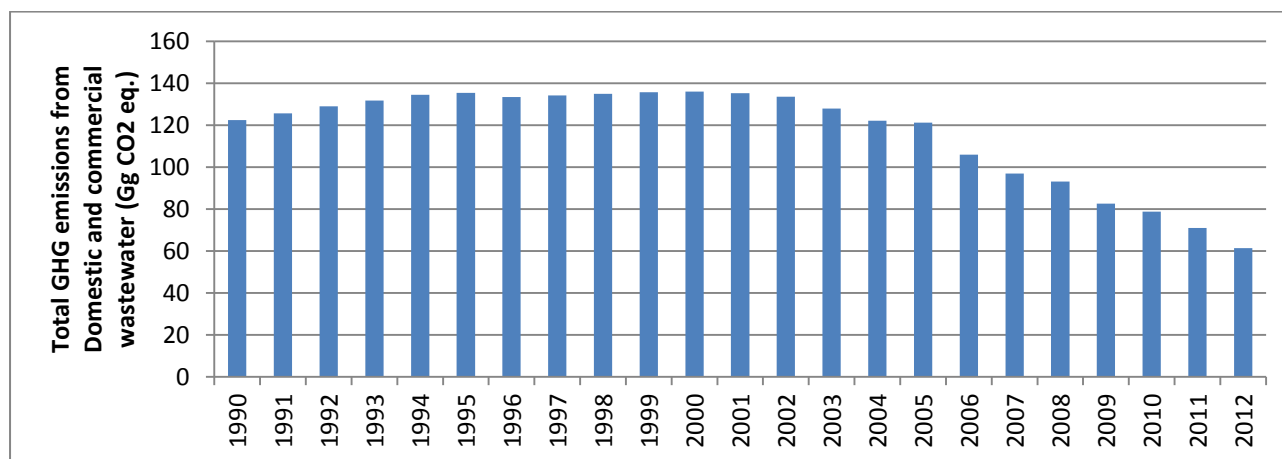
8.3.2. Domestic and commercial wastewater (6B2)

In Cyprus during 2012 approximately 78% of the population was served by a sewer and aerobic treatment systems, the majority of which apply tertiary or advance treatment, since most of the treated water is reused in agriculture. The wastewater produced by the remaining population is collected in septic tanks where anaerobic conditions are dominant. 30% of this wastewater is collected by authorised wastewater collectors and transported to aerobic wastewater treatment plants. Some industrial wastewater may be discharged into municipal sewer lines where it combines with domestic wastewater provided that the organic load of the wastewater is reduced to the limits set in the wastewater disposal permit issued by the Department of Environment. Methane emissions from this source are presented in Table 8.29 and Figure 8.29. The N₂O emissions from Domestic and commercial wastewater (6B.2.1) are included in the human sewage (6B.2.2) and also presented in Table 8.29.

Emission estimates from this source have been revised due to (a) change in the distribution of wastewater to aerobic and anaerobic treatments, (b) annual protein intake per capita and (c) revision of the B₀.

Table 8.29. Total emissions from Domestic and commercial wastewater 1990-2012

	1990	1995	2000	2005	2010	2011	2012
CH ₄ (Gg)	5.05	5.55	5.50	4.80	2.66	2.26	1.79
N ₂ O (Gg)	0.05	0.06	0.07	0.07	0.07	0.08	0.08
Total (Gg CO ₂ eq.)	122.3	135.4	135.9	121.2	78.8	70.9	61.3

**Figure 8.29.** Total emissions from Domestic and commercial wastewater 1990-2012

8.3.2.1. Methodological issues

Domestic and commercial wastewater (6B.2.1)

The IPCC Guidelines describe a single method for calculating CH₄ emissions from domestic wastewater handling. Emissions are a function of the amount of waste generated and an emission factor that characterises the extent to which this waste generates CH₄. The simplified general equation is as follows (equation 5.5, GPG pg. 5.14).

$$\text{Emissions} = (\text{Total Organic Waste} * \text{Emission Factor}) - \text{Methane Recovery}$$

No CH₄ is recovered and flared or used for energy therefore methane recovery is assumed 0.

Total organic waste (TOW)

The activity data for this source category is the amount of organic waste in a country. Total Organic Waste (TOW) is a function of human population and waste generation per person, and is expressed in terms of biochemical oxygen demand (equation 5.10):

$$\text{TOW} = P * D_{\text{dom}}$$

where TOW is the total organic waste (kg BOD/yr), P is the human population (1000 persons) and D_{dom} is the degradable organic component (kg BOD/1000 persons/yr).

D_{dom} was assumed to be 60g BOD/person/day and the value proposed by the European Directive 91/271/EC which corresponds to 21900 kg BOD/1000 persons/year. The population used and the estimated TOW are presented in Table 8.30.

Table 8.30. Human population and total organic waste

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Human population (1000s)	587.1	603.1	619.2	632.9	645.4	656.3	666.3	675.2	682.9
TOW (Gg BOD/yr)	12.86	13.21	13.56	13.86	14.13	14.37	14.59	14.79	14.96

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Human population (1000s)	690.5	697.5	705.5	713.7	722.9	733	744	757.9	776.4
TOW (Gg BOD/yr)	15.12	15.28	15.45	15.63	15.83	16.05	16.29	16.60	17.00

	2008	2009	2010	2011	2012				
Human population (1000s)	796.9	819.1	839.8	862.0	865.9				
TOW (Gg BOD/yr)	17.45	17.94	18.39	18.88	18.96				

Emission factor

The emission factor for each waste type is a function of the maximum methane producing potential of each waste type (B_o) and the weighted average of the methane conversion factors (MCFs) for the different wastewater treatment systems used in the country, as shown in the equation below (equation 5.7, GPG pg. 5.16). The MCF indicates the extent to which the methane producing potential (B_o) is realised in each type of treatment method.

$$\text{Emission Factor} = B_o * \text{Weighted Average of MCFs}$$

where B_o is the maximum methane producing capacity (kg CH₄/kg BOD) and MCF is the methane conversion factor (fraction).

The value used for the maximum methane producing capacity (B_o) is the value proposed as default by the IPCC guidelines, i.e. 0.6 kg CH₄/kg BOD (GPG, pg. 5.17).

The Weighted Average of MCFs according to the IPCC guidelines is estimated using the equation below (equation 5.8, GPG pg. 5.18):

$$\text{Weighted MCF} = \sum x (WS_x * MCF_x)$$

where WS_x is the fraction of wastewater treated using wastewater handling system x and MCF_x is the methane conversion factors of each wastewater handling system x .

According to the IPCC guidelines (revised IPCC 1996 guidelines, reference manual pg. 6.20) the MCF for completely aerobic system is 0 and for completely anaerobic conditions 1.

Amount of waste treated aerobically (WS_x)

All the sewage treatment plants in Cyprus are using aerobic treatment. The wastewater Information on the percentage of national population connected to wastewater collection and treatment systems is available for 1992-2005, 2007 and 2009. For the years 1990 and 1991, it has been assumed that value is the same as 1992, since not many changes have taken place regarding wastewater treatment during 1990 and 1992. The percentage of national population connected to wastewater collection and treatment systems for the years 2006, 2008 and 2010-2012, were estimated using the linear trend that is created between 2001 and 2009, which has the equation $y=0.0595x-0.5937$ (see Figure 8.30).

The remaining population is served by septic tanks. According to Dr. Chrystalla Stylianou²⁵, approximately 30% of organic load in the septic tanks is removed from the septic tanks and transported to aerobic treatment. The additional percentage of the population served by aerobic treatment through this route is presented in Table 8.31.

The total percentage of the population served by aerobic treatment is presented in Table 8.31.

²⁵ Senior Environment Officer, head of pollution control unit, department of Environment, tel. +35722408941, cstylianou@environment.moa.gov.cy

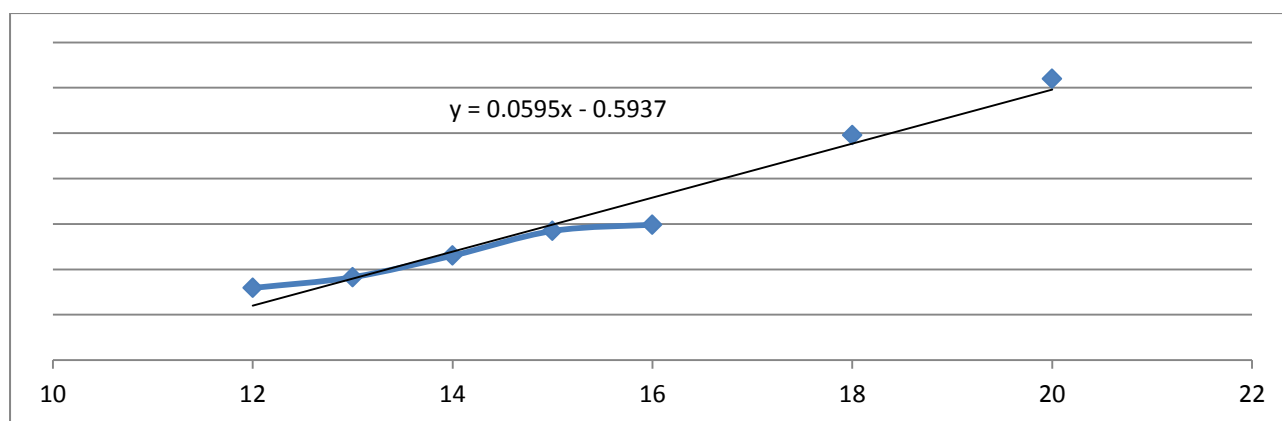


Figure 8.30. Linear trend that is created between percentage of national population connected to wastewater collection and treatment systems for the years 2001 and 2009 and time (where 1990=1)

Amount of waste treated anaerobically (WSx)

The amount of waste treated anaerobically is the remaining when the amount of waste treated aerobically is subtracted from 100%. The percentage of national population served by anaerobic treatment is presented in Table 8.31.

Table 8.31. Percentages of national population served by aerobic and anaerobic treatment

	Percentage of national population connected to wastewater collection and treatment systems	Percentage of population served by septic tanks	Percentage of population served by septic tanks & aerobic treatment	Total aerobic	Total anaerobic
1990	6.4%	93.6%	28.1%	34.5%	65.5%
1991	6.4%	93.6%	28.1%	34.5%	65.5%
1992	6.4%	93.6%	28.1%	34.5%	65.5%
1993	6.8%	93.2%	27.9%	34.8%	65.2%
1994	6.7%	93.3%	28.0%	34.7%	65.3%
1995	8.1%	91.9%	27.6%	35.6%	64.4%
1996	11.2%	88.8%	26.6%	37.8%	62.2%
1997	12.0%	88.0%	26.4%	38.4%	61.6%
1998	12.8%	87.2%	26.2%	39.0%	61.0%
1999	13.3%	86.7%	26.0%	39.3%	60.7%
2000	14.3%	85.7%	25.7%	40.0%	60.0%
2001	15.9%	84.1%	25.2%	41.1%	58.9%
2002	18.3%	81.7%	24.5%	42.8%	57.2%
2003	23.0%	77.0%	23.1%	46.1%	53.9%
2004	28.5%	71.5%	21.5%	49.9%	50.1%
2005	29.8%	70.2%	21.1%	50.9%	49.1%
2006	41.8%	58.2%	17.5%	59.2%	40.8%
2007	50.0%	50.4%	15.1%	64.7%	35.3%
2008	53.7%	46.3%	13.9%	67.6%	32.4%
2009	62.0%	38.0%	11.4%	73.4%	26.6%
2010	65.6%	34.4%	10.3%	75.9%	24.1%
2011	71.5%	28.5%	8.5%	80.1%	19.9%
2012	77.5%	22.5%	6.8%	84.2%	15.8%

Sludge

The IPCC Guidelines propose a separate calculation for wastewater and for sludge removed from the wastewater. The distinction however is inappropriate for Cyprus, because sludge is not collected separately. Nevertheless, the total

organic product of sludge is 0 for all years, since according to the revised IPCC1996 guidelines (workbook, pg. 6.21) the fraction of degradable organic component remove in sludge is 0.

Human sewage (6B2.2)

The emissions of N₂O from human sewage according to the revised IPCC1996 (reference manual, pg. 6.28) are calculated using the following equation:

$$N_2O_{(S)} = \text{Protein} * \text{Frac}_{NPR} * NR_{PEOPLE} * EF_6$$

where N₂O_(S) is the N₂O emissions from human sewage in kg N₂O -N/yr, Protein is the annual protein intake per capita in kg/person/yr, NR_{PEOPLE} is the number of people in country, EF₆ is the emissions factor (default 0.01 kg N₂O-N/kg sewage-N produced from Table 4-18 Agriculture Chapter) and Frac_{NPR} is the fraction of nitrogen in protein (default is 0.16 kg N/kg protein from Table 4-19 Agriculture Chapter).

The population and the annual protein intake per capita used are presented in Table 8.32.

The protein intake is according to FAO (2009) is also presented in Table 8.32. Information for 1994-1995, 1998-1999, 2003-2004 and 2008-2012 were not available. For 1994-1995, 1998-1999 and 2003-2004 the average between the year before and after were used. For 2008-2012, the protein intake was assumed that same as 2007.

Table 8.32. Human population and annual protein intake per capita

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Human population (1000s)	587.1	603.1	619.2	632.9	645.4	656.3	666.3	675.2	682.9
Protein intake (kg/person/yr)	35.4	35.4	35.4	36.1	36.1	36.9	36.9	36.9	37.2

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Human population (1000s)	690.5	697.5	705.5	713.7	722.9	733	744	757.9	776.4
Protein intake (kg/person/yr)	37.2	37.6	37.6	37.6	36.3	36.3	35.0	35.0	35.0

	2008	2009	2010	2011	2012				
Human population (1000s)	796.9	819.1	839.8	862.0	865.9				
Protein intake (kg/person/yr)	35.0	35.0	35.0	35.0	35.0				

8.3.2.2. Uncertainties and time-series consistency

Uncertainty analysis is presented in [section 1.7](#).

8.3.2.3. Source-specific QA / QC and verification

QA/QC and verification activities are presented in [section 1.6](#).

8.3.2.4. Source-specific recalculations

Recalculations that took place have been caused by (a) change in the distribution of wastewater to aerobic and anaerobic treatments, (b) annual protein intake per capita and (c) revision of the B₀. The overall impact of these changes to the emissions is presented in Table 8.33.

Table 8.33. Change in emissions caused by recalculations

Gg CO ₂ eq.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	23.6	24.0	24.4	24.7	24.9	25.1	25.2	25.5	25.5	25.7	25.6
NIR2014	122.3	125.6	129.0	131.7	134.5	135.4	133.4	134.1	134.8	135.7	135.9
% difference	418%	423%	428%	433%	439%	439%	429%	427%	429%	429%	430%

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	25.6	25.5	24.9	24.9	25.0	24.5	24.7	25.0	25.4	25.8	26.5
NIR2014	135.3	133.6	128.0	122.0	121.2	105.9	96.9	93.1	82.5	78.8	70.9
% difference	428%	425%	415%	390%	386%	333%	292%	272%	225%	205%	168%

(a) Change in the distribution of wastewater to aerobic and anaerobic treatments

For NIR2013, it was assumed that all urban population was connected to a sewage system and led to aerobic treatment and that all rural population was not connect to a sewage system and the wastewater was disposed in septic tanks. The assumptions were revised for this submission and information was obtained for the total population. The resulting impact on the CH₄ emission factor is presented in Table 8.34.

Table 8.34. Change in CH₄ emission factor used

kg CH ₄ /kg BOD	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	1.25	1.21	1.16	1.12	1.08	1.03	0.99	0.95	0.90	0.86	0.81
NIR2014	0.39	0.39	0.39	0.39	0.39	0.39	0.37	0.37	0.37	0.36	0.36

kg CH ₄ /kg BOD	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	0.77	0.75	0.68	0.63	0.58	0.54	0.49	0.45	0.40	0.37	0.37
NIR2014	0.35	0.34	0.32	0.30	0.29	0.24	0.21	0.19	0.16	0.14	0.12

(b) Annual protein intake per capita

A mistake in the conversion of protein intake per capita from g/day to kg/ year was identified and corrected. The change in the protein intake used in NIR2013 compared to NIR2014 is presented in Table 8.35.

Table 8.35. Change in annual protein intake per capita

kg protein/cap/yr	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NIR2013	36.9	36.9	36.9	36.9	36.9	36.9	36.9	37.2	37.2	37.6	37.6
NIR2014	35.4	35.4	35.4	36.1	36.1	36.9	36.9	36.9	37.2	37.2	37.6

kg protein/cap/yr	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NIR2013	37.6	36.9	36.1	36.1	36.1	35.0	35.0	35.0	35.0	35.0	35.0
NIR2014	37.6	37.6	36.3	36.3	35.0	35.0	35.0	35.0	35.0	35.0	35.0

(c) Revision of B₀

B₀ in NIR2013 was assumed 0.25 kg CH₄/kg BOD as stated in revised IPCC 1996 guidelines (pg. 6.20 in reference manual). This value was revised to 0.60 kg CH₄/kg BOD as stated in GPG (pg. 5.17).

8.3.2.5. Source-specific planned improvement

No source specific improvements are planned.

Chapter 9: Recalculations and improvements

The recalculations and improvements that have been performed have been presented in detail in the appropriate chapter. Several of the improvements and recalculations have been implemented because of comments received for the submission of 2013 by the EU QA/QC team and the UNFCCC review team or the mistakes identified by these two teams. The comments made and mistakes identified by the UNFCCC review team with the resulting changes that have taken place are presented in the Table 9.1.

Table 9.1. Provisional main findings and recommendations received by the UNFCCC review team for NIR2013²⁶

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
General			Completeness	Give high priority to completeness of the inventory, mainly for those categories for which a IPCC guidance exist	Many categories have been estimated for the first time; LULUCF still incomplete, navigation emissions still NE due to lack of data
General			National system	Develop the institutional arrangements and the basic infrastructure to report LULUCF completely	In preparation. Completion expected by January 2015.
General			Transparency	Transparency regarding e.g. the used methods for estimating the emissions has to be improved throughout the NIR	More details have been provided in NIR0214
General			Uncertainty analysis	Introduce corrected uncertainty analysis into the NIR	Mistakes identified and corrected
General			Notation keys, empty cells, zero value	Use notation keys instead of empty cells and zeros	Work in progress.
General			Uncertainty analysis	Calculate an uncertainty analysis with LULUCF categories after having completed the LULUCF sector	Uncertainty analysis with LULUCF has not been estimated for NIR2014
General			Key category analysis	Present 1990 KCA in chapter 1.5 of the NIR	Presented
Energy	Reference approach with the sectoral approach	-	Apparent energy consumption (excluding non-energy use and feedstock's) has not been reported in CRF Table1.A(c) for all years, causing a difference of 100% in the energy consumption between the reference approach and the sectoral approach.	The ERT recommends Cyprus to correct this error in its next annual submission.	Corrected
Energy	International bunker fuels		Fuel combustion from both domestic and civil aviation were reported to be accounted under international bunker fuels (NIR section 3.2.2).	The ERT recommends Cyprus to report the related emissions under 1.A.3.a Civil Aviation and 1.A.3. d Navigation in its next annual submission.	Emissions for civil aviation (1A3a) have been estimated and excluded from international aviation. However, navigation (1A3d) is still NE due to lack of data.

²⁶ As these were sent by Tomoyuki Aizawa (TAizawa@unfccc.int) on behalf of Rda-Reviews (Rda-Reviews@unfccc.int) via email entitled "<Cyprus: CR8-UNFCCC> Provisional main findings and recommendations" on 28/9/2013

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
Energy	Feedstock's and non-energy use of fuels		The ERT noted that the amount of associated CO2 emissions in CRF table 1.A (d) was not allocated anywhere in the industrial processes sector, more specifically in CRF table 2(I).	The ERT recommends that the Cyprus allocates the CO2 not emitted under feedstocks and non-energy use in the corresponding categories under CRF table 2(I).	Corrected
Energy	1.A Fuel Combustion	CO2	Cyprus has reported in the NIR (section 3.2.6.2, 3.2.7.2 and 3.2.9.2) a change in the methodology used for calculating CO2 emissions from stationary combustion. The Revised 1996 IPCC Guidelines were used for the 1990-2004 period while EU ETS reports were used for the 2005-2011 period.	The ERT recommends that the inventory agency ensure that the methodology adopted under EU ETS is consistent with the Revised 1996 IPCC Guidelines and IPCC Good Practice Guidance and encourages Cyprus to compare, in terms of the level and the trend, estimates using both the previously used and the new methodology. The ERT further recommends Cyprus, in its next annual submission, to recalculate previous estimates using the same methodology over the entire time series.	Corrected as recommendation. Methodology revised to increase consistency.
Energy	1.A Fuel Combustion	CO2	Cyprus has reported in the NIR (section 3.2.6.2 and 3.2.7.2) using different carbon content and oxidation factors for calculating CO2 emissions from stationary combustion. Default values based on the Revised 1996 IPCC Guidelines were used for the 1990-2004 period while country and plant specific values were used for the 2005-2011 period.	In line with the good practice guidance, the ERT recommends to use country and/or plant specific emission factors when available, and to implement QA procedures on the reported data. The ERT further recommends Cyprus, in its next annual submission, to recalculate previous estimates using higher tiers over the entire time series especially that this category is a key category.	Higher tiers not possible for whole time series. Methodology revised to increase consistency.
Energy	1.A.2 Manufacturing Industries and Construction 1.A.4 Other Sectors	CO2	Cyprus has reported in the NIR (sections 3.2.7.2 and 3.2.9) different sources of activity data used for calculating CO2 emissions from Manufacturing Industries and Construction and Other sectors. The ERT is of the view that the difference in the source of activity data may be at the origin of the sharp increase/decrease of the emissions trend of these subcategories (NIR figures 3.5 and 3.7). In response to a question raised by the ERT during the review regarding the emission trend, Cyprus explained that a different fuel allocation was used after 2005 based on availability of new data	The ERT commends Cyprus on using disaggregated data for calculating emissions from these subsectors and recommends Cyprus, in its next annual submission, to recalculate previous estimates using a consistent fuel allocation over the entire time series. In case of lack of complete data set for the past years, it is good practice to consider a variety of means of obtaining them especially that this category is a key category.	Corrected.
Energy	1.A.2 Manufacturing Industries and	CO2	Cyprus used a Tier 1 methodology for the calculation of its CO2 emission from combustion of solid fuel with IPCC default carbon content, net	Given this wealth of information, the ERT is of the view that Cyprus is in a position to generate national carbon content and hence use higher tiers	In progress

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
	Construction		calorific value and oxidation factor for the period 1990-2004. The ERT noted that Cyprus has used plant specific net calorific values, oxidation factors and tier 2 emission factors for its CO2 emissions for the period 2005-2011	for estimating emissions from this key category for the 1990-2004 period. The ERT recommends that Cyprus makes efforts to generate national CO2 emission factors and use higher tiers for the whole reporting period to ensure time-series consistency.	
Industrial processes	2.A.3 Limestone and dolomite use	CO ₂	There is some dolomite use in Cyprus, but CO2 emissions from 1990 to 2011 have been reported as "NE". No information on this sector is included in NIR.	ERT recommends improving completeness of the reporting by including emissions from dolomite use.	Reported.
Industrial processes	2.F.1 Refrigeration and air-conditioning equipment	HFC	As mentioned in NIR on page 82 emission estimates for 2011 are significantly higher than for 2010. Party explained that this is result of availability of additional data and including new sources to inventory.	ERT recommends keeping up the efforts to ensure time series consistency for emission reporting in that sector.	Methodology revised to increase consistency and reduce uncertainty caused by assumptions. Work in progress for further improvement.
Industrial processes	2.F.1 Refrigeration and air-conditioning equipment	HFC	As mentioned in NIR on page 84 there is available data on disposal of refrigeration and air conditioning equipment on Cyprus, but is considered to be uncertain. If this data is complete and consistent but associated with high uncertainty it should be reported, and information on uncertainty should be included in uncertainty analysis of emission inventory. In CRF for emission from disposal of equipment "NA" notation key was used for whole time series (except 2009). For 2009 notation key IE was used suggesting that activity occurs but is reported elsewhere, but no information was provided in CRF table 9(a). If there is activity, but emission was not estimated "NE" notation key should be used instead.	ERT recommends revising use of notation keys for that sector as well as further investigating available data on disposal of equipment to provide reliable emission time series.	Methodology revised to increase consistency and reduce uncertainty caused by assumptions. Work in progress for further improvement. Notation keys corrected
Industrial processes	2.F.1 Refrigeration and air-conditioning equipment	HFC	Assumptions used for HFC estimates like: charge, annual leakage rate and lifetime of equipment were presented in table 4.14 of the NIR. Some of the assumptions are significantly lower than ranges presented in IPCC GPG in table 3.22 on page 3.104.	ERT recommends collecting documentation supporting applied assumptions or using default charges from IPCC Guidelines.	Methodology revised to increase consistency and reduce uncertainty caused by assumptions. Work in progress for

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
			Average charge of passenger cars, tractors and trailers is 450g, while GPG suggests using average 800g. As mentioned in NIR part of the assumptions was made on the basis of information provided by Union of Refrigeration Technicians.		further improvement. Notation keys corrected
Industrial processes	2.F.3. Fire Extinguisher	HFC	No f-gases emissions are reported under fire extinguishers. HFC-227ea is reported as “NE”.	ERT recommends continuing efforts to collect information on equipment in that sector and including emission estimates in national inventory.	Work in progress.
Industrial processes	2.F (p) Consumption of Halocarbons and SF6 Potential Emission.	HFC-134a	In NIR on page 92 in table 4.18 there information about bulk imports 19 tons of HFC 134a in 1994 and 7.46 tons in 1996. It is unclear for ERT how those gases were used. Actual emission estimates of HFC-134a start from 1999. If imported gas was used as a charge – emissions from stock should be reported at least since 1995.	ERT recommends investigating further final use of HFC-134a bulk imports and revise actual emissions if necessary.	Work in progress.
Agriculture	4.D.1 Direct soil	N2O	Has not been estimated N2O emissions from cultivated organic soils and from the application of sewage sludge to agricultural soils	Provides an estimate for N2O emissions from cultivated organic soils and from the application of sewage sludge to agricultural soils in the next annual submission	Estimated and reported.
Agriculture	4.D.1 Direct soil	N2O	The IEFs for direct N2O emissions from agricultural soils for synthetic fertilizer applied and for manure spread are lower than the IPCC default value	Recheck the values and rectify them as default value provided in IPCC guidelines and document these revised estimates undertaken and their impact on time-series consistency.	Mistake identified in the data that was entered in the CRFReporter. Corrected.
Agriculture	4.D.1 Direct soil		Calculate N2O emissions from N-fixing crops for the period 1990 – 2011 that is not in line with IPCC GPG	Use the Equation 4.25 from the IPCC Good Practice Guidelines for the calculation of N2O emissions from N-fixing crops for the period 1990-2011 and document these revised estimates undertaken and their impact on time-series consistency.	Corrected.
LULUCF	General		Lack of transparency ERT notes that information on documentation of approaches used for representing land areas and land use databases for the inventory preparation has been listed by Party as “Not Available”.	The ERT recommends that Party increase transparency by providing information on approaches used for consistent representation of land areas including definitions and classification system in accordance with the IPCC guidance. The Party should take into national definitions first and be guided by international databases and other sources such as Forest Resource Assessment of the FAO 2000, FRA2010, UNECE TBFRA 2000 and The	Work in progress.

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
				State of Europe's Forests 2003 by MCPPE (Annex 2A2 PAGE 2.27 in the 2003 GPG-LULUCF, 2006 IPCC guidelines).	
LULUCF	General		Inconsistency in the reporting of mandatory carbon pools, for example lands converted to forest land, all carbon stocks have been reported as "0"	The ERT recommends that Cyprus explore the use of, where relevant, the carbon stock change factors and assumptions used for the estimation of the carbon stock changes in biomass, dead wood and litter and ensure comparability between the land-use changes both to and from one category to another. For example, the per unit of area losses of biomass carbon stock due to the conversion of grassland to cropland are expected to be equivalent, in magnitude, to the gains of biomass carbon stock due to the conversion of cropland to grassland.	Work in progress.
LULUCF	Forest land remaining forest land	CO2	The time series data on forest areas show that the inter-annual changes of net C-stock changes in living biomass for forest land remaining forest land is unstable and the trend fluctuates. The ERT notes that the reported inter-annual changes may not represent the actual trends in annual stock changes in real time.	The ERT recommends that Cyprus provides information on the approach and method used to estimate C-stock changes in living biomass in future submissions. ERT further recommends that Cyprus explore different methods of estimating the annual values (including interpolation and extrapolation techniques) and make efforts to reduce the influence of random variation in the annual estimates for living biomass in future annual submissions.	Work in progress.
Waste	6. A 1 Managed Waste Disposal on Land	CH4	The sudden decrease that occurs between 2010 and 2011for should be completed explaining the decrease	It is recommended that the reason for the decrease in emissions for 2010-2011 is provided in the next submission	Corrected.
Waste	6. A 1 Managed Waste Disposal on Land	CH4	For 1990-2006, information was provided for the estimation of proportions of solid waste disposed on land going to managed sites. No information was provided for the years 2007-2011	It is recommended that the Party provides information for 2007-2011 to enhance completeness and transparency	Corrected.
Waste	6. A 1 Managed Waste Disposal on Land	CH4	The 2011 CRF table 6A, C additional information is incomplete as data was not provided for urban population and per capita waste generation. This raises the issue of transparency and consistency	It is recommended that Cyprus completes CRF table 6A, C additional information in the next submission	Corrected.
Waste	6. A 1 Managed	CH4	In Cyprus, all unmanaged sites are considered	It is recommended that since new data is available	Corrected.

Sector	Category	Gas	Provisional issue	Potential recommendation	Action
	Waste Disposal on Land		shallow without taking the depth into consideration	all assumptions used shall be revised and incorporated in the next submission	
Waste	6. B Waste-water Handling	CH4	The information provided and detailed methodology used in estimating emission from wastewater is inadequate. There is no information on the type of handling system used for treatment of waste water and how sludge is handled	It is recommended that the party provides information on the wastewater handling system and sludge and also provide the details of the methodology used for estimation of emissions to enhance transparency.	Corrected.
Waste	6. B Waste-water Handling	CH4	According to the NIR 8.1.2, data was not provided on industrial wastewater for 2011 as data was not available therefore production for 2011 was considered same as 2010. This is contradictory to 8.3.2 (a). There should be consistency and transparency in reporting	It is recommended that Party reconciles the information provided in the NIR to enhance transparency and consistency	Corrected.

Annex I. Key categories analysis

Table I1. Level assessment 1990

IPCC Source category	Direct GHG	1990 estimate (Gg CO2 eq.)	Level assessment	Cumulative total of level assessment
1AA1A. Public electricity and heat production	CO2	1675.77	0.275265	27.5%
1AA3B. Road transport	CO2	1168.21	0.191892	46.7%
2A1. Cement Production	CO2	696.86	0.114468	58.2%
6A. Solid waste disposal on land	CH4	541.74	0.088987	67.1%
1AA2F2. Non-metallic minerals	CO2	451.49	0.074163	74.5%
1AA4B. Residential	CO2	306.74	0.050386	79.5%
4D1. Direct Soil Emissions	N2O	196.94	0.032349	82.8%
4A. Enteric Fermentation	CH4	161.41	0.026514	85.4%
4D3. Indirect emissions	N2O	159.43	0.026188	88.0%
4B. Manure Management	N2O	123.98	0.020365	90.1%
6B. Wastewater handling	CH4	107.04	0.017582	91.8%
1AA1B. Petroleum refining	CO2	91.12	0.014968	93.3%
4B. Manure Management	CH4	88.08	0.014468	94.8%
2A7. Other	CO2	56.83	0.009334	95.7%
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56.42	0.009268	96.6%
1AA2E. Food processing, Beverages and Tobacco	CO2	53.41	0.008773	97.5%
3D. Other	N2O	42.99	0.007061	98.2%
1AA3A. Civil aviation	CO2	19.46	0.003197	98.5%
6B. Wastewater handling	N2O	16.52	0.002714	98.8%
1AA2A. Iron and steel	CO2	14.07	0.002311	99.0%
1AA5A. Other Stationary	CO2	11.20	0.001840	99.2%
1AA2F1. Other	CO2	8.28	0.001360	99.3%
3A. Paint application	CO2	5.86	0.000963	99.4%
2A2. Lime production	CO2	5.75	0.000945	99.5%
1AA1A. Public electricity and heat production	N2O	4.07	0.000668	99.6%
1AA3B. Road transport	CH4	4.02	0.000661	99.7%
1AA3B. Road transport	N2O	3.05	0.000501	99.7%
3D. Other	CO2	2.48	0.000407	99.8%
1AA2C. Chemicals	CO2	2.24	0.000368	99.8%
4F. Field burning of agricultural residues	CH4	2.18	0.000359	99.8%
1AA4B. Residential	CH4	1.79	0.000294	99.9%
1AA2F2. Non-metallic minerals	N2O	1.67	0.000274	99.9%
1AA1A. Public electricity and heat production	CH4	1.38	0.000226	99.9%
1AA4B. Residential	N2O	0.98	0.000162	99.9%
1B2A4. Refining / Storage	CH4	0.92	0.000152	99.9%
1AA2F2. Non-metallic minerals	CH4	0.70	0.000115	100.0%
3B. Degreasing and dry cleaning	CO2	0.63	0.000104	100.0%
4F. Field burning of agricultural residues	N2O	0.45	0.000074	100.0%
1AA4A. Commercial/ Institutional	CH4	0.31	0.000051	100.0%
1AA1B. Petroleum refining	N2O	0.24	0.000040	100.0%
1AA3A. Civil aviation	N2O	0.23	0.000038	100.0%
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.16	0.000027	100.0%
1AA4A. Commercial/ Institutional	N2O	0.15	0.000024	100.0%

IPCC Source category	Direct GHG	1990 estimate (Gg CO ₂ eq.)	Level assessment	Cumulative total of level assessment
1AA4C. Agriculture/ Forestry/ Fisheries	N ₂ O	0.14	0.000024	100.0%
1AA2E. Food processing, Beverages and Tobacco	N ₂ O	0.14	0.000022	100.0%
1AA1B. Petroleum refining	CH ₄	0.08	0.000014	100.0%
1AA4A. Commercial/ Institutional	CO ₂	0.05	0.000008	100.0%
1AA2A. Iron and steel	N ₂ O	0.04	0.000006	100.0%
1AA5A. Other Stationary	CH ₄	0.03	0.000005	100.0%
1AA2E. Food processing, Beverages and Tobacco	CH ₄	0.03	0.000005	100.0%
1AA5A. Other Stationary	N ₂ O	0.03	0.000005	100.0%
1AA2F1. Other	N ₂ O	0.02	0.000003	100.0%
1AA3A. Civil aviation	CH ₄	0.02	0.000003	100.0%
1AA2A. Iron and steel	CH ₄	0.01	0.000001	100.0%
1AA2C. Chemicals	N ₂ O	0.01	0.000001	100.0%
1AA2F1. Other	CH ₄	0.00	0.000001	100.0%
1AA2C. Chemicals	CH ₄	0.00	0.000000	100.0%
2A3. Limestone and dolomite use	CO ₂		0.000000	100.0%
TOTAL		6087.85		

Table I2. Level assessment 2012

IPCC Source category	Direct GHG	2012 estimate (Gg CO ₂ eq.)	Level assessment	Cumulative total of level assessment
1AA1A. Public electricity and heat production	CO ₂	3545.930	0.382959	38.3%
1AA3B. Road transport	CO ₂	2023.466	0.218533	60.1%
6A. Solid waste disposal on land	CH ₄	936.198	0.101109	70.3%
2A1. Cement Production	CO ₂	504.536	0.054490	75.7%
1AA4B. Residential	CO ₂	411.241	0.044414	80.2%
1AA2F2. Non-metallic minerals	CO ₂	335.985	0.036286	83.8%
2F. Consumption of Halocarbons and SF₆	HFCs & SF ₆	260.527	0.028137	86.6%
4D1. Direct Soil Emissions	N ₂ O	193.561	0.020904	88.7%
4A. Enteric Fermentation	CH ₄	193.433	0.020891	90.8%
4D3. Indirect emissions	N ₂ O	160.307	0.017313	92.5%
4B. Manure Management	N ₂ O	153.079	0.016532	94.2%
4B. Manure Management	CH ₄	114.419	0.012357	95.4%
1AA4C. Agriculture/ Forestry/ Fisheries	CO ₂	79.188	0.008552	96.2%
3D. Other	N ₂ O	63.403	0.006847	96.9%
1AA2E. Food processing, Beverages and Tobacco	CO ₂	52.452	0.005665	97.5%
2A7. Other	CO ₂	45.338	0.004897	98.0%
6B. Wastewater handling	CH ₄	40.392	0.004362	98.4%
1AA3A. Civil aviation	CO ₂	29.063	0.003139	98.7%
6B. Wastewater handling	N ₂ O	23.956	0.002587	99.0%
1AA5A. Other Stationary	CO ₂	17.078	0.001844	99.2%
1AA2A. Iron and steel	CO ₂	12.189	0.001316	99.3%
1AA2F1. Other	CO ₂	9.433	0.001019	99.4%
1AA1A. Public electricity and heat production	N ₂ O	8.494	0.000917	99.5%
1AA3B. Road transport	CH ₄	8.328	0.000899	99.6%
3A. Paint application	CO ₂	5.502	0.000594	99.7%
1AA3B. Road transport	N ₂ O	5.453	0.000589	99.7%

IPCC Source category	Direct GHG	2012 estimate (Gg CO2 eq.)	Level assessment	Cumulative total of level assessment
3D. Other	CO2	4.216	0.000455	99.8%
2A2. Lime production	CO2	3.657	0.000395	99.8%
1AA2C. Chemicals	CO2	3.177	0.000343	99.8%
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	3.158	0.000341	99.9%
1AA1A. Public electricity and heat production	CH4	2.877	0.000311	99.9%
1AA4B. Residential	CH4	2.793	0.000302	99.9%
1AA4B. Residential	N2O	1.311	0.000142	99.9%
1AA4A. Commercial/ Institutional	CH4	1.103	0.000119	100.0%
1AA2F2. Non-metallic minerals	N2O	0.911	0.000098	100.0%
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.779	0.000084	100.0%
4F. Field burning of agricultural residues	CH4	0.537	0.000058	100.0%
1AA3A. Civil aviation	N2O	0.347	0.000037	100.0%
1AA4A. Commercial/ Institutional	N2O	0.261	0.000028	100.0%
1AA2F2. Non-metallic minerals	CH4	0.255	0.000028	100.0%
3B. Degreasing and dry cleaning	CO2	0.170	0.000018	100.0%
4F. Field burning of agricultural residues	N2O	0.165	0.000018	100.0%
2A3. Limestone and dolomite use	CO2	0.138	0.000015	100.0%
1AA2E. Food processing, Beverages and Tobacco	N2O	0.134	0.000014	100.0%
1AA5A. Other Stationary	CH4	0.120	0.000013	100.0%
1AA4A. Commercial/ Institutional	CO2	0.068	0.000007	100.0%
1AA5A. Other Stationary	N2O	0.045	0.000005	100.0%
1AA2A. Iron and steel	N2O	0.031	0.000003	100.0%
1AA2E. Food processing, Beverages and Tobacco	CH4	0.030	0.000003	100.0%
1AA2F1. Other	N2O	0.024	0.000003	100.0%
1AA3A. Civil aviation	CH4	0.023	0.000003	100.0%
1AA2C. Chemicals	N2O	0.008	0.000001	100.0%
1AA2A. Iron and steel	CH4	0.007	0.000001	100.0%
1AA2F1. Other	CH4	0.005	0.000001	100.0%
1AA2C. Chemicals	CH4	0.002	0.000000	100.0%
1AA1B. Petroleum refining	CO2		0.000000	100.0%
1AA1B. Petroleum refining	CH4		0.000000	100.0%
1B2A4. Refining / Storage	CH4		0.000000	100.0%
1AA1B. Petroleum refining	N2O		0.000000	100.0%
TOTAL		9259.301		

Table I3. Trend assessment 2012

IPCC Source category	Direct GHG	1990 estimate	2011 estimate	Level assessment	Trend assessment	% contribution to trend	Cumulative total of level assessment
1AA1A. Public electricity and heat production	CO2	1675.77	3545.93	0.382959	0.070807	32.014%	32.014%
2A1. Cement Production	CO2	696.86	504.54	0.054490	0.039435	17.830%	49.843%
1AA2F2. Non-metallic minerals	CO2	451.49	335.99	0.036286	0.024903	11.260%	61.103%
2F. Consumption of Halocarbons and SF6	HFCs & SF6		260.53	0.028137	0.018499	8.364%	69.467%
1AA3B. Road transport	CO2	1168.21	2023.47	0.218533	0.017516	7.920%	77.387%
6B. Wastewater handling	CH4	107.04	40.39	0.004362	0.008692	3.930%	81.316%
6A. Solid waste disposal on land	CH4	541.74	936.20	0.101109	0.007970	3.604%	84.920%
4D1. Direct Soil Emissions	N2O	196.94	193.56	0.020904	0.007525	3.402%	88.322%
4D3. Indirect emissions	N2O	159.43	160.31	0.017313	0.005835	2.638%	90.960%
1AA4B. Residential	CO2	306.74	411.24	0.044414	0.003927	1.775%	92.736%
4A. Enteric Fermentation	CH4	161.41	193.43	0.020891	0.003697	1.672%	94.407%
2A7. Other	CO2	56.83	45.34	0.004897	0.002918	1.319%	95.726%
4B. Manure Management	N2O	123.98	153.08	0.016532	0.002520	1.139%	96.866%
1AA2E. Food processing, Beverages and Tobacco	CO2	53.41	52.45	0.005665	0.002044	0.924%	97.790%
4B. Manure Management	CH4	88.08	114.42	0.012357	0.001388	0.627%	98.417%
1AA2A. Iron and steel	CO2	14.07	12.19	0.001316	0.000654	0.296%	98.713%
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56.42	79.19	0.008552	0.000471	0.213%	98.926%
2A2. Lime production	CO2	5.75	3.66	0.000395	0.000362	0.164%	99.089%
3A. Paint application	CO2	5.86	5.50	0.000594	0.000242	0.109%	99.199%
1AA2F1. Other	CO2	8.28	9.43	0.001019	0.000224	0.101%	99.300%
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.16	3.16	0.000341	0.000207	0.093%	99.393%
4F. Field burning of agricultural residues	CH4	2.18	0.54	0.000058	0.000198	0.089%	99.483%
1AA1A. Public electricity and heat production	N2O	4.07	8.49	0.000917	0.000164	0.074%	99.557%
1AA3B. Road transport	CH4	4.02	8.33	0.000899	0.000157	0.071%	99.628%
3D. Other	N2O	42.99	63.40	0.006847	0.000141	0.064%	99.691%
1AA2F2. Non-metallic minerals	N2O	1.67	0.91	0.000098	0.000116	0.052%	99.744%
6B. Wastewater handling	N2O	16.52	23.96	0.002587	0.000084	0.038%	99.781%
1AA3B. Road transport	N2O	3.05	5.45	0.000589	0.000058	0.026%	99.808%
1AA2F2. Non-metallic minerals	CH4	0.70	0.26	0.000028	0.000058	0.026%	99.834%
3B. Degreasing and dry cleaning	CO2	0.63	0.17	0.000018	0.000056	0.025%	99.859%
1AA1A. Public electricity and heat production	CH4	1.38	2.88	0.000311	0.000056	0.025%	99.884%
1AA4A. Commercial/ Institutional	CH4	0.31	1.10	0.000119	0.000045	0.020%	99.904%
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.14	0.78	0.000084	0.000040	0.018%	99.922%
1AA3A. Civil aviation	CO2	19.46	29.06	0.003139	0.000038	0.017%	99.939%

IPCC Source category	Direct GHG	1990 estimate	2011 estimate	Level assessment	Trend assessment	% contribution to trend	Cumulative total of level assessment
4F. Field burning of agricultural residues	N2O	0.45	0.16	0.000018	0.000037	0.017%	99.956%
3D. Other	CO2	2.48	4.22	0.000455	0.000032	0.014%	99.970%
1AA2C. Chemicals	CO2	2.24	3.18	0.000343	0.000016	0.007%	99.978%
1AA4B. Residential	N2O	0.98	1.31	0.000142	0.000013	0.006%	99.984%
2A3. Limestone and dolomite use	CO2		0.14	0.000015	0.000010	0.004%	99.988%
1AA4B. Residential	CH4	1.79	2.79	0.000302	0.000005	0.002%	99.991%
1AA2E. Food processing, Beverages and Tobacco	N2O	0.14	0.13	0.000014	0.000005	0.002%	99.993%
1AA5A. Other Stationary	CH4	0.03	0.12	0.000013	0.000005	0.002%	99.995%
1AA5A. Other Stationary	CO2	11.20	17.08	0.001844	0.000003	0.001%	99.997%
1AA4A. Commercial/ Institutional	N2O	0.15	0.26	0.000028	0.000003	0.001%	99.998%
1AA2A. Iron and steel	N2O	0.04	0.03	0.000003	0.000002	0.001%	99.999%
1AA2E. Food processing, Beverages and Tobacco	CH4	0.03	0.03	0.000003	0.000001	0.001%	99.999%
1AA2F1. Other	N2O	0.02	0.02	0.000003	0.000001	0.000%	99.999%
1AA3A. Civil aviation	N2O	0.23	0.35	0.000037	0.000000	0.000%	100.000%
1AA2A. Iron and steel	CH4	0.01	0.01	0.000001	0.000000	0.000%	100.000%
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	0.000007	0.000000	0.000%	100.000%
1AA5A. Other Stationary	N2O	0.03	0.05	0.000005	0.000000	0.000%	100.000%
1AA2F1. Other	CH4	0.00	0.01	0.000001	0.000000	0.000%	100.000%
1AA2C. Chemicals	N2O	0.01	0.01	0.000001	0.000000	0.000%	100.000%
1AA3A. Civil aviation	CH4	0.02	0.02	0.000003	0.000000	0.000%	100.000%
1AA2C. Chemicals	CH4	0.00	0.00	0.000000	0.000000	0.000%	100.000%
1AA1B. Petroleum refining	CO2	91.12		0.000000		0.000%	100.000%
1AA1B. Petroleum refining	CH4	0.08		0.000000		0.000%	100.000%
1B2A4. Refining / Storage	CH4	0.92		0.000000		0.000%	100.000%
1AA1B. Petroleum refining	N2O	0.24		0.000000		0.000%	100.000%
TOTAL		6087.85	9259.30		0.221176		

Annex II. Uncertainty analysis

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1990

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1990 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	1676	5%	5%	7.1%	1.95%	0.00%	27.53%	0.00	0.02	1.95%	D	R		
1AA1B. Petroleum refining	CO2	91	91	5%	5%	7.1%	0.11%	0.00%	1.50%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	14	5%	5%	7.1%	0.02%	0.00%	0.23%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	2	5%	5%	7.1%	0.00%	0.00%	0.04%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	53	5%	5%	7.1%	0.06%	0.00%	0.88%	0.00	0.00	0.06%	D	R		
1AA2F1. Other	CO2	8	8	5%	5%	7.1%	0.01%	0.00%	0.14%	0.00	0.00	0.01%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	451	5%	5%	7.1%	0.52%	0.00%	7.42%	0.00	0.01	0.52%	D	R		
1AA3A. Civil aviation	CO2	19	19	5%	5%	7.1%	0.02%	0.00%	0.32%	0.00	0.00	0.02%	D	R		
1AA3B. Road transport	CO2	1168	1168	5%	5%	7.1%	1.36%	0.00%	19.19%	0.00	0.01	1.36%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.05	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	307	2%	2%	2.8%	0.14%	0.00%	5.04%	0.00	0.00	0.14%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	56	2%	2%	2.8%	0.03%	0.00%	0.93%	0.00	0.00	0.03%	D	R		
1AA5A. Other Stationary	CO2	11	11	5%	5%	7.1%	0.01%	0.00%	0.18%	0.00	0.00	0.01%	D	R		
2A1. Cement Production	CO2	697	697	5%	5%	7.1%	0.81%	0.00%	11.45%	0.00	0.01	0.81%	D	R		
2A2. Lime production	CO2	6	6	5%	5%	7.1%	0.01%	0.00%	0.09%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	57	2%	2%	2.8%	0.03%	0.00%	0.93%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	6	2%	2%	2.8%	0.00%	0.00%	0.10%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	2	2%	2%	2.8%	0.00%	0.00%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	4627				0.07%					0.07%				
1AA1A. Public electricity and heat production	CH4	0.07	0.07	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.19	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.09	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.04	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	7.69	30%	100%	104.4%	0.13%	0.00%	0.13%	0.00	0.00	0.05%	D	R		
4B. Manure Management	CH4	4.19	4.19	5%	30%	30.4%	0.02%	0.00%	0.07%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.10	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	25.80	5%	20%	20.6%	0.09%	0.00%	0.42%	0.00	0.00	0.03%	D	R		
6B. Wastewater handling	CH4	5.10	5.10	20%	40%	44.7%	0.04%	0.00%	0.08%	0.00	0.00	0.02%	D	R		
TOTAL	CH4	43	43				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.14	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.40	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.64	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D3. Indirect emissions	N2O	0.51	0.51	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.05	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs			50%	200%	206.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%				
TOTAL	HCFs						0.00%					0.00%				
TOTAL EMISSIONS		6088	6088				2.57%					2.57%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.57%			Trend uncertainty:			2.57%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1991

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1991 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	1738	5%	5%	7.1%	1.87%	-1.14%	28.55%	0.00	0.02	2.02%	D	R		
1AA1B. Petroleum refining	CO2	91	91	5%	5%	7.1%	0.10%	-0.12%	1.50%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	41	5%	5%	7.1%	0.04%	0.42%	0.67%	0.00	0.00	0.05%	D	R		
1AA2C. Chemicals	CO2	2	2	5%	5%	7.1%	0.00%	0.00%	0.04%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	135	5%	5%	7.1%	0.15%	1.27%	2.22%	0.00	0.00	0.17%	D	R		
1AA2F1. Other	CO2	8	32	5%	5%	7.1%	0.03%	0.38%	0.53%	0.00	0.00	0.04%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	724	5%	5%	7.1%	0.78%	3.89%	11.89%	0.00	0.01	0.86%	D	R		
1AA3A. Civil aviation	CO2	19	17	5%	5%	7.1%	0.02%	-0.07%	0.27%	0.00	0.00	0.02%	D	R		
1AA3B. Road transport	CO2	1168	1164	5%	5%	7.1%	1.25%	-1.57%	19.13%	0.00	0.01	1.35%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	326	2%	2%	2.8%	0.14%	-0.07%	5.36%	0.00	0.00	0.15%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	62	2%	2%	2.8%	0.03%	0.03%	1.03%	0.00	0.00	0.03%	D	R		
1AA5A. Other Stationary	CO2	11	12	5%	5%	7.1%	0.01%	0.01%	0.20%	0.00	0.00	0.01%	D	R		
2A1. Cement Production	CO2	697	666	5%	5%	7.1%	0.71%	-1.56%	10.78%	0.00	0.01	0.77%	D	R		
2A2. Lime production	CO2	6	5	5%	5%	7.1%	0.01%	-0.02%	0.08%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	55	2%	2%	2.8%	0.02%	-0.11%	0.90%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.03%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	0.00%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	5070				0.06%					0.07%				
1AA1A. Public electricity and heat production	CH4	0.07	0.07	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.20	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.08	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.05	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	7.80	30%	100%	104.4%	0.12%	-0.01%	0.13%	0.00	0.00	0.05%	D	R		
4B. Manure Management	CH4	4.19	4.35	5%	30%	30.4%	0.02%	0.00%	0.07%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.07	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	27.12	5%	20%	20.6%	0.09%	-0.01%	0.45%	0.00	0.00	0.03%	D	R		
6B. Wastewater handling	CH4	5.10	5.23	20%	40%	44.7%	0.04%	0.00%	0.09%	0.00	0.00	0.02%	D	R		
TOTAL	CH4	43	45				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.14	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.40	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.62	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D3. Indirect emissions	N2O	0.51	0.51	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.05	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs			50%	200%	206.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%				
TOTAL	HCFs						0.00%					0.00%				
TOTAL EMISSIONS		6088	6567				2.50%					2.71%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.50%			Trend uncertainty:			2.71%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1992

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1992 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2032	5%	5%	7.1%	2.05%	1.70%	33.38%	0.00	0.02	2.36%	D	R		
1AA1B. Petroleum refining	CO2	91	94	5%	5%	7.1%	0.09%	-0.18%	1.55%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	39	5%	5%	7.1%	0.04%	0.38%	0.65%	0.00	0.00	0.05%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	0.01%	0.05%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	133	5%	5%	7.1%	0.13%	1.18%	2.19%	0.00	0.00	0.17%	D	R		
1AA2F1. Other	CO2	8	18	5%	5%	7.1%	0.02%	0.14%	0.30%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	502	5%	5%	7.1%	0.51%	-0.29%	8.24%	0.00	0.01	0.58%	D	R		
1AA3A. Civil aviation	CO2	19	20	5%	5%	7.1%	0.02%	-0.04%	0.33%	0.00	0.00	0.02%	D	R		
1AA3B. Road transport	CO2	1168	1310	5%	5%	7.1%	1.32%	-0.56%	21.52%	0.00	0.02	1.52%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	395	2%	2%	2.8%	0.16%	0.69%	6.48%	0.00	0.00	0.18%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	75	2%	2%	2.8%	0.03%	0.17%	1.24%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	15	5%	5%	7.1%	0.02%	0.04%	0.25%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	715	5%	5%	7.1%	0.72%	-1.42%	11.75%	0.00	0.01	0.83%	D	R		
2A2. Lime production	CO2	6	4	5%	5%	7.1%	0.00%	-0.04%	0.07%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	48	2%	2%	2.8%	0.02%	-0.29%	0.79%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.03%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	0.00%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	5413				0.07%					0.09%				
1AA1A. Public electricity and heat production	CH4	0.07	0.08	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.21	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.09	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.05	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	7.85	30%	100%	104.4%	0.12%	-0.02%	0.13%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	4.87	5%	30%	30.4%	0.02%	0.00%	0.08%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.15	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	28.48	5%	20%	20.6%	0.08%	-0.02%	0.47%	0.00	0.00	0.03%	D	R		
6B. Wastewater handling	CH4	5.10	5.37	20%	40%	44.7%	0.03%	-0.01%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	47				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.15	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.40	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.72	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D3. Indirect emissions	N2O	0.51	0.57	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs			50%	200%	206.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%				
TOTAL	HCFs						0.00%					0.00%				
TOTAL EMISSIONS		6088	7005				2.61%					3.00%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.61%			Trend uncertainty:			3.00%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1993

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1993 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2165	5%	5%	7.1%	2.09%	2.46%	35.57%	0.00	0.03	2.52%	D	R		
1AA1B. Petroleum refining	CO2	91	81	5%	5%	7.1%	0.08%	-0.46%	1.34%	0.00	0.00	0.10%	D	R		
1AA2A. Iron and steel	CO2	14	34	5%	5%	7.1%	0.03%	0.27%	0.55%	0.00	0.00	0.04%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	0.01%	0.05%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	116	5%	5%	7.1%	0.11%	0.86%	1.91%	0.00	0.00	0.14%	D	R		
1AA2F1. Other	CO2	8	19	5%	5%	7.1%	0.02%	0.16%	0.32%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	570	5%	5%	7.1%	0.55%	0.45%	9.37%	0.00	0.01	0.66%	D	R		
1AA3A. Civil aviation	CO2	19	21	5%	5%	7.1%	0.02%	-0.06%	0.34%	0.00	0.00	0.02%	D	R		
1AA3B. Road transport	CO2	1168	1330	5%	5%	7.1%	1.28%	-1.23%	21.84%	0.00	0.02	1.55%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	393	2%	2%	2.8%	0.15%	0.39%	6.45%	0.00	0.00	0.18%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	78	2%	2%	2.8%	0.03%	0.17%	1.28%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	16	5%	5%	7.1%	0.02%	0.04%	0.26%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	780	5%	5%	7.1%	0.75%	-0.96%	12.80%	0.00	0.01	0.91%	D	R		
2A2. Lime production	CO2	6	5	5%	5%	7.1%	0.00%	-0.04%	0.08%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	57	2%	2%	2.8%	0.02%	-0.19%	0.93%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.03%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	5675				0.07%					0.10%				
1AA1A. Public electricity and heat production	CH4	0.07	0.08	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.21	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.09	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.05	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.15	30%	100%	104.4%	0.12%	-0.02%	0.13%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.31	5%	30%	30.4%	0.02%	0.00%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.15	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	29.67	5%	20%	20.6%	0.08%	-0.02%	0.49%	0.00	0.00	0.03%	D	R		
6B. Wastewater handling	CH4	5.10	5.47	20%	40%	44.7%	0.03%	-0.01%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	49				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.15	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.42	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.73	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D3. Indirect emissions	N2O	0.51	0.57	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs		0.005	50%	200%	206.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%				
TOTAL	HCFs		0.0				0.00%					0.00%				
TOTAL EMISSIONS		6088	7320				2.64%					3.17%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.64%			Trend uncertainty:			3.17%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1994

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1994 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2259	5%	5%	7.1%	2.11%	2.80%	37.10%	0.00	0.03	2.63%	D	R		
1AA1B. Petroleum refining	CO2	91	119	5%	5%	7.1%	0.11%	0.10%	1.96%	0.00	0.00	0.14%	D	R		
1AA2A. Iron and steel	CO2	14	37	5%	5%	7.1%	0.03%	0.31%	0.60%	0.00	0.00	0.05%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	0.01%	0.05%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	126	5%	5%	7.1%	0.12%	0.97%	2.07%	0.00	0.00	0.15%	D	R		
1AA2F1. Other	CO2	8	18	5%	5%	7.1%	0.02%	0.12%	0.29%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	569	5%	5%	7.1%	0.53%	0.10%	9.34%	0.00	0.01	0.66%	D	R		
1AA3A. Civil aviation	CO2	19	22	5%	5%	7.1%	0.02%	-0.04%	0.36%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1383	5%	5%	7.1%	1.29%	-1.20%	22.71%	0.00	0.02	1.61%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	401	2%	2%	2.8%	0.15%	0.31%	6.59%	0.00	0.00	0.19%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	80	2%	2%	2.8%	0.03%	0.16%	1.32%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	16	5%	5%	7.1%	0.02%	0.04%	0.26%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	818	5%	5%	7.1%	0.76%	-0.82%	13.44%	0.00	0.01	0.95%	D	R		
2A2. Lime production	CO2	6	6	5%	5%	7.1%	0.01%	-0.02%	0.10%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	50	2%	2%	2.8%	0.02%	-0.35%	0.82%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	6	2%	2%	2.8%	0.00%	-0.03%	0.09%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	5915				0.07%					0.11%				
1AA1A. Public electricity and heat production	CH4	0.07	0.09	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.01	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.22	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.09	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.06	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.27	30%	100%	104.4%	0.11%	-0.02%	0.14%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.20	5%	30%	30.4%	0.02%	0.00%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.12	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	30.84	5%	20%	20.6%	0.08%	-0.02%	0.51%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.58	20%	40%	44.7%	0.03%	-0.01%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	51				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.15	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.43	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.71	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.57	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	0.009	50%	200%	206.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%				
TOTAL	HCFs		0.0				0.00%					0.00%				
TOTAL EMISSIONS		6088	7585				2.65%					3.30%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.65%			Trend uncertainty:			3.30%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1995

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1995 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2076	5%	5%	7.1%	1.95%	0.09%	34.10%	0.00	0.02	2.41%	D	R		
1AA1B. Petroleum refining	CO2	91	94	5%	5%	7.1%	0.09%	-0.31%	1.54%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	33	5%	5%	7.1%	0.03%	0.25%	0.54%	0.00	0.00	0.04%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	0.01%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	115	5%	5%	7.1%	0.11%	0.81%	1.90%	0.00	0.00	0.14%	D	R		
1AA2F1. Other	CO2	8	20	5%	5%	7.1%	0.02%	0.16%	0.33%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	569	5%	5%	7.1%	0.53%	0.18%	9.34%	0.00	0.01	0.66%	D	R		
1AA3A. Civil aviation	CO2	19	23	5%	5%	7.1%	0.02%	-0.02%	0.38%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1468	5%	5%	7.1%	1.38%	0.40%	24.11%	0.00	0.02	1.71%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	425	2%	2%	2.8%	0.16%	0.75%	6.97%	0.00	0.00	0.20%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	87	2%	2%	2.8%	0.03%	0.28%	1.42%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	17	5%	5%	7.1%	0.02%	0.06%	0.29%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	784	5%	5%	7.1%	0.74%	-1.27%	12.88%	0.00	0.01	0.91%	D	R		
2A2. Lime production	CO2	6	5	5%	5%	7.1%	0.00%	-0.04%	0.08%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	50	2%	2%	2.8%	0.02%	-0.33%	0.83%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.04%	0.07%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	5777				0.07%					0.10%				
1AA1A. Public electricity and heat production	CH4	0.07	0.08	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.23	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.10	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.06	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.59	30%	100%	104.4%	0.12%	-0.01%	0.14%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.45	5%	30%	30.4%	0.02%	0.00%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.11	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	33.01	5%	20%	20.6%	0.09%	0.02%	0.54%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.59	20%	40%	44.7%	0.03%	-0.01%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	53				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.44	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.73	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.59	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	2.30	50%	200%	206.2%	0.06%	0.04%	0.04%	0.00	0.00	0.08%				
TOTAL	HCFs		2.3				0.00%					0.00%				
TOTAL EMISSIONS		6088	7524				2.57%					3.18%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.57%			Trend uncertainty:			3.18%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1996

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1996 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2197	5%	5%	7.1%	1.97%	0.35%	36.09%	0.00	0.03	2.55%	D	R		
1AA1B. Petroleum refining	CO2	91	87	5%	5%	7.1%	0.08%	-0.51%	1.44%	0.00	0.00	0.10%	D	R		
1AA2A. Iron and steel	CO2	14	37	5%	5%	7.1%	0.03%	0.31%	0.61%	0.00	0.00	0.05%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.01%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	129	5%	5%	7.1%	0.12%	0.98%	2.12%	0.00	0.00	0.16%	D	R		
1AA2F1. Other	CO2	8	22	5%	5%	7.1%	0.02%	0.18%	0.36%	0.00	0.00	0.03%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	645	5%	5%	7.1%	0.58%	0.97%	10.60%	0.00	0.01	0.75%	D	R		
1AA3A. Civil aviation	CO2	19	23	5%	5%	7.1%	0.02%	-0.04%	0.37%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1518	5%	5%	7.1%	1.36%	0.03%	24.94%	0.00	0.02	1.76%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	442	2%	2%	2.8%	0.16%	0.72%	7.26%	0.00	0.00	0.21%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	91	2%	2%	2.8%	0.03%	0.29%	1.50%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	18	5%	5%	7.1%	0.02%	0.06%	0.30%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	846	5%	5%	7.1%	0.76%	-0.96%	13.90%	0.00	0.01	0.98%	D	R		
2A2. Lime production	CO2	6	4	5%	5%	7.1%	0.00%	-0.05%	0.07%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	48	2%	2%	2.8%	0.02%	-0.42%	0.79%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.05%	0.07%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.04%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	6121				0.07%					0.11%				
1AA1A. Public electricity and heat production	CH4	0.07	0.09	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.23	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.12	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.05	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.75	30%	100%	104.4%	0.12%	-0.02%	0.14%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.76	5%	30%	30.4%	0.02%	0.01%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.10	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	33.21	5%	20%	20.6%	0.09%	0.00%	0.55%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.49	20%	40%	44.7%	0.03%	-0.02%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	54				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.47	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.75	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.60	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	4.45	50%	200%	206.2%	0.12%	0.07%	0.07%	0.00	0.00	0.15%				
TOTAL	HCFs		4.4				0.00%					0.00%				
TOTAL EMISSIONS		6088	7903				2.59%					3.36%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.59%			Trend uncertainty:			3.36%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1997

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1997 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2322	5%	5%	7.1%	2.05%	1.90%	38.14%	0.00	0.03	2.70%	D	R		
1AA1B. Petroleum refining	CO2	91	94	5%	5%	7.1%	0.08%	-0.43%	1.54%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	24	5%	5%	7.1%	0.02%	0.10%	0.40%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.02%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	92	5%	5%	7.1%	0.08%	0.36%	1.52%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	21	5%	5%	7.1%	0.02%	0.16%	0.34%	0.00	0.00	0.03%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	604	5%	5%	7.1%	0.53%	0.16%	9.93%	0.00	0.01	0.70%	D	R		
1AA3A. Civil aviation	CO2	19	24	5%	5%	7.1%	0.02%	-0.03%	0.39%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1585	5%	5%	7.1%	1.40%	0.77%	26.03%	0.00	0.02	1.84%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	465	2%	2%	2.8%	0.16%	1.00%	7.63%	0.00	0.00	0.22%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	96	2%	2%	2.8%	0.03%	0.35%	1.57%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	19	5%	5%	7.1%	0.02%	0.08%	0.32%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	814	5%	5%	7.1%	0.72%	-1.69%	13.37%	0.00	0.01	0.95%	D	R		
2A2. Lime production	CO2	6	4	5%	5%	7.1%	0.00%	-0.05%	0.07%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	45	2%	2%	2.8%	0.02%	-0.49%	0.74%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.04%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	6222				0.07%					0.12%				
1AA1A. Public electricity and heat production	CH4	0.07	0.09	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.24	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.10	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.07	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.58	30%	100%	104.4%	0.11%	-0.03%	0.14%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.82	5%	30%	30.4%	0.02%	0.00%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.04	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	34.04	5%	20%	20.6%	0.09%	0.00%	0.56%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.51	20%	40%	44.7%	0.03%	-0.02%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	55				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.50	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.69	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.59	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.06	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	8.71	50%	200%	206.2%	0.22%	0.14%	0.14%	0.00	0.00	0.30%				
TOTAL	HCFs		8.7				0.00%					0.00%				
TOTAL EMISSIONS		6088	8013				2.66%					3.50%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.66%			Trend uncertainty:			3.50%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1998

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1998 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2551	5%	5%	7.1%	2.16%	4.20%	41.91%	0.00	0.03	2.97%	D	R		
1AA1B. Petroleum refining	CO2	91	97	5%	5%	7.1%	0.08%	-0.45%	1.59%	0.00	0.00	0.12%	D	R		
1AA2A. Iron and steel	CO2	14	24	5%	5%	7.1%	0.02%	0.07%	0.39%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.02%	0.07%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	92	5%	5%	7.1%	0.08%	0.30%	1.50%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	15	5%	5%	7.1%	0.01%	0.06%	0.25%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	617	5%	5%	7.1%	0.52%	-0.02%	10.14%	0.00	0.01	0.72%	D	R		
1AA3A. Civil aviation	CO2	19	25	5%	5%	7.1%	0.02%	-0.03%	0.40%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1661	5%	5%	7.1%	1.41%	1.00%	27.28%	0.00	0.02	1.93%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	484	2%	2%	2.8%	0.16%	1.04%	7.94%	0.00	0.00	0.23%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	101	2%	2%	2.8%	0.03%	0.40%	1.67%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	21	5%	5%	7.1%	0.02%	0.09%	0.34%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	771	5%	5%	7.1%	0.65%	-3.00%	12.67%	0.00	0.01	0.91%	D	R		
2A2. Lime production	CO2	6	5	5%	5%	7.1%	0.00%	-0.04%	0.08%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	42	2%	2%	2.8%	0.01%	-0.59%	0.69%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.06%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	6517				0.07%					0.14%				
1AA1A. Public electricity and heat production	CH4	0.07	0.10	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.25	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.07	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.28	30%	100%	104.4%	0.10%	-0.04%	0.14%	0.00	0.00	0.07%	D	R		
4B. Manure Management	CH4	4.19	5.90	5%	30%	30.4%	0.02%	0.00%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.05	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	34.63	5%	20%	20.6%	0.09%	-0.01%	0.57%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.52	20%	40%	44.7%	0.03%	-0.02%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	55				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.51	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.71	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.60	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	14.06	50%	200%	206.2%	0.35%	0.23%	0.23%	0.00	0.00	0.49%				
TOTAL	HCFs		14.1				0.00%					0.00%				
TOTAL EMISSIONS		6088	8336				2.75%					3.77%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.75%			Trend uncertainty:			3.77%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 1999

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	1999 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2721	5%	5%	7.1%	2.23%	5.60%	44.69%	0.00	0.03	3.17%	D	R		
1AA1B. Petroleum refining	CO2	91	113	5%	5%	7.1%	0.09%	-0.27%	1.85%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	24	5%	5%	7.1%	0.02%	0.06%	0.39%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.02%	0.07%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	92	5%	5%	7.1%	0.08%	0.27%	1.51%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	18	5%	5%	7.1%	0.02%	0.11%	0.30%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	640	5%	5%	7.1%	0.52%	-0.01%	10.51%	0.00	0.01	0.74%	D	R		
1AA3A. Civil aviation	CO2	19	26	5%	5%	7.1%	0.02%	-0.03%	0.42%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1704	5%	5%	7.1%	1.39%	0.76%	27.99%	0.00	0.02	1.98%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	487	2%	2%	2.8%	0.16%	0.85%	8.00%	0.00	0.00	0.23%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	104	2%	2%	2.8%	0.03%	0.40%	1.71%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	21	5%	5%	7.1%	0.02%	0.09%	0.35%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	771	5%	5%	7.1%	0.63%	-3.58%	12.66%	0.00	0.01	0.91%	D	R		
2A2. Lime production	CO2	6	5	5%	5%	7.1%	0.00%	-0.05%	0.09%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	48	2%	2%	2.8%	0.02%	-0.54%	0.78%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.06%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	6787				0.08%					0.15%				
1AA1A. Public electricity and heat production	CH4	0.07	0.11	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.26	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.08	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.25	30%	100%	104.4%	0.10%	-0.04%	0.14%	0.00	0.00	0.07%	D	R		
4B. Manure Management	CH4	4.19	5.75	5%	30%	30.4%	0.02%	0.00%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.08	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	35.27	5%	20%	20.6%	0.08%	-0.02%	0.58%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.55	20%	40%	44.7%	0.03%	-0.03%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	56				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.52	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.73	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.61	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	21.87	50%	200%	206.2%	0.52%	0.36%	0.36%	0.01	0.00	0.76%				
TOTAL	HCFs		21.9				0.00%					0.01%				
TOTAL EMISSIONS		6088	8641				2.81%					4.01%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.81%			Trend uncertainty:			4.01%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2000

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2000 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2851	5%	5%	7.1%	2.26%	6.55%	46.83%	0.00	0.03	3.33%	D	R		
1AA1B. Petroleum refining	CO2	91	110	5%	5%	7.1%	0.09%	-0.39%	1.80%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	24	5%	5%	7.1%	0.02%	0.06%	0.40%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.02%	0.07%	0.00	0.00	0.01%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	95	5%	5%	7.1%	0.08%	0.28%	1.56%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	16	5%	5%	7.1%	0.01%	0.06%	0.26%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	661	5%	5%	7.1%	0.52%	0.01%	10.86%	0.00	0.01	0.77%	D	R		
1AA3A. Civil aviation	CO2	19	28	5%	5%	7.1%	0.02%	-0.01%	0.45%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1745	5%	5%	7.1%	1.39%	0.60%	28.67%	0.00	0.02	2.03%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	518	2%	2%	2.8%	0.16%	1.15%	8.52%	0.00	0.00	0.24%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	108	2%	2%	2.8%	0.03%	0.41%	1.77%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	22	5%	5%	7.1%	0.02%	0.09%	0.36%	0.00	0.00	0.03%	D	R		
2A1. Cement Production	CO2	697	797	5%	5%	7.1%	0.63%	-3.65%	13.09%	0.00	0.01	0.94%	D	R		
2A2. Lime production	CO2	6	6	5%	5%	7.1%	0.00%	-0.04%	0.10%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	44	2%	2%	2.8%	0.01%	-0.64%	0.73%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.06%	0.09%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7038				0.08%					0.17%				
1AA1A. Public electricity and heat production	CH4	0.07	0.11	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.26	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.08	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.49	30%	100%	104.4%	0.10%	-0.05%	0.14%	0.00	0.00	0.07%	D	R		
4B. Manure Management	CH4	4.19	5.65	5%	30%	30.4%	0.02%	-0.01%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.03	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	36.11	5%	20%	20.6%	0.08%	-0.03%	0.59%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.54	20%	40%	44.7%	0.03%	-0.03%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	56				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.16	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.55	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.68	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.02%	D	R		
4D3. Indirect emissions	N2O	0.51	0.59	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	28.70	50%	200%	206.2%	0.66%	0.47%	0.47%	0.01	0.00	1.00%				
TOTAL	HCFs		28.7				0.00%					0.01%				
TOTAL EMISSIONS		6088	8904				2.87%					4.21%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.87%			Trend uncertainty:			4.21%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2001

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2001 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2783	5%	5%	7.1%	2.21%	5.46%	45.72%	0.00	0.03	3.24%	D	R		
1AA1B. Petroleum refining	CO2	91	60	5%	5%	7.1%	0.05%	-1.20%	0.99%	0.00	0.00	0.09%	D	R		
1AA2A. Iron and steel	CO2	14	20	5%	5%	7.1%	0.02%	-0.02%	0.32%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.02%	0.07%	0.00	0.00	0.01%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	81	5%	5%	7.1%	0.06%	0.04%	1.32%	0.00	0.00	0.09%	D	R		
1AA2F1. Other	CO2	8	17	5%	5%	7.1%	0.01%	0.09%	0.28%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	629	5%	5%	7.1%	0.50%	-0.51%	10.33%	0.00	0.01	0.73%	D	R		
1AA3A. Civil aviation	CO2	19	30	5%	5%	7.1%	0.02%	0.03%	0.50%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	1801	5%	5%	7.1%	1.43%	1.53%	29.58%	0.00	0.02	2.09%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	522	2%	2%	2.8%	0.17%	1.21%	8.57%	0.00	0.00	0.24%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	109	2%	2%	2.8%	0.03%	0.43%	1.79%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	22	5%	5%	7.1%	0.02%	0.09%	0.36%	0.00	0.00	0.03%	D	R		
2A1. Cement Production	CO2	697	778	5%	5%	7.1%	0.62%	-3.95%	12.78%	0.00	0.01	0.92%	D	R		
2A2. Lime production	CO2	6	7	5%	5%	7.1%	0.01%	-0.02%	0.12%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	34	2%	2%	2.8%	0.01%	-0.80%	0.57%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	5	2%	2%	2.8%	0.00%	-0.06%	0.08%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	6907				0.08%					0.16%				
1AA1A. Public electricity and heat production	CH4	0.07	0.11	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.27	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.08	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.21	30%	100%	104.4%	0.11%	-0.03%	0.15%	0.00	0.00	0.07%	D	R		
4B. Manure Management	CH4	4.19	6.10	5%	30%	30.4%	0.02%	0.00%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.07	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	37.82	5%	20%	20.6%	0.09%	0.00%	0.62%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.50	20%	40%	44.7%	0.03%	-0.03%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	59				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.17	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.61	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.75	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.64	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	40.35	50%	200%	206.2%	0.93%	0.66%	0.66%	0.01	0.00	1.41%				
TOTAL	HCFs		40.4				0.01%					0.02%				
TOTAL EMISSIONS		6088	8900				2.92%					4.29%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			2.92%			Trend uncertainty:			4.29%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2002

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2002 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	2892	5%	5%	7.1%	2.23%	5.94%	47.50%	0.00	0.03	3.37%	D	R		
1AA1B. Petroleum refining	CO2	91	113	5%	5%	7.1%	0.09%	-0.39%	1.86%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	20	5%	5%	7.1%	0.02%	-0.02%	0.33%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.01%	0.07%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	81	5%	5%	7.1%	0.06%	0.00%	1.33%	0.00	0.00	0.09%	D	R		
1AA2F1. Other	CO2	8	14	5%	5%	7.1%	0.01%	0.03%	0.23%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	644	5%	5%	7.1%	0.50%	-0.62%	10.58%	0.00	0.01	0.75%	D	R		
1AA3A. Civil aviation	CO2	19	30	5%	5%	7.1%	0.02%	0.01%	0.49%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	1784	5%	5%	7.1%	1.37%	0.35%	29.31%	0.00	0.02	2.07%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	532	2%	2%	2.8%	0.16%	1.13%	8.74%	0.00	0.00	0.25%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	104	2%	2%	2.8%	0.03%	0.32%	1.72%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	21	5%	5%	7.1%	0.02%	0.07%	0.35%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	799	5%	5%	7.1%	0.61%	-4.15%	13.12%	0.00	0.01	0.95%	D	R		
2A2. Lime production	CO2	6	11	5%	5%	7.1%	0.01%	0.04%	0.18%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	42	2%	2%	2.8%	0.01%	-0.71%	0.70%	0.00	0.00	0.02%	D	R		
3A. Paint application	CO2	6	7	2%	2%	2.8%	0.00%	-0.03%	0.12%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7103				0.08%					0.17%				
1AA1A. Public electricity and heat production	CH4	0.07	0.11	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.28	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.12	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.08	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.73	30%	100%	104.4%	0.11%	-0.03%	0.16%	0.00	0.00	0.07%	D	R		
4B. Manure Management	CH4	4.19	6.60	5%	30%	30.4%	0.02%	0.00%	0.11%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.07	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	38.60	5%	20%	20.6%	0.09%	-0.01%	0.63%	0.00	0.00	0.04%	D	R		
6B. Wastewater handling	CH4	5.10	5.41	20%	40%	44.7%	0.03%	-0.04%	0.09%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.17	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.64	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.80	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.68	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	55.83	50%	200%	206.2%	1.25%	0.92%	0.92%	0.02	0.01	1.95%				
TOTAL	HCFs		55.8				0.02%					0.04%				
TOTAL EMISSIONS		6088	9188				3.02%					4.58%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			3.02%			Trend uncertainty:			4.58%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2003

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2003 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3118	5%	5%	7.1%	2.30%	7.92%	51.22%	0.00	0.04	3.64%	D	R		
1AA1B. Petroleum refining	CO2	91	113	5%	5%	7.1%	0.08%	-0.49%	1.86%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	23	5%	5%	7.1%	0.02%	0.01%	0.38%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.01%	0.07%	0.00	0.00	0.01%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	90	5%	5%	7.1%	0.07%	0.10%	1.48%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	15	5%	5%	7.1%	0.01%	0.04%	0.25%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	654	5%	5%	7.1%	0.48%	-0.92%	10.74%	0.00	0.01	0.76%	D	R		
1AA3A. Civil aviation	CO2	19	30	5%	5%	7.1%	0.02%	0.00%	0.50%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	1890	5%	5%	7.1%	1.40%	0.87%	31.04%	0.00	0.02	2.20%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	548	2%	2%	2.8%	0.16%	1.09%	9.01%	0.00	0.00	0.26%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	107	2%	2%	2.8%	0.03%	0.31%	1.76%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	22	5%	5%	7.1%	0.02%	0.07%	0.36%	0.00	0.00	0.03%	D	R		
2A1. Cement Production	CO2	697	784	5%	5%	7.1%	0.58%	-5.11%	12.88%	0.00	0.01	0.95%	D	R		
2A2. Lime production	CO2	6	10	5%	5%	7.1%	0.01%	0.02%	0.17%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	60	2%	2%	2.8%	0.02%	-0.48%	0.99%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	9	2%	2%	2.8%	0.00%	0.00%	0.15%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.02%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7484				0.08%					0.20%				
1AA1A. Public electricity and heat production	CH4	0.07	0.12	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.30	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.12	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.00	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.07	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.32	30%	100%	104.4%	0.10%	-0.05%	0.15%	0.00	0.00	0.08%	D	R		
4B. Manure Management	CH4	4.19	6.57	5%	30%	30.4%	0.02%	0.00%	0.11%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.08	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	39.46	5%	20%	20.6%	0.08%	-0.02%	0.65%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	5.16	20%	40%	44.7%	0.02%	-0.05%	0.08%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.01	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.17	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.60	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.78	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.01%	D	R		
4D3. Indirect emissions	N2O	0.51	0.65	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	77.90	50%	200%	206.2%	1.68%	1.28%	1.28%	0.03	0.01	2.71%				
TOTAL	HCFs		77.9				0.03%					0.07%				
TOTAL EMISSIONS		6088	9572				3.27%					5.20%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			3.27%			Trend uncertainty:			5.20%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2004

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2004 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3258	5%	5%	7.1%	2.35%	9.21%	53.52%	0.00	0.04	3.81%	D	R		
1AA1B. Petroleum refining	CO2	91	29	5%	5%	7.1%	0.02%	-1.94%	0.47%	0.00	0.00	0.10%	D	R		
1AA2A. Iron and steel	CO2	14	26	5%	5%	7.1%	0.02%	0.06%	0.42%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.01%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	96	5%	5%	7.1%	0.07%	0.17%	1.58%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	33	5%	5%	7.1%	0.02%	0.32%	0.54%	0.00	0.00	0.04%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	703	5%	5%	7.1%	0.51%	-0.38%	11.55%	0.00	0.01	0.82%	D	R		
1AA3A. Civil aviation	CO2	19	31	5%	5%	7.1%	0.02%	0.00%	0.52%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	1991	5%	5%	7.1%	1.44%	1.84%	32.71%	0.00	0.02	2.31%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.09	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	489	2%	2%	2.8%	0.14%	-0.08%	8.02%	0.00	0.00	0.23%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	97	2%	2%	2.8%	0.03%	0.10%	1.59%	0.00	0.00	0.05%	D	R		
1AA5A. Other Stationary	CO2	11	21	5%	5%	7.1%	0.01%	0.04%	0.34%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	842	5%	5%	7.1%	0.61%	-4.58%	13.83%	0.00	0.01	1.00%	D	R		
2A2. Lime production	CO2	6	11	5%	5%	7.1%	0.01%	0.03%	0.18%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	67	2%	2%	2.8%	0.02%	-0.41%	1.10%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	12	2%	2%	2.8%	0.00%	0.04%	0.20%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7713				0.08%					0.22%				
1AA1A. Public electricity and heat production	CH4	0.07	0.13	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.33	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04	0.02	20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.26	30%	100%	104.4%	0.10%	-0.05%	0.15%	0.00	0.00	0.08%	D	R		
4B. Manure Management	CH4	4.19	6.35	5%	30%	30.4%	0.02%	-0.01%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.05	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	40.33	5%	20%	20.6%	0.08%	-0.02%	0.66%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	4.93	20%	40%	44.7%	0.02%	-0.05%	0.08%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	62				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.17	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.57	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.73	20%	400%	400.5%	0.03%	0.00%	0.01%	0.00	0.00	0.02%	D	R		
4D3. Indirect emissions	N2O	0.51	0.61	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	101.7	50%	200%	206.2%	2.14%	1.67%	1.67%	0.03	0.01	3.55%				
TOTAL	HCFs		101.7				0.05%					0.13%				
TOTAL EMISSIONS		6088	9795				3.59%					5.85%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			3.59%			Trend uncertainty:			5.85%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2005

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2005 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3472	5%	5%	7.1%	4.03%	29.42%	57.03%	0.01	0.04	4.29%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-1.50%	0.00%	0.00	0.00	0.07%	D	R		
1AA2A. Iron and steel	CO2	14	23	5%	5%	7.1%	0.03%	0.14%	0.37%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.03%	0.07%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	89	5%	5%	7.1%	0.10%	0.58%	1.45%	0.00	0.00	0.11%	D	R		
1AA2F1. Other	CO2	8	18	5%	5%	7.1%	0.02%	0.15%	0.29%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	753	5%	5%	7.1%	0.87%	4.95%	12.37%	0.00	0.01	0.91%	D	R		
1AA3A. Civil aviation	CO2	19	32	5%	5%	7.1%	0.04%	0.20%	0.52%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2031	5%	5%	7.1%	2.36%	14.14%	33.36%	0.01	0.02	2.46%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	416	2%	2%	2.8%	0.19%	1.80%	6.84%	0.00	0.00	0.20%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	89	2%	2%	2.8%	0.04%	0.53%	1.46%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	21	5%	5%	7.1%	0.02%	0.17%	0.35%	0.00	0.00	0.03%	D	R		
2A1. Cement Production	CO2	697	822	5%	5%	7.1%	0.95%	2.06%	13.50%	0.00	0.01	0.96%	D	R		
2A2. Lime production	CO2	6	13	5%	5%	7.1%	0.02%	0.12%	0.21%	0.00	0.00	0.02%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	60	2%	2%	2.8%	0.03%	0.05%	0.98%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	13	2%	2%	2.8%	0.01%	0.12%	0.21%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	1	2%	2%	2.8%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7858				0.24%					0.26%				
1AA1A. Public electricity and heat production	CH4	0.07	0.14	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.35	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.10	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.67	30%	100%	104.4%	0.15%	0.02%	0.14%	0.00	0.00	0.06%	D	R		
4B. Manure Management	CH4	4.19	5.87	5%	30%	30.4%	0.03%	0.03%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.03	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	40.55	5%	20%	20.6%	0.14%	0.24%	0.67%	0.00	0.00	0.07%	D	R		
6B. Wastewater handling	CH4	5.10	4.91	20%	40%	44.7%	0.04%	0.00%	0.08%	0.00	0.00	0.02%	D	R		
TOTAL	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.18	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.52	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.66	20%	400%	400.5%	0.04%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D3. Indirect emissions	N2O	0.51	0.56	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	121.3	50%	200%	206.2%	4.11%	1.99%	1.99%	0.04	0.01	4.23%				
TOTAL	HCFs		121.3				0.17%					0.18%				
TOTAL EMISSIONS		6088	6088				6.36%					6.65%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			6.36%			Trend uncertainty:			6.65%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2006

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2006 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3653	5%	5%	7.1%	2.57%	14.48%	60.01%	0.01	0.04	4.30%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.47%	0.00%	0.00	0.00	0.12%	D	R		
1AA2A. Iron and steel	CO2	14	16	5%	5%	7.1%	0.01%	-0.11%	0.27%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	5	5%	5%	7.1%	0.00%	0.02%	0.08%	0.00	0.00	0.01%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	73	5%	5%	7.1%	0.05%	-0.25%	1.20%	0.00	0.00	0.09%	D	R		
1AA2F1. Other	CO2	8	17	5%	5%	7.1%	0.01%	0.06%	0.28%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	727	5%	5%	7.1%	0.51%	-0.31%	11.94%	0.00	0.01	0.84%	D	R		
1AA3A. Civil aviation	CO2	19	32	5%	5%	7.1%	0.02%	0.00%	0.52%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2019	5%	5%	7.1%	1.42%	1.45%	33.16%	0.00	0.02	2.35%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	466	2%	2%	2.8%	0.13%	-0.68%	7.65%	0.00	0.00	0.22%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	92	2%	2%	2.8%	0.03%	-0.02%	1.51%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	14	5%	5%	7.1%	0.01%	-0.08%	0.23%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	821	5%	5%	7.1%	0.58%	-5.43%	13.49%	0.00	0.01	0.99%	D	R		
2A2. Lime production	CO2	6	10	5%	5%	7.1%	0.01%	0.01%	0.16%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	72	2%	2%	2.8%	0.02%	-0.37%	1.18%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	16	2%	2%	2.8%	0.00%	0.10%	0.26%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	8036				0.09%					0.26%				
1AA1A. Public electricity and heat production	CH4	0.07	0.14	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.03	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.36	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.04	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.12	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.34	30%	100%	104.4%	0.09%	-0.07%	0.14%	0.00	0.00	0.09%	D	R		
4B. Manure Management	CH4	4.19	5.99	5%	30%	30.4%	0.02%	-0.02%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.05	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	41.51	5%	20%	20.6%	0.09%	-0.02%	0.68%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	4.19	20%	40%	44.7%	0.02%	-0.07%	0.07%	0.00	0.00	0.03%	D	R		
TOTAL	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.18	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.46	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.64	20%	400%	400.5%	0.03%	-0.01%	0.01%	0.00	0.00	0.03%	D	R		
4D3. Indirect emissions	N2O	0.51	0.52	20%	50%	53.9%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	151.9	50%	200%	206.2%	3.11%	2.50%	2.50%	0.05	0.02	5.29%				
TOTAL	HCFs		151.9				0.10%					0.28%				
TOTAL EMISSIONS		6088	10062				4.35%					7.34%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			4.35%			Trend uncertainty:			7.34%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2007

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2007 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3802	5%	5%	7.1%	2.59%	15.46%	62.45%	0.01	0.04	4.48%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.55%	0.00%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	22	5%	5%	7.1%	0.02%	-0.03%	0.36%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.00%	0.07%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	86	5%	5%	7.1%	0.06%	-0.08%	1.42%	0.00	0.00	0.10%	D	R		
1AA2F1. Other	CO2	8	17	5%	5%	7.1%	0.01%	0.06%	0.28%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	730	5%	5%	7.1%	0.50%	-0.65%	11.99%	0.00	0.01	0.85%	D	R		
1AA3A. Civil aviation	CO2	19	32	5%	5%	7.1%	0.02%	-0.02%	0.53%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2153	5%	5%	7.1%	1.47%	2.63%	35.36%	0.00	0.03	2.50%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	440	2%	2%	2.8%	0.12%	-1.36%	7.23%	0.00	0.00	0.21%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	92	2%	2%	2.8%	0.03%	-0.07%	1.51%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	20	5%	5%	7.1%	0.01%	0.02%	0.33%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	812	5%	5%	7.1%	0.55%	-6.17%	13.34%	0.00	0.01	0.99%	D	R		
2A2. Lime production	CO2	6	11	5%	5%	7.1%	0.01%	0.01%	0.17%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	71	2%	2%	2.8%	0.02%	-0.42%	1.17%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	15	2%	2%	2.8%	0.00%	0.08%	0.24%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.02%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	8311				0.09%					0.28%				
1AA1A. Public electricity and heat production	CH4	0.07	0.14	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.39	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.05	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.13	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.02	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.49	30%	100%	104.4%	0.09%	-0.08%	0.14%	0.00	0.00	0.10%	D	R		
4B. Manure Management	CH4	4.19	5.98	5%	30%	30.4%	0.02%	-0.02%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.03	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	41.26	5%	20%	20.6%	0.08%	-0.04%	0.68%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	3.73	20%	40%	44.7%	0.02%	-0.08%	0.06%	0.00	0.00	0.04%	D	R		
TOTAL	CH4	43	60				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.18	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.51	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.65	20%	400%	400.5%	0.02%	-0.01%	0.01%	0.00	0.00	0.03%	D	R		
4D3. Indirect emissions	N2O	0.51	0.54	20%	50%	53.9%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	180.7	50%	200%	206.2%	3.59%	2.97%	2.97%	0.06	0.02	6.30%				
TOTAL	HCFs		180.7				0.13%					0.40%				
TOTAL EMISSIONS		6088	10382				4.72%					8.23%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			4.72%			Trend uncertainty:			8.23%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2008

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2008 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3967	5%	5%	7.1%	2.66%	17.38%	65.17%	0.01	0.05	4.69%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.60%	0.00%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	18	5%	5%	7.1%	0.01%	-0.11%	0.29%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	-0.01%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	80	5%	5%	7.1%	0.05%	-0.21%	1.31%	0.00	0.00	0.09%	D	R		
1AA2F1. Other	CO2	8	13	5%	5%	7.1%	0.01%	-0.02%	0.21%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	730	5%	5%	7.1%	0.49%	-0.86%	12.00%	0.00	0.01	0.85%	D	R		
1AA3A. Civil aviation	CO2	19	35	5%	5%	7.1%	0.02%	0.02%	0.58%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2195	5%	5%	7.1%	1.47%	2.77%	36.05%	0.00	0.03	2.55%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	393	2%	2%	2.8%	0.11%	-2.28%	6.45%	0.00	0.00	0.19%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	86	2%	2%	2.8%	0.02%	-0.20%	1.41%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	42	5%	5%	7.1%	0.03%	0.38%	0.70%	0.00	0.00	0.05%	D	R		
2A1. Cement Production	CO2	697	818	5%	5%	7.1%	0.55%	-6.41%	13.44%	0.00	0.01	1.00%	D	R		
2A2. Lime production	CO2	6	11	5%	5%	7.1%	0.01%	0.02%	0.18%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	67	2%	2%	2.8%	0.02%	-0.53%	1.09%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	11	2%	2%	2.8%	0.00%	0.02%	0.19%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.01%	0.06%	0.00	0.00	0.00%	D	R		
TOTAL CO2	CO2	4627	8474				0.10%					0.30%				
1AA1A. Public electricity and heat production	CH4	0.07	0.15	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.41	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.06	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.13	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.04	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.54	30%	100%	104.4%	0.08%	-0.08%	0.14%	0.00	0.00	0.10%	D	R		
4B. Manure Management	CH4	4.19	6.13	5%	30%	30.4%	0.02%	-0.02%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.01	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	41.62	5%	20%	20.6%	0.08%	-0.05%	0.68%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	3.53	20%	40%	44.7%	0.01%	-0.09%	0.06%	0.00	0.00	0.04%	D	R		
TOTAL CH4	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.19	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.49	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.61	20%	400%	400.5%	0.02%	-0.01%	0.01%	0.00	0.00	0.03%	D	R		
4D3. Indirect emissions	N2O	0.51	0.52	20%	50%	53.9%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL N2O	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	206.1	50%	200%	206.2%	4.02%	3.39%	3.39%	0.07	0.02	7.18%				
TOTAL HCFs	HCFs		206.1				0.16%					0.52%				
TOTAL EMISSIONS		6088	10559				5.10%					9.05%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			5.10%			Trend uncertainty:			9.05%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2009

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2009 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3992	5%	5%	7.1%	2.74%	18.96%	65.58%	0.01	0.05	4.73%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.53%	0.00%	0.00	0.00	0.13%	D	R		
1AA2A. Iron and steel	CO2	14	15	5%	5%	7.1%	0.01%	-0.14%	0.25%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	4	5%	5%	7.1%	0.00%	0.00%	0.06%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	63	5%	5%	7.1%	0.04%	-0.45%	1.03%	0.00	0.00	0.08%	D	R		
1AA2F1. Other	CO2	8	11	5%	5%	7.1%	0.01%	-0.06%	0.18%	0.00	0.00	0.01%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	620	5%	5%	7.1%	0.43%	-2.36%	10.19%	0.00	0.01	0.73%	D	R		
1AA3A. Civil aviation	CO2	19	36	5%	5%	7.1%	0.02%	0.06%	0.59%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2197	5%	5%	7.1%	1.51%	3.62%	36.09%	0.00	0.03	2.56%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	431	2%	2%	2.8%	0.12%	-1.45%	7.07%	0.00	0.00	0.20%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	79	2%	2%	2.8%	0.02%	-0.27%	1.30%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	17	5%	5%	7.1%	0.01%	-0.03%	0.28%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	673	5%	5%	7.1%	0.46%	-8.30%	11.06%	0.00	0.01	0.89%	D	R		
2A2. Lime production	CO2	6	9	5%	5%	7.1%	0.01%	-0.01%	0.15%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	42	2%	2%	2.8%	0.01%	-0.89%	0.68%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	10	2%	2%	2.8%	0.00%	0.00%	0.17%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	3	2%	2%	2.8%	0.00%	-0.02%	0.05%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	8203				0.10%					0.30%				
1AA1A. Public electricity and heat production	CH4	0.07	0.15	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.42	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.05	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.16	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.07	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.52	30%	100%	104.4%	0.09%	-0.07%	0.14%	0.00	0.00	0.09%	D	R		
4B. Manure Management	CH4	4.19	6.08	5%	30%	30.4%	0.02%	-0.02%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.02	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	42.27	5%	20%	20.6%	0.08%	-0.02%	0.69%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	2.99	20%	40%	44.7%	0.01%	-0.09%	0.05%	0.00	0.00	0.04%	D	R		
TOTAL	CH4	43	61				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.19	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.47	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.60	20%	400%	400.5%	0.02%	-0.01%	0.01%	0.00	0.00	0.03%	D	R		
4D3. Indirect emissions	N2O	0.51	0.50	20%	50%	53.9%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	230.3	50%	200%	206.2%	4.61%	3.78%	3.78%	0.08	0.03	8.03%				
TOTAL	HCFs		230.3				0.21%					0.64%				
TOTAL EMISSIONS		6088	10299				5.61%					9.73%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			5.61%			Trend uncertainty:			9.73%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2010

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2010 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3868	5%	5%	7.1%	2.74%	18.32%	63.54%	0.01	0.04	4.59%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.46%	0.00%	0.00	0.00	0.12%	D	R		
1AA2A. Iron and steel	CO2	14	17	5%	5%	7.1%	0.01%	-0.10%	0.28%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	65	5%	5%	7.1%	0.05%	-0.37%	1.07%	0.00	0.00	0.08%	D	R		
1AA2F1. Other	CO2	8	10	5%	5%	7.1%	0.01%	-0.05%	0.17%	0.00	0.00	0.01%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	530	5%	5%	7.1%	0.37%	-3.47%	8.70%	0.00	0.01	0.64%	D	R		
1AA3A. Civil aviation	CO2	19	33	5%	5%	7.1%	0.02%	0.02%	0.55%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2244	5%	5%	7.1%	1.59%	5.36%	36.86%	0.00	0.03	2.62%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.08	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	367	2%	2%	2.8%	0.10%	-2.23%	6.04%	0.00	0.00	0.18%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	76	2%	2%	2.8%	0.02%	-0.27%	1.25%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	17	5%	5%	7.1%	0.01%	-0.02%	0.28%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	555	5%	5%	7.1%	0.39%	-9.65%	9.12%	0.00	0.01	0.81%	D	R		
2A2. Lime production	CO2	6	8	5%	5%	7.1%	0.01%	-0.03%	0.13%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	22	2%	2%	2.8%	0.01%	-1.17%	0.36%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	11	2%	2%	2.8%	0.00%	0.03%	0.19%	0.00	0.00	0.01%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	4	2%	2%	2.8%	0.00%	0.00%	0.07%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7832				0.10%					0.29%				
1AA1A. Public electricity and heat production	CH4	0.07	0.15	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.04	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.42	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.06	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.11	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.09	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	8.92	30%	100%	104.4%	0.09%	-0.06%	0.15%	0.00	0.00	0.09%	D	R		
4B. Manure Management	CH4	4.19	6.11	5%	30%	30.4%	0.02%	-0.01%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.02	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	42.94	5%	20%	20.6%	0.09%	0.01%	0.71%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	2.79	20%	40%	44.7%	0.01%	-0.09%	0.05%	0.00	0.00	0.04%	D	R		
TOTAL	CH4	43	62				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.01	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.20	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.49	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.62	20%	400%	400.5%	0.03%	-0.01%	0.01%	0.00	0.00	0.03%	D	R		
4D3. Indirect emissions	N2O	0.51	0.52	20%	50%	53.9%	0.00%	-0.01%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.07	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	249.9	50%	200%	206.2%	5.16%	4.10%	4.10%	0.08	0.03	8.71%				
TOTAL	HCFs		249.9				0.27%					0.76%				
TOTAL EMISSIONS		6088	9989				6.08%					10.24%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			6.08%			Trend uncertainty:			10.24%			

* for HFCs the base year is 1993

Tier 1 UNCERTAINTY CALCULATION AND REPORTING - 2011

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2011 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3710	5%	5%	7.1%	2.71%	17.12%	60.94%	0.01	0.04	4.39%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.38%	0.00%	0.00	0.00	0.12%	D	R		
1AA2A. Iron and steel	CO2	14	27	5%	5%	7.1%	0.02%	0.08%	0.45%	0.00	0.00	0.03%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.00%	-0.01%	0.05%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	100	5%	5%	7.1%	0.07%	0.25%	1.65%	0.00	0.00	0.12%	D	R		
1AA2F1. Other	CO2	8	14	5%	5%	7.1%	0.01%	0.02%	0.24%	0.00	0.00	0.02%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	397	5%	5%	7.1%	0.29%	-5.27%	6.52%	0.00	0.00	0.53%	D	R		
1AA3A. Civil aviation	CO2	19	34	5%	5%	7.1%	0.02%	0.05%	0.55%	0.00	0.00	0.04%	D	R		
1AA3B. Road transport	CO2	1168	2178	5%	5%	7.1%	1.59%	5.24%	35.77%	0.00	0.03	2.54%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CO2	307	417	2%	2%	2.8%	0.12%	-1.16%	6.86%	0.00	0.00	0.20%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	82	2%	2%	2.8%	0.02%	-0.12%	1.35%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	20	5%	5%	7.1%	0.01%	0.04%	0.33%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	546	5%	5%	7.1%	0.40%	-9.23%	8.97%	0.00	0.01	0.78%	D	R		
2A2. Lime production	CO2	6	8	5%	5%	7.1%	0.01%	-0.02%	0.13%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2			2%	2%	2.8%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
2A7. Other	CO2	57	18	2%	2%	2.8%	0.01%	-1.18%	0.30%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	6	2%	2%	2.8%	0.00%	-0.06%	0.09%	0.00	0.00	0.00%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.00%	-0.01%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	CO2	2	4	2%	2%	2.8%	0.00%	0.01%	0.07%	0.00	0.00	0.00%	D	R		
TOTAL	CO2	4627	7566				0.10%					0.27%				
1AA1A. Public electricity and heat production	CH4	0.07	0.14	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.02	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	CH4	0.19	0.42	5%	100%	100.1%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.05	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	CH4	0.09	0.13	5%	30%	30.4%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.14	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.14	30%	100%	104.4%	0.10%	-0.05%	0.15%	0.00	0.00	0.08%	D	R		
4B. Manure Management	CH4	4.19	5.88	5%	30%	30.4%	0.02%	-0.01%	0.10%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.03	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6A. Solid waste disposal on land	CH4	25.80	40.76	5%	20%	20.6%	0.09%	0.00%	0.67%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	2.39	20%	40%	44.7%	0.01%	-0.09%	0.04%	0.00	0.00	0.04%	D	R		
TOTAL	CH4	43	59				0.00%					0.00%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
3D. Other	N2O	0.14	0.20	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
4B. Manure Management	N2O	0.40	0.49	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.63	20%	400%	400.5%	0.03%	-0.01%	0.01%	0.00	0.00	0.02%	D	R		
4D3. Indirect emissions	N2O	0.51	0.52	20%	50%	53.9%	0.00%	0.00%	0.01%	0.00	0.00	0.00%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
6B. Wastewater handling	N2O	0.05	0.08	5%	10%	11.2%	0.00%	0.00%	0.00%	0.00	0.00	0.00%	D	R		
TOTAL	N2O	2	2				0.00%					0.00%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	259.2	50%	200%	206.2%	5.52%	4.26%	4.26%	0.09	0.03	9.03%				
TOTAL	HCFs		259.2				0.30%					0.82%				
TOTAL EMISSIONS		6088	9682				6.37%					10.41%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			6.37%			Trend uncertainty:			10.41%			

* for HFCs the base year is 1993

Tier I UNCERTAINTY CALCULATION AND REPORTING - 2012

IPCC Source category	Gas	Base year emissions (1990*), CO2 equiv. (Gg)	2012 emissions, CO2 equiv. (Gg)	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions	Emission factor quality indicator	Activity data quality indicator	Expert judgement reference numbers	Footnote reference number
1AA1A. Public electricity and heat production	CO2	1676	3546	5%	5%	7.1%	2.71%	16.33%	58.25%	0.01	0.04	4.20%	D	R		
1AA1B. Petroleum refining	CO2	91		5%	5%	7.1%	0.00%	-2.28%	0.00%	0.00	0.00	0.11%	D	R		
1AA2A. Iron and steel	CO2	14	12	5%	5%	7.1%	0.01%	-0.15%	0.20%	0.00	0.00	0.02%	D	R		
1AA2C. Chemicals	CO2	2	3	5%	5%	7.1%	0.0024%	-0.0038%	0.05%	0.00	0.00	0.0037%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CO2	53	52	5%	5%	7.1%	0.04%	-0.47%	0.86%	0.00	0.00	0.07%	D	R		
1AA2F1. Other	CO2	8	9	5%	5%	7.1%	0.01%	-0.05%	0.15%	0.00	0.00	0.01%	D	R		
1AA2F2. Non-metallic minerals	CO2	451	336	5%	5%	7.1%	0.26%	-5.76%	5.52%	0.00	0.00	0.48%	D	R		
1AA3A. Civil aviation	CO2	19	29	5%	5%	7.1%	0.02%	-0.01%	0.48%	0.00	0.00	0.03%	D	R		
1AA3B. Road transport	CO2	1168	2023	5%	5%	7.1%	1.55%	4.04%	33.24%	0.00	0.02	2.36%	D	R		
1AA4A. Commercial/ Institutional	CO2	0.05	0.07	2%	2%	2.8%	0.00002%	-0.0001%	0.00%	0.00	0.00	0.00003%	D	R		
1AA4B. Residential	CO2	307	411	2%	2%	2.8%	0.13%	-0.91%	6.76%	0.00	0.00	0.19%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CO2	56	79	2%	2%	2.8%	0.02%	-0.11%	1.30%	0.00	0.00	0.04%	D	R		
1AA5A. Other Stationary	CO2	11	17	5%	5%	7.1%	0.01%	0.00%	0.28%	0.00	0.00	0.02%	D	R		
2A1. Cement Production	CO2	697	505	5%	5%	7.1%	0.39%	-9.11%	8.29%	0.00	0.01	0.74%	D	R		
2A2. Lime production	CO2	6	4	5%	5%	7.1%	0.0028%	-0.08%	0.06%	0.00	0.00	0.01%	D	R		
2A3. Limestone and dolomite use	CO2		0	2%	2%	2.8%	0.0000%	0.00%	0.00%	0.00	0.00	0.0001%	D	R		
2A7. Other	CO2	57	45	2%	2%	2.8%	0.01%	-0.67%	0.74%	0.00	0.00	0.03%	D	R		
3A. Paint application	CO2	6	6	2%	2%	2.8%	0.0017%	-0.06%	0.09%	0.00	0.00	0.0028%	D	R		
3B. Degreasing and dry cleaning	CO2	1	0	2%	2%	2.8%	0.0001%	-0.01%	0.00%	0.00	0.00	0.0003%	D	R		
3D. Other	CO2	2	4	2%	2%	2.8%	0.0013%	0.01%	0.07%	0.00	0.00	0.0020%	D	R		
TOTAL	CO2	4627	7083				0.10%					0.24%				
1AA1A. Public electricity and heat production	CH4	0.07	0.14	5%	100%	100.1%	0.00148%	0.00061%	0.00%	0.00	0.00	0.00063%	D	R		
1AA1B. Petroleum refining	CH4	0.00		5%	100%	100.1%	0.00000%	-0.00010%	0.00%	0.00	0.00	0.00010%	D	R		
1AA2A. Iron and steel	CH4	0.00	0.00	5%	100%	100.1%	0.000004%	0.00000%	0.00%	0.00	0.00	0.00000%	D	R		
1AA2C. Chemicals	CH4	0.00	0.00	5%	100%	100.1%	0.000001%	0.00000%	0.00%	0.00	0.00	0.00000%	D	R		
1AA2E. Food processing, Beverages and Tobacco	CH4	0.00	0.00	4%	40%	40.2%	0.00001%	-0.00001%	0.00%	0.00	0.00	0.00001%	D	R		
1AA2F1. Other	CH4	0.00	0.00	5%	100%	100.1%	0.000003%	0.00000%	0.00%	0.00	0.00	0.00000%	D	R		
1AA2F2. Non-metallic minerals	CH4	0.03	0.01	5%	100%	100.1%	0.00013%	-0.00063%	0.00%	0.00	0.00	0.00063%	D	R		
1AA3A. Civil aviation	CH4	0.00	0.00	5%	100%	100.1%	0.00001%	0.00000%	0.00%	0.00	0.00	0.00000%	D	R		
1AA3B. Road transport	CH4	0.19	0.40	5%	100%	100.1%	0.00429%	0.00173%	0.01%	0.00	0.00	0.00179%	D	R		
1AA4A. Commercial/ Institutional	CH4	0.01	0.05	5%	300%	300.0%	0.00170%	0.00049%	0.00%	0.00	0.00	0.00147%	D	R		
1AA4B. Residential	CH4	0.09	0.13	5%	30%	30.4%	0.00044%	0.00006%	0.00%	0.00	0.00	0.00016%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	CH4	0.01	0.15	5%	50%	50.2%	0.00082%	0.00228%	0.00%	0.00	0.00	0.00115%	D	R		
1AA5A. Other Stationary	CH4	0.00	0.01	5%	20%	20.6%	0.00001%	0.00006%	0.00%	0.00	0.00	0.00001%	D	R		
1B2A4. Refining / Storage	CH4	0.04		20%	40%	44.7%	0.00000%	-0.00110%	0.00%	0.00	0.00	0.00044%	D	R		
4A. Enteric Fermentation	CH4	7.69	9.21	30%	100%	104.4%	0.10%	-0.04%	0.15%	0.00	0.00	0.08%	D	R		
4B. Manure Management	CH4	4.19	5.45	5%	30%	30.4%	0.02%	-0.02%	0.09%	0.00	0.00	0.01%	D	R		
4F. Field burning of agricultural residues	CH4	0.10	0.03	5%	50%	50.2%	0.00014%	-0.00218%	0.00%	0.00	0.00	0.001089%	D	R		
6A. Solid waste disposal on land	CH4	25.80	44.58	5%	20%	20.6%	0.10%	0.09%	0.73%	0.00	0.00	0.05%	D	R		
6B. Wastewater handling	CH4	5.10	1.92	20%	40%	44.7%	0.01%	-0.10%	0.03%	0.00	0.00	0.04%	D	R		
TOTAL	CH4	43	62				0.00021%					0.00010%				
1AA1A. Public electricity and heat production	N2O	0.01	0.03	5%	300%	300.0%	0.000888%	0.00%	0.00%	0.00	0.00	0.000369%	D	R		
1AA1B. Petroleum refining	N2O	0.00		5%	300%	300.0%	0.000000%	0.00%	0.00%	0.00	0.00	0.000059%	D	R		
1AA2A. Iron and steel	N2O	0.00	0.00	5%	300%	300.0%	0.000003%	0.00%	0.00%	0.00	0.00	0.000004%	D	R		
1AA2C. Chemicals	N2O	0.00	0.00	5%	300%	300.0%	0.000001%	0.00%	0.00%	0.00	0.00	0.000000%	D	R		
1AA2E. Food processing, Beverages and Tobacco	N2O	0.00	0.00	5%	50%	50.2%	0.000002%	0.00%	0.00%	0.00	0.00	0.000002%	D	R		
1AA2F1. Other	N2O	0.00	0.00	5%	300%	300.0%	0.000002%	0.00%	0.00%	0.00	0.00	0.000001%	D	R		
1AA2F2. Non-metallic minerals	N2O	0.01	0.00	5%	300%	300.0%	0.000095%	0.00%	0.00%	0.00	0.00	0.000259%	D	R		
1AA3A. Civil aviation	N2O	0.00	0.00	5%	300%	300.0%	0.000036%	0.00%	0.00%	0.00	0.00	0.000002%	D	R		
1AA3B. Road transport	N2O	0.01	0.02	5%	300%	300.0%	0.000570%	0.00%	0.00%	0.00	0.00	0.000131%	D	R		
1AA4A. Commercial/ Institutional	N2O	0.00	0.00	5%	100%	100.1%	0.000009%	0.00%	0.00%	0.00	0.00	0.000002%	D	R		
1AA4B. Residential	N2O	0.00	0.00	20%	400%	400.5%	0.000183%	0.00%	0.00%	0.00	0.00	0.000044%	D	R		
1AA4C. Agriculture/ Forestry/ Fisheries	N2O	0.00	0.00	20%	50%	53.9%	0.000015%	0.00%	0.00%	0.00	0.00	0.000019%	D	R		
1AA5A. Other Stationary	N2O	0.00	0.00	20%	20%	28.3%	0.000004%	0.00%	0.00%	0.00	0.00	0.000001%	D	R		
3D. Other	N2O	0.14	0.20	5%	10%	11.2%	0.000247%	0.00%	0.00%	0.00	0.00	0.000238%	D	R		
4B. Manure Management	N2O	0.40	0.49	5%	100%	100.1%	0.01%	0.00%	0.01%	0.00	0.00	0.001966%	D	R		
4D1. Direct Soil Emissions	N2O	0.64	0.62	20%	400%	400.5%	0.03%	-0.01%	0.01%	0.00	0.00	0.02%	D	R		
4D3. Indirect emissions	N2O	0.51	0.52	20%	50%	53.9%	0.003008%	0.00%	0.01%	0.00	0.00	0.003242%	D	R		
4F. Field burning of agricultural residues	N2O	0.00	0.00	20%	20%	28.3%	0.000002%	0.00%	0.00%	0.00	0.00	0.000006%	D	R		
6B. Wastewater handling	N2O	0.05	0.08	5%	10%	11.2%	0.000093%	0.00%	0.00%	0.00	0.00	0.000090%	D	R		
TOTAL	N2O	2	2				0.00001%					0.000001%				
2F. Consumption of Halocarbons and SF6	HCFs	0.005	260.5	50%	200%	206.2%	5.80%	4.28%	4.28%	0.09	0.03	9.08%				
TOTAL	HCFs		260.5				0.34%					0.82%				
TOTAL EMISSIONS		6088	9259				6.60%					10.32%				
TOTAL UNCERTAINTIES				Percentage uncertainty in total inventory			6.60%			Trend uncertainty:			10.32%			

* for HFCs the base year is 1993

Annex III. CRF summary tables for 1990-2012

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Inventory 1990

Submission 2014 v1.5

CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	4,485.30	910.18	553.40	NA,NE,NO	NA,NE,NO	NA,NE,NO	5,948.88
1. Energy	3,858.47	9.46	10.76				3,878.69
A. Fuel Combustion (Sectoral Approach)	3,858.47	8.54	10.76				3,877.76
1. Energy Industries	1,766.89	1.46	4.31				1,772.66
2. Manufacturing Industries and Construction	529.49	0.75	1.87				532.10
3. Transport	1,187.67	4.04	3.28				1,194.99
4. Other Sectors	363.21	2.26	1.27				366.75
5. Other	11.20	0.03	0.03				11.26
B. Fugitive Emissions from Fuels	NA,NE,NO	0.92	NA,NE,NO				0.92
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	0.92	NA,NE,NO				0.92
2. Industrial Processes	759.44	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	759.44
A. Mineral Products	759.44	NA,NE	NA,NE				759.44
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.97		42.99				51.96
4. Agriculture		251.67	480.79				732.47
A. Enteric Fermentation		161.41					161.41
B. Manure Management		88.08	123.98				212.06
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	356.36				356.36
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		2.18	0.45				2.63
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-141.58	0.27	2.33				-138.97
A. Forest Land	-156.51	0.27	2.33				-153.90
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	14.93	NE	NE				14.93
6. Waste	NA,NO	648.77	16.52				665.30
A. Solid Waste Disposal on Land	NA,NO	541.74					541.74
B. Waste-water Handling		107.04	16.52				123.56
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	906.31	0.36	6.80				913.47
Aviation	725.40	0.11	6.35				731.86
Marine	180.91	0.25	0.45				181.61
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	15.14						15.14
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							6,087.85
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							5,948.88

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1991
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	4,912.93	946.05	550.55	NA,NE,NO	NA,NE,NO	NA,NE,NO	6,409.53
1. Energy	4,345.92	9.98	11.92				4,367.82
A. Fuel Combustion (Sectoral Approach)	4,345.92	8.90	11.92				4,366.74
1. Energy Industries	1,829.07	1.51	4.46				1,835.04
2. Manufacturing Industries and Construction	934.69	0.96	2.80				938.45
3. Transport	1,180.82	4.13	3.24				1,188.19
4. Other Sectors	388.89	2.26	1.38				392.54
5. Other	12.46	0.04	0.03				12.52
B. Fugitive Emissions from Fuels	NA,NE,NO	1.08	NA,NE,NO				1.08
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.08	NA,NE,NO				1.08
2. Industrial Processes	716.44	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	716.44
A. Mineral Products	716.44	NA,NE	NA,NE				716.44
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	7.87		44.16				52.03
4. Agriculture		256.66	477.27				733.93
A. Enteric Fermentation		163.79					163.79
B. Manure Management		91.42	124.00				215.42
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	352.95				352.95
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.46	0.32				1.77
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-157.31	0.03	0.24				-157.04
A. Forest Land	-169.00	0.03	0.24				-168.74
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	11.70	NE	NE				11.70
6. Waste	NA,NO	679.38	16.96				696.34
A. Solid Waste Disposal on Land	NA,NO	569.45					569.45
B. Waste-water Handling		109.93	16.96				126.89
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,041.59	0.37	8.03				1,049.99
Aviation	867.23	0.13	7.60				874.96
Marine	174.36	0.24	0.43				175.04
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	13.85						13.85
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							6,566.57
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							6,409.53

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1992
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	5,252.81	991.20	600.20	NA,NE,NO	NA,NE,NO	NA,NE,NO	6,844.21
1. Energy	4,637.23	10.23	12.27				4,659.73
A. Fuel Combustion (Sectoral Approach)	4,637.23	9.17	12.27				4,658.67
1. Energy Industries	2,126.15	1.76	5.18				2,133.09
2. Manufacturing Industries and Construction	695.48	0.49	1.79				697.76
3. Transport	1,330.25	4.37	3.65				1,338.28
4. Other Sectors	470.25	2.51	1.61				474.38
5. Other	15.09	0.04	0.04				15.17
B. Fugitive Emissions from Fuels	NA,NE,NO	1.06	NA,NE,NO				1.06
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.06	NA,NE,NO				1.06
2. Industrial Processes	767.74	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	767.74
A. Mineral Products	767.74	NA,NE	NA,NE				767.74
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.25		45.34				53.59
4. Agriculture		270.13	525.10				795.23
A. Enteric Fermentation		164.75					164.75
B. Manure Management		102.32	125.25				227.58
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	399.31				399.31
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		3.06	0.54				3.59
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-160.41	0.01	0.07				-160.34
A. Forest Land	-171.16	0.01	0.07				-171.09
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	10.75	NE	NE				10.75
6. Waste	NA,NO	710.84	17.42				728.26
A. Solid Waste Disposal on Land	NA,NO	598.01					598.01
B. Waste-water Handling		112.84	17.42				130.26
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,022.18	0.38	7.80				1,030.36
Aviation	838.49	0.12	7.34				845.96
Marine	183.70	0.26	0.45				184.41
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	13.65						13.65
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							7,004.55
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							6,844.21

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1993
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	5,569.15	1,035.35	620.38	0.01	NA,NE,NO	NA,NE,NO	7,224.89
1. Energy	4,826.26	10.41	12.72				4,849.39
A. Fuel Combustion (Sectoral Approach)	4,826.26	9.28	12.72				4,848.26
1. Energy Industries	2,246.77	1.85	5.47				2,254.09
2. Manufacturing Industries and Construction	742.72	0.53	1.91				745.16
3. Transport	1,350.26	4.36	3.71				1,358.33
4. Other Sectors	470.85	2.49	1.60				474.94
5. Other	15.66	0.04	0.04				15.74
B. Fugitive Emissions from Fuels	NA,NE,NO	1.13	NA,NE,NO				1.13
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.13	NA,NE,NO				1.13
2. Industrial Processes	840.94	NA,NE,NO	NA,NE,NO	0.01	NA,NE,NO	NA,NE,NO	840.95
A. Mineral Products	840.94	NA,NE	NA,NE				840.94
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				0.01	NA,NE,NO	NA,NE,NO	0.01
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.28		46.34				54.62
4. Agriculture		285.84	533.14				818.99
A. Enteric Fermentation		171.16					171.16
B. Manure Management		111.44	129.97				241.41
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	402.63				402.63
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		3.25	0.55				3.79
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-106.32	1.16	10.00				-95.17
A. Forest Land	-118.95	1.16	10.00				-107.80
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	12.63	NE	NE				12.63
6. Waste	NA,NO	737.93	18.17				756.10
A. Solid Waste Disposal on Land	NA,NO	623.12					623.12
B. Waste-water Handling		114.81	18.17				132.99
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	863.74	0.32	6.59				870.65
Aviation	708.44	0.11	6.21				714.75
Marine	155.30	0.22	0.38				155.90
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	13.55						13.55
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							7,320.05
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							7,224.89

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1994
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	5,792.62	1,061.86	617.23	0.01	NA,NE,NO	NA,NE,NO	7,471.72
1. Energy	5,032.26	10.89	13.22				5,056.37
A. Fuel Combustion (Sectoral Approach)	5,032.26	9.58	13.22				5,055.05
1. Energy Industries	2,378.20	1.96	5.80				2,385.97
2. Manufacturing Industries and Construction	752.16	0.52	1.91				754.58
3. Transport	1,404.39	4.59	3.86				1,412.85
4. Other Sectors	481.39	2.46	1.61				485.46
5. Other	16.11	0.05	0.04				16.20
B. Fugitive Emissions from Fuels	NA,NE,NO	1.32	NA,NE,NO				1.32
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.32	NA,NE,NO				1.32
2. Industrial Processes	873.64	NA,NE,NO	NA,NE,NO	0.01	NA,NE,NO	NA,NE,NO	873.65
A. Mineral Products	873.64	NA,NE	NA,NE				873.64
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				0.01	NA,NE,NO	NA,NE,NO	0.01
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.97		47.26				56.23
4. Agriculture		285.31	530.60				815.91
A. Enteric Fermentation		173.74					173.74
B. Manure Management		109.14	132.02				241.16
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	398.19				398.19
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		2.43	0.40				2.83
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-122.25	0.88	7.59				-113.77
A. Forest Land	-133.12	0.88	7.59				-124.65
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	10.87	NE	NE				10.87
6. Waste	NA,NO	764.78	18.56				783.34
A. Solid Waste Disposal on Land	NA,NO	647.54					647.54
B. Waste-water Handling		117.24	18.56				135.79
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	918.16	0.37	6.83				925.36
Aviation	726.12	0.11	6.36				732.59
Marine	192.04	0.27	0.47				192.78
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	12.44						12.44
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							7,585.50
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							7,471.72

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1995
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	5,625.21	1,119.56	627.53	2.30	NA,NE,NO	NA,NE,NO	7,374.61
1. Energy	4,929.83	11.48	12.98				4,954.29
A. Fuel Combustion (Sectoral Approach)	4,929.83	10.28	12.98				4,953.09
1. Energy Industries	2,169.91	1.79	5.28				2,176.99
2. Manufacturing Industries and Construction	740.09	0.48	1.82				742.39
3. Transport	1,490.99	4.76	4.10				1,499.85
4. Other Sectors	511.34	3.20	1.74				516.28
5. Other	17.49	0.05	0.04				17.58
B. Fugitive Emissions from Fuels	NA,NE,NO	1.20	NA,NE,NO				1.20
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.20	NA,NE,NO				1.20
2. Industrial Processes	838.98	NA,NE,NO	NA,NE,NO	2.30	NA,NE,NO	NA,NE,NO	841.28
A. Mineral Products	838.98	NA,NE	NA,NE				838.98
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				2.30	NA,NE,NO	NA,NE,NO	2.30
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	7.89		48.06				55.94
4. Agriculture		297.20	544.95				842.15
A. Enteric Fermentation		180.37					180.37
B. Manure Management		114.53	137.11				251.64
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	407.41				407.41
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		2.30	0.44				2.73
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-151.48	0.27	2.29				-148.92
A. Forest Land	-162.84	0.27	2.29				-160.28
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	11.36	NE	NE				11.36
6. Waste	NA,NO	810.62	19.24				829.86
A. Solid Waste Disposal on Land	NA,NO	693.15					693.15
B. Waste-water Handling		117.46	19.24				136.71
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,011.47	0.41	7.51				1,019.39
Aviation	797.58	0.12	6.99				804.69
Marine	213.88	0.30	0.52				214.71
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	23.22						23.22
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							7,523.53
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							7,374.61

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1996
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	5,966.39	1,131.85	648.72	4.45	NA,NE,NO	NA,NE,NO	7,751.40
1. Energy	5,213.93	12.00	13.72				5,239.65
A. Fuel Combustion (Sectoral Approach)	5,213.93	10.90	13.72				5,238.54
1. Energy Industries	2,284.51	1.88	5.56				2,291.96
2. Manufacturing Industries and Construction	836.70	0.52	2.03				839.25
3. Transport	1,541.13	4.87	4.22				1,550.22
4. Other Sectors	533.18	3.57	1.87				538.62
5. Other	18.40	0.05	0.05				18.50
B. Fugitive Emissions from Fuels	NA,NE,NO	1.10	NA,NE,NO				1.10
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.10	NA,NE,NO				1.10
2. Industrial Processes	898.85	NA,NE,NO	NA,NE,NO	4.45	NA,NE,NO	NA,NE,NO	903.30
A. Mineral Products	898.85	NA,NE	NA,NE				898.85
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				4.45	NA,NE,NO	NA,NE,NO	4.45
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	7.86		48.79				56.65
4. Agriculture		306.88	564.56				871.44
A. Enteric Fermentation		183.75					183.75
B. Manure Management		120.94	144.37				265.31
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	419.76				419.76
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		2.19	0.43				2.62
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-154.25	0.25	2.12				-151.89
A. Forest Land	-165.03	0.25	2.12				-162.67
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	10.78	NE	NE				10.78
6. Waste	NA,NO	812.73	19.53				832.25
A. Solid Waste Disposal on Land	NA,NO	697.50					697.50
B. Waste-water Handling		115.22	19.53				134.75
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,045.69	0.51	7.38				1,053.58
Aviation	763.26	0.11	6.69				770.05
Marine	282.44	0.39	0.69				283.52
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	27.64						27.64
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							7,903.29
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							7,751.40

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1997
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions)⁽¹⁾	6,069.35	1,146.19	639.67	8.71	NA,NE,NO	NA,NE,NO	7,863.93
1. Energy	5,349.41	12.28	13.98				5,375.66
A. Fuel Combustion (Sectoral Approach)	5,349.41	10.77	13.98				5,374.15
1. Energy Industries	2,415.76	1.99	5.88				2,423.63
2. Manufacturing Industries and Construction	745.72	0.47	1.81				748.00
3. Transport	1,608.45	5.04	4.41				1,617.90
4. Other Sectors	560.16	3.21	1.83				565.20
5. Other	19.31	0.06	0.05				19.42
B. Fugitive Emissions from Fuels	NA,NE,NO	1.51	NA,NE,NO				1.51
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.51	NA,NE,NO				1.51
2. Industrial Processes	863.71	NA,NE,NO	NA,NE,NO	8.71	NA,NE,NO	NA,NE,NO	872.42
A. Mineral Products	863.71	NA,NE	NA,NE				863.71
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				8.71	NA,NE,NO	NA,NE,NO	8.71
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.47		49.44				57.91
4. Agriculture		303.08	553.53				856.61
A. Enteric Fermentation		180.12					180.12
B. Manure Management		122.18	156.19				278.37
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	397.12				397.12
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.78	0.22				1.00
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry⁽¹⁾	-152.23	0.34	2.95				-148.94
A. Forest Land	-161.77	0.34	2.95				-158.48
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	9.54	NE	NE				9.54
6. Waste	NA,NO	830.49	19.78				850.27
A. Solid Waste Disposal on Land	NA,NO	714.82					714.82
B. Waste-water Handling		115.67	19.78				135.45
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items:⁽⁴⁾							
International Bunkers	1,056.77	0.54	7.32				1,064.63
Aviation	749.51	0.11	6.56				756.19
Marine	307.26	0.43	0.76				308.44
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	21.15						21.15
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							8,012.87
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							7,863.93

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1998
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	6,508.49	1,158.27	680.05	14.06	NA,NE,NO	NA,NE,NO	8,360.87
1. Energy	5,690.56	12.90	14.88				5,718.35
A. Fuel Combustion (Sectoral Approach)	5,690.56	11.33	14.88				5,716.77
1. Energy Industries	2,648.20	2.18	6.45				2,656.83
2. Manufacturing Industries and Construction	751.66	0.51	1.87				754.04
3. Transport	1,685.07	5.21	4.61				1,694.89
4. Other Sectors	585.06	3.37	1.90				590.33
5. Other	20.57	0.06	0.05				20.68
B. Fugitive Emissions from Fuels	NA,NE,NO	1.57	NA,NE,NO				1.57
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.57	NA,NE,NO				1.57
2. Industrial Processes	818.17	NA,NE,NO	NA,NE,NO	14.06	NA,NE,NO	NA,NE,NO	832.23
A. Mineral Products	818.17	NA,NE	NA,NE				818.17
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				14.06	NA,NE,NO	NA,NE,NO	14.06
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.05		50.00				58.05
4. Agriculture		298.73	564.84				863.57
A. Enteric Fermentation		173.83					173.83
B. Manure Management		123.88	158.31				282.18
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	406.28				406.28
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.03	0.25				1.28
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-8.30	3.50	30.16				25.37
A. Forest Land	-16.69	3.50	30.16				16.97
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	8.39	NE	NE				8.39
6. Waste	NA,NO	843.14	20.17				863.31
A. Solid Waste Disposal on Land	NA,NO	727.21					727.21
B. Waste-water Handling		115.93	20.17				136.11
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,097.81	0.55	7.68				1,106.03
Aviation	789.76	0.12	6.92				796.79
Marine	308.05	0.43	0.76				309.24
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	22.60						22.60
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							8,335.51
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							8,360.87

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1999
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	6,615.43	1,166.36	665.98	21.87	NA,NE,NO	NA,NE,NO	8,469.64
1. Energy	5,954.45	13.46	15.60				5,983.51
A. Fuel Combustion (Sectoral Approach)	5,954.45	11.75	15.60				5,981.80
1. Energy Industries	2,833.53	2.34	6.91				2,842.78
2. Manufacturing Industries and Construction	778.17	0.54	1.95				780.66
3. Transport	1,730.04	5.39	4.74				1,740.17
4. Other Sectors	591.56	3.42	1.94				596.93
5. Other	21.14	0.06	0.05				21.26
B. Fugitive Emissions from Fuels	NA,NE,NO	1.71	NA,NE,NO				1.71
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.71	NA,NE,NO				1.71
2. Industrial Processes	824.07	NA,NE,NO	NA,NE,NO	21.87	NA,NE,NO	NA,NE,NO	845.94
A. Mineral Products	824.07	NA,NE	NA,NE				824.07
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				21.87	NA,NE,NO	NA,NE,NO	21.87
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.16		50.56				58.72
4. Agriculture		295.58	579.39				874.97
A. Enteric Fermentation		173.30					173.30
B. Manure Management		120.66	162.51				283.16
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	416.57				416.57
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.62	0.32				1.94
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-171.25	0.00	0.03				-171.21
A. Forest Land	-179.91	0.00	0.03				-179.87
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	8.66	NE	NE				8.66
6. Waste	NA,NO	857.32	20.40				877.72
A. Solid Waste Disposal on Land	NA,NO	740.76					740.76
B. Waste-water Handling		116.56	20.40				136.96
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary I.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,288.90	0.79	8.26				1,297.95
Aviation	807.38	0.12	7.07				814.57
Marine	481.52	0.67	1.19				483.38
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	22.92						22.92
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							8,640.85
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							8,469.64

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2000
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	6,883.30	1,186.39	655.27	28.69	NA,NE,NO	0.01	8,753.66
1. Energy	6,182.42	13.59	16.34				6,212.36
A. Fuel Combustion (Sectoral Approach)	6,182.42	11.89	16.34				6,210.65
1. Energy Industries	2,960.79	2.44	7.21				2,970.45
2. Manufacturing Industries and Construction	800.85	0.67	2.19				803.71
3. Transport	1,772.79	5.49	4.87				1,783.15
4. Other Sectors	626.17	3.22	2.01				631.40
5. Other	21.83	0.06	0.06				21.95
B. Fugitive Emissions from Fuels	NA,NE,NO	1.70	NA,NE,NO				1.70
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.70	NA,NE,NO				1.70
2. Industrial Processes	846.82	NA,NE,NO	NA,NE,NO	28.69	NA,NE,NO	0.01	875.52
A. Mineral Products	846.82	NA,NE	NA,NE				846.82
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				28.69	NA,NE,NO	0.01	28.70
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.73		51.07				59.80
4. Agriculture		297.73	563.21				860.94
A. Enteric Fermentation		178.37					178.37
B. Manure Management		118.67	171.21				289.87
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	391.83				391.83
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.69	0.18				0.87
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-154.67	0.45	3.84				-150.38
A. Forest Land	-160.64	0.45	3.84				-156.35
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	5.97	NE	NE				5.97
6. Waste	NA,NO	874.62	20.80				895.42
A. Solid Waste Disposal on Land	NA,NO	758.24					758.24
B. Waste-water Handling		116.39	20.80				137.19
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,420.22	0.96	8.65				1,429.82
Aviation	818.24	0.12	7.17				825.53
Marine	601.97	0.84	1.48				604.29
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	22.17						22.17
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							8,904.04
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							8,753.66

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2001
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	6,775.28	1,247.52	714.58	40.34	NA,NE,NO	0.01	8,777.73
1. Energy	6,078.68	13.78	16.20				6,108.66
A. Fuel Combustion (Sectoral Approach)	6,078.68	12.10	16.20				6,106.98
1. Energy Industries	2,843.69	2.35	6.92				2,852.96
2. Manufacturing Industries and Construction	750.71	0.69	2.16				753.56
3. Transport	1,831.39	5.76	5.05				1,842.20
4. Other Sectors	630.83	3.24	2.02				636.08
5. Other	22.06	0.06	0.06				22.18
B. Fugitive Emissions from Fuels	NA,NE,NO	1.68	NA,NE,NO				1.68
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.68	NA,NE,NO				1.68
2. Industrial Processes	819.78	NA,NE,NO	NA,NE,NO	40.34	NA,NE,NO	0.01	860.13
A. Mineral Products	819.78	NA,NE	NA,NE				819.78
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				40.34	NA,NE,NO	0.01	40.35
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	8.41		51.66				60.07
4. Agriculture		322.96	617.51				940.46
A. Enteric Fermentation		193.35					193.35
B. Manure Management		128.20	187.84				316.04
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	429.42				429.42
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.40	0.25				1.65
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-131.58	0.95	8.17				-122.46
A. Forest Land	-136.90	0.95	8.17				-127.78
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	5.31	NE	NE				5.31
6. Waste	NA,NO	909.84	21.05				930.88
A. Solid Waste Disposal on Land	NA,NO	794.31					794.31
B. Waste-water Handling		115.53	21.05				136.58
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,559.27	0.97	9.88				1,570.13
Aviation	960.67	0.14	8.41				969.23
Marine	598.60	0.83	1.47				600.90
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	25.42						25.42
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							8,900.20
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							8,777.73

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2002
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,001.92	1,284.43	760.59	55.82	NA,NE,NO	0.01	9,102.77
1. Energy	6,239.65	14.14	16.60				6,270.40
A. Fuel Combustion (Sectoral Approach)	6,239.65	12.57	16.60				6,268.82
1. Energy Industries	3,004.99	2.48	7.32				3,014.80
2. Manufacturing Industries and Construction	762.92	0.70	2.18				765.81
3. Transport	1,814.16	5.87	5.01				1,825.03
4. Other Sectors	636.43	3.46	2.04				641.92
5. Other	21.14	0.06	0.05				21.26
B. Fugitive Emissions from Fuels	NA,NE,NO	1.58	NA,NE,NO				1.58
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.58	NA,NE,NO				1.58
2. Industrial Processes	852.43	NA,NE,NO	NA,NE,NO	55.82	NA,NE,NO	0.01	908.26
A. Mineral Products	852.43	NA,NE	NA,NE				852.43
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				55.82	NA,NE,NO	0.01	55.83
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	10.81		52.26				63.06
4. Agriculture		344.50	656.51				1,001.00
A. Enteric Fermentation		204.31					204.31
B. Manure Management		138.69	199.51				338.20
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	456.72				456.72
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.50	0.27				1.77
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-100.97	1.62	13.93				-85.42
A. Forest Land	-104.74	1.62	13.93				-89.19
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	3.77	NE	NE				3.77
6. Waste	NA,NO	924.18	21.29				945.46
A. Solid Waste Disposal on Land	NA,NO	810.58					810.58
B. Waste-water Handling		113.59	21.29				134.88
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,354.19	0.73	9.14				1,364.07
Aviation	923.21	0.14	8.09				931.43
Marine	430.98	0.60	1.06				432.64
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	31.00						31.00
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,188.19
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,102.77

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2003
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,358.23	1,288.23	732.12	77.89	NA,NE,NO	0.01	9,456.49
1. Energy	6,615.85	14.79	17.72				6,648.36
A. Fuel Combustion (Sectoral Approach)	6,615.85	13.38	17.72				6,646.95
1. Energy Industries	3,231.56	2.67	7.87				3,242.10
2. Manufacturing Industries and Construction	786.51	0.80	2.41				789.72
3. Transport	1,920.09	6.36	5.29				1,931.75
4. Other Sectors	655.97	3.49	2.09				661.55
5. Other	21.71	0.06	0.06				21.83
B. Fugitive Emissions from Fuels	NA,NE,NO	1.41	NA,NE,NO				1.41
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	1.41	NA,NE,NO				1.41
2. Industrial Processes	855.19	NA,NE,NO	NA,NE,NO	77.89	NA,NE,NO	0.01	933.09
A. Mineral Products	855.19	NA,NE	NA,NE				855.19
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				77.89	NA,NE,NO	0.01	77.90
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	12.95		52.93				65.89
4. Agriculture		335.31	631.17				966.49
A. Enteric Fermentation		195.76					195.76
B. Manure Management		137.95	184.58				322.53
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	446.30				446.30
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.61	0.29				1.90
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-125.76	1.10	9.47				-115.19
A. Forest Land	-128.70	1.10	9.47				-118.13
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	2.95	NE	NE				2.95
6. Waste	NA,NO	937.03	20.82				957.85
A. Solid Waste Disposal on Land	NA,NO	828.61					828.61
B. Waste-water Handling		108.41	20.82				129.23
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,377.28	0.69	9.62				1,387.58
Aviation	989.09	0.15	8.66				997.90
Marine	388.19	0.54	0.96				389.68
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	43.03						43.03
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,571.67
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,456.49

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2004
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions)⁽¹⁾	7,574.69	1,294.48	693.59	101.68	NA,NE,NO	0.07	9,664.49
1. Energy	6,777.53	14.38	18.09				6,809.99
A. Fuel Combustion (Sectoral Approach)	6,777.53	13.97	18.09				6,809.59
1. Energy Industries	3,286.73	2.71	7.99				3,297.42
2. Manufacturing Industries and Construction	861.79	0.84	2.57				865.19
3. Transport	2,022.84	6.94	5.58				2,035.36
4. Other Sectors	585.44	3.35	1.90				590.69
5. Other	20.74	0.13	0.05				20.92
B. Fugitive Emissions from Fuels	NA,NE,NO	0.40	NA,NE,NO				0.40
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	0.40	NA,NE,NO				0.40
2. Industrial Processes	919.91	NA,NE,NO	NA,NE,NO	101.68	NA,NE,NO	0.07	1,021.65
A. Mineral Products	919.91	NA,NE	NA,NE				919.91
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				101.68	NA,NE,NO	0.07	101.75
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	15.61		53.67				69.28
4. Agriculture		328.88	593.52				922.40
A. Enteric Fermentation		194.50					194.50
B. Manure Management		133.26	176.11				309.37
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	417.19				417.19
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.12	0.22				1.34
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry⁽¹⁾	-138.36	0.84	7.24				-130.28
A. Forest Land	-140.68	0.84	7.24				-132.60
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	2.32	NE	NE				2.32
6. Waste	NA,NO	950.38	21.07				971.45
A. Solid Waste Disposal on Land	NA,NO	846.86					846.86
B. Waste-water Handling		103.52	21.07				124.59
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items:⁽⁴⁾							
International Bunkers	1,071.52	0.37	8.31				1,080.20
Aviation	899.71	0.13	7.88				907.72
Marine	171.82	0.24	0.43				172.48
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	35.65						35.65
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,794.77
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,664.49

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2005
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,774.85	1,277.09	648.76	121.19	NA,NE,NO	0.07	9,821.97
1. Energy	6,946.43	14.42	18.41				6,979.26
A. Fuel Combustion (Sectoral Approach)	6,946.43	14.42	18.41				6,979.26
1. Energy Industries	3,471.84	2.86	8.43				3,483.13
2. Manufacturing Industries and Construction	885.86	0.82	2.56				889.24
3. Transport	2,062.50	7.30	5.69				2,075.49
4. Other Sectors	504.86	3.31	1.67				509.84
5. Other	21.37	0.13	0.06				21.56
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	894.79	NA,NE,NO	NA,NE,NO	121.19	NA,NE,NO	0.07	1,016.06
A. Mineral Products	894.79	NA,NE	NA,NE				894.79
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				121.19	NA,NE,NO	0.07	121.27
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	16.67		54.48				71.15
4. Agriculture		306.09	538.34				844.44
A. Enteric Fermentation		182.17					182.17
B. Manure Management		123.20	160.17				283.37
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	378.02				378.02
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.72	0.16				0.88
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-83.04	1.96	16.91				-64.17
A. Forest Land	-85.35	1.96	16.91				-66.48
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	2.31	NE	NE				2.31
6. Waste	NA,NO	954.61	20.62				975.23
A. Solid Waste Disposal on Land	NA,NO	851.52					851.52
B. Waste-water Handling		103.09	20.62				123.70
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,794.96	1.39	9.99				1,806.34
Aviation	886.56	0.13	7.77				894.45
Marine	908.40	1.26	2.23				911.89
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	30.08						30.08
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,886.13
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,821.97

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2006
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,898.88	1,277.55	604.30	151.87	NA,NE,NO	0.08	9,932.68
1. Energy	7,114.23	14.98	18.58				7,147.79
A. Fuel Combustion (Sectoral Approach)	7,114.23	14.98	18.58				7,147.79
1. Energy Industries	3,653.38	2.92	8.61				3,664.91
2. Manufacturing Industries and Construction	838.38	0.77	2.41				841.57
3. Transport	2,050.91	7.57	5.67				2,064.15
4. Other Sectors	557.66	3.60	1.84				563.11
5. Other	13.90	0.11	0.04				14.05
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	902.63	NA,NE,NO	NA,NE,NO	151.87	NA,NE,NO	0.08	1,054.58
A. Mineral Products	902.63	NA,NE	NA,NE				902.63
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				151.87	NA,NE,NO	0.08	151.95
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	19.35		55.49				74.84
4. Agriculture		302.01	501.86				803.87
A. Enteric Fermentation		175.16					175.16
B. Manure Management		125.76	143.06				268.82
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	358.35				358.35
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		1.09	0.45				1.54
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-137.33	0.86	7.38				-129.09
A. Forest Land	-139.02	0.86	7.38				-130.78
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	1.69	NE	NE				1.69
6. Waste	NA,NO	959.71	20.98				980.69
A. Solid Waste Disposal on Land	NA,NO	871.75					871.75
B. Waste-water Handling		87.96	20.98				108.94
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,839.52	1.42	10.30				1,851.24
Aviation	914.95	0.14	8.01				923.10
Marine	924.57	1.29	2.28				928.14
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	35.43						35.43
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							10,061.77
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,932.68

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2007
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	8,327.82	1,269.66	658.11	180.64	NA,NE,NO	0.08	10,436.31
1. Energy	7,398.53	16.46	19.71				7,434.70
A. Fuel Combustion (Sectoral Approach)	7,398.53	16.46	19.71				7,434.70
1. Energy Industries	3,801.67	3.04	8.97				3,813.67
2. Manufacturing Industries and Construction	859.69	0.94	2.80				863.43
3. Transport	2,184.90	8.19	6.04				2,199.12
4. Other Sectors	532.02	4.17	1.85				538.04
5. Other	20.26	0.13	0.05				20.44
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	894.21	NA,NE,NO	NA,NE,NO	180.64	NA,NE,NO	0.08	1,074.93
A. Mineral Products	894.21	NA,NE	NA,NE				894.21
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				180.64	NA,NE,NO	0.08	180.72
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	18.12		56.85				74.97
4. Agriculture		304.45	526.40				830.85
A. Enteric Fermentation		178.31					178.31
B. Manure Management		125.55	158.13				283.68
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	368.14				368.14
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.59	0.14				0.73
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	16.97	3.91	33.67				54.55
A. Forest Land	13.78	3.91	33.67				51.36
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	3.19	NE	NE				3.19
6. Waste	NA,NO	944.84	21.48				966.32
A. Solid Waste Disposal on Land	NA,NO	866.45					866.45
B. Waste-water Handling		78.38	21.48				99.86
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,733.27	1.33	9.78				1,744.38
Aviation	873.54	0.13	7.65				881.32
Marine	859.73	1.20	2.12				863.06
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	49.86						49.86
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							10,381.76
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							10,436.31

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2008
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	8,420.93	1,276.22	626.27	206.00	NA,NE,NO	0.09	10,529.50
1. Energy	7,563.11	17.54	20.43				7,601.08
A. Fuel Combustion (Sectoral Approach)	7,563.11	17.54	20.43				7,601.08
1. Energy Industries	3,967.29	3.19	9.40				3,979.88
2. Manufacturing Industries and Construction	844.86	0.94	2.79				848.59
3. Transport	2,230.02	8.61	6.29				2,244.92
4. Other Sectors	478.44	4.61	1.84				484.90
5. Other	42.50	0.19	0.11				42.80
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	895.95	NA,NE,NO	NA,NE,NO	206.00	NA,NE,NO	0.09	1,102.04
A. Mineral Products	895.95	NA,NE	NA,NE				895.95
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				206.00	NA,NE,NO	0.09	206.09
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	15.04		58.35				73.40
4. Agriculture		308.14	503.84				811.98
A. Enteric Fermentation		179.26					179.26
B. Manure Management		128.71	153.29				282.01
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	350.50				350.50
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.16	0.05				0.21
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-53.18	2.51	21.59				-29.08
A. Forest Land	-55.58	2.51	21.59				-31.49
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	2.40	NE	NE				2.40
6. Waste	NA,NO	948.03	22.06				970.09
A. Solid Waste Disposal on Land	NA,NO	874.01					874.01
B. Waste-water Handling		74.03	22.06				96.08
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,657.99	1.23	9.55				1,668.77
Aviation	867.56	0.13	7.60				875.29
Marine	790.43	1.10	1.95				793.48
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	115.40						115.40
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							10,558.59
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							10,529.50

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2009
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	8,064.14	1,277.15	595.89	230.27	NA,NE,NO	0.07	10,167.52
1. Energy	7,465.48	18.84	20.56				7,504.88
A. Fuel Combustion (Sectoral Approach)	7,465.48	18.84	20.56				7,504.88
1. Energy Industries	3,992.47	3.24	9.55				4,005.26
2. Manufacturing Industries and Construction	713.02	0.83	2.45				716.30
3. Transport	2,233.11	8.76	6.32				2,248.19
4. Other Sectors	509.80	5.90	2.18				517.88
5. Other	17.08	0.12	0.05				17.24
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	724.21	NA,NE,NO	NA,NE,NO	230.27	NA,NE,NO	0.07	954.55
A. Mineral Products	724.21	NA,NE	NA,NE				724.21
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				230.27	NA,NE,NO	0.07	230.34
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	13.63		59.98				73.60
4. Agriculture		307.04	485.99				793.03
A. Enteric Fermentation		178.86					178.86
B. Manure Management		127.73	144.77				272.50
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	341.09				341.09
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.45	0.13				0.58
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-139.18	0.78	6.72				-131.67
A. Forest Land	-142.10	0.78	6.72				-134.59
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	2.92	NE	NE				2.92
6. Waste	NA,NO	950.48	22.65				973.13
A. Solid Waste Disposal on Land	NA,NO	887.64					887.64
B. Waste-water Handling		62.85	22.65				85.49
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,484.85	1.07	8.72				1,494.63
Aviation	803.48	0.12	7.04				810.64
Marine	681.36	0.95	1.68				683.99
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	141.15						141.15
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							10,299.19
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							10,167.52

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2010
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,754.81	1,296.73	629.90	249.78	NA,NE,NO	0.08	9,931.31
1. Energy	7,231.00	18.29	19.98				7,269.28
A. Fuel Combustion (Sectoral Approach)	7,231.00	18.29	19.98				7,269.28
1. Energy Industries	3,868.00	3.12	9.22				3,880.34
2. Manufacturing Industries and Construction	625.18	0.84	2.36				628.38
3. Transport	2,277.23	8.93	6.41				2,292.57
4. Other Sectors	443.50	5.28	1.95				450.74
5. Other	17.08	0.12	0.05				17.24
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	585.14	NA,NE,NO	NA,NE,NO	249.78	NA,NE,NO	0.08	835.01
A. Mineral Products	585.14	NA,NE	NA,NE				585.14
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				249.78	NA,NE,NO	0.08	249.87
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	15.68		61.49				77.17
4. Agriculture		316.11	507.93				824.04
A. Enteric Fermentation		187.33					187.33
B. Manure Management		128.29	153.30				281.59
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	354.48				354.48
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.49	0.15				0.64
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-77.01	2.01	17.28				-57.73
A. Forest Land	-78.59	2.01	17.28				-59.31
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	1.58	NE	NE				1.58
6. Waste	NA,NO	960.32	23.22				983.55
A. Solid Waste Disposal on Land	NA,NO	901.76					901.76
B. Waste-water Handling		58.56	23.22				81.78
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,402.96	0.93	8.63				1,412.52
Aviation	822.08	0.12	7.20				829.40
Marine	580.88	0.81	1.43				583.12
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	142.95						142.95
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,989.04
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,931.31

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2011
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CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,473.78	1,243.07	630.15	259.12	NA,NE,NO	0.09	9,606.21
1. Energy	6,983.75	19.31	19.24				7,022.30
A. Fuel Combustion (Sectoral Approach)	6,983.75	19.31	19.24				7,022.30
1. Energy Industries	3,710.04	3.02	8.90				3,721.96
2. Manufacturing Industries and Construction	542.08	0.52	1.69				544.29
3. Transport	2,211.57	8.76	6.25				2,226.59
4. Other Sectors	499.81	6.87	2.35				509.03
5. Other	20.26	0.13	0.05				20.44
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	572.20	NA,NE,NO	NA,NE,NO	259.12	NA,NE,NO	0.09	831.40
A. Mineral Products	572.20	NA,NE	NA,NE				572.20
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				259.12	NA,NE,NO	0.09	259.20
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	10.24		63.12				73.36
4. Agriculture		316.03	509.26				825.29
A. Enteric Fermentation		191.96					191.96
B. Manure Management		123.54	151.20				274.74
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	357.90				357.90
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.53	0.16				0.69
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-92.41	1.70	14.68				-76.02
A. Forest Land	-93.87	1.70	14.68				-77.49
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	1.47	NE	NE				1.47
6. Waste	NA,NO	906.03	23.85				929.88
A. Solid Waste Disposal on Land	NA,NO	855.90					855.90
B. Waste-water Handling		50.13	23.85				73.98
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,518.76	0.99	9.41				1,529.16
Aviation	900.45	0.13	7.89				908.47
Marine	618.31	0.86	1.52				620.70
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	160.63						160.63
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,682.23
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,606.21

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2012
Submission 2014 v1.5
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCs ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions) ⁽¹⁾	7,038.34	1,306.31	634.88	260.44	NA,NE,NO	0.09	9,240.06
1. Energy	6,519.27	18.70	17.80				6,555.77
A. Fuel Combustion (Sectoral Approach)	6,519.27	18.70	17.80				6,555.77
1. Energy Industries	3,545.93	2.88	8.49				3,557.30
2. Manufacturing Industries and Construction	413.24	0.30	1.11				414.64
3. Transport	2,052.53	8.35	5.80				2,066.68
4. Other Sectors	490.50	7.05	2.35				499.90
5. Other	17.08	0.12	0.05				17.24
B. Fugitive Emissions from Fuels	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	NA,NE,NO	NA,NE,NO	NA,NO				NA,NE,NO
2. Industrial Processes	553.67	NA,NE,NO	NA,NE,NO	260.44	NA,NE,NO	0.09	814.20
A. Mineral Products	553.67	NA,NE	NA,NE				553.67
B. Chemical Industry	NO	NO	NO	NA	NA	NA	NA,NO
C. Metal Production	NA,NO	NA,NO	NA	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production	NE						NE
E. Production of Halocarbons and SF ₆				NA,NO	NA	NA	NA,NO
F. Consumption of Halocarbons and SF ₆ ⁽²⁾				260.44	NA,NE,NO	0.09	260.53
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	9.89		63.40				73.29
4. Agriculture		308.39	507.11				815.50
A. Enteric Fermentation		193.43					193.43
B. Manure Management		114.42	153.08				267.50
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils ⁽³⁾		NA,NE	353.87				353.87
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		0.54	0.16				0.70
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry ⁽¹⁾	-44.48	2.63	22.61				-19.24
A. Forest Land	-45.81	2.63	22.61				-20.57
B. Cropland	NA,NE,NO	NE,NO	NE,NO				NA,NE,NO
C. Grassland	NE,NO	NE,NO	NE,NO				NE,NO
D. Wetlands	NE,NO	NE,NO	NE,NO				NE,NO
E. Settlements	NA,NE	NE	NE				NA,NE
F. Other Land	NE,NO	NE	NE				NE,NO
G. Other	1.32	NE	NE				1.32
6. Waste	NA,NO	976.59	23.96				1,000.55
A. Solid Waste Disposal on Land	NA,NO	936.20					936.20
B. Waste-water Handling		40.39	23.96				64.35
C. Waste Incineration	NA	NA,NO	NA,NO				NA,NO
D. Other	NA	NA	NA				NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA	NA
Memo Items: ⁽⁴⁾							
International Bunkers	1,420.56	0.97	8.58				1,430.12
Aviation	807.31	0.12	7.07				814.50
Marine	613.25	0.85	1.51				615.61
Multilateral Operations	NO	NO	NO				NO
CO₂ Emissions from Biomass	159.30						159.30
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry							9,259.30
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry							9,240.06

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary 1.A.

Annex IV. CO₂ reference approach and comparison with sectoral approach, and relevant information on the national energy balance

Due to the unavailability of consumption data for several years and sectors, using the data as is, would create issues of consistence and comparability. Therefore it was decided to complete the period using the following assumptions. The resulting data used for the estimation of the emissions will be presented at the methodological issues section of the appropriate sector. The assumptions made to allocate consumption to activities where data was not available are presented in [section 3.2.2](#).

The revised data used for the calculations of emissions is presented in the Tables in [section IV1](#).

IV1. Fuel consumption: Reference Vs. Sectoral approach

Crude oil (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Imports (Balance)	624	763	749	789	916	797	804	1039	1075
Stock changes	12	-7	-22	-8	-10	31	-44	4	7
Gross inland deliveries (Calculated)	0	0	0	0	0	0	0	0	0
Statistical difference	0	-17	0	0	0	0	0	0	0
Gross inland deliveries (Observed)	0	0	0	0	0	0	0	0	0
Refinery intake (Observed)	636	763	727	781	906	828	760	1043	1082

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Imports (Balance)	1186	1155	1154	1078	969	243	NO	NO	NO
Stock changes	-6	18	2	8	2	35	NO	NO	NO
Gross inland deliveries (Calculated)	0	0	0	0	0	0	NO	NO	NO
Statistical difference	0	0	0	0	0	-1	NO	NO	NO
Gross inland deliveries (Observed)	0	0	0	0	0	0	NO	NO	NO
Refinery intake (Observed)	1180	1173	1156	1086	971	279	NO	NO	NO

LPG (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	25	29	28	27	32	27	26	32	30
Imports (Balance)	25	16	28	25	13	21	24	17	20
Stock changes	1	-4	1	1	-2	0	1	0	0
Gross inland deliveries (Calculated)	49	49	55	51	47	48	49	49	50
Statistical difference	0	0	0	0	-3	-3	-2	-3	0
Gross inland deliveries (Observed)	49	49	55	51	50	51	51	52	50
1AA2A Iron and steel	1	1	1	1	1	1	1	1	1
1AA2F2 Non-metallic minerals	1	1	1	1	1	1	1	1	1
1AA2E Food, beverages and tobacco	3	3	3	3	3	3	3	3	3
1AA4A Commercial and public services	12	12	13	12	12	12	12	13	12
1AA4B residential	32	32	36	33	32	33	33	34	32
1AA4C Agriculture/ forestry	1	1	1	1	1	1	1	1	1

	1999	2000	2001	2002	2003	2004	2005	2006	2007
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Refinery gross output	34	30	31	33	28	9			
Imports (Balance)	10	14	19	19	28	45	49	54	52
Stock changes			1	1	-1	-1	2	-1	-1
Gross inland deliveries (Calculated)	44	44	51	53	55	53	51	53	51
Statistical difference	-5	-9	-2	-1	-3	-3	-2	-1	-4
Gross inland deliveries (Observed)	49	53	53	54	58	56	53	54	55
1AA2A Iron and steel	1	1	1	1	1	1	1	1	1
1AA2F2 Non-metallic minerals	1	1	1	1	1	1	1	1	1
1AA2E Food, beverages and tobacco	3	3	3	3	3	3	3	3	3
1AA4A Commercial and public services	12	13	13	13	14	13	13	13	13
1AA4B residential	32	34	34	35	38	36	34	35	36
1AA4C Agriculture/ forestry	1	1	1	1	1	1	1	1	1

	2008	2009	2010	2011	2012				
Refinery gross output									
Imports (Balance)	52	50	51	54	53				
Stock changes		1	-2	1	-1				
Gross inland deliveries (Calculated)	52	51	49	55	52				
Statistical difference	-1	-4	-4	-4	-5				
Gross inland deliveries (Observed)	53	55	53	59	57				
1AA2A Iron and steel	0	1	1	1	1				
1AA2F2 Non-metallic minerals	1	1	1	1	1				
1AA2E Food, beverages and tobacco	3	3	3	4	3				
1AA4A Commercial and public services	14	13	13	14	14				
1AA4B residential	34	36	34	38	37				
1AA4C Agriculture/ forestry	1	1	1	1	1				

Gasoline (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	122	121	102	94	122	102	95	141	142
Imports (Balance)	32	40	70	75	58	72	99	50	51
Stock changes	9	9			1	5	-5	3	-2
Gross inland deliveries (Calculated)	163	170	172	169	181	179	189	194	191
Statistical difference	0	0	0	0	1	-4	3	3	-4
Gross inland deliveries (Observed)	163	170	172	169	180	183	186	191	195
1AA3b Road transport	163	170	172	169	180	183	186	191	195

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output	148	153	150	153	146	40			
Imports (Balance)	57	62	84	78	110	239	331	335	344
Stock changes	-3	-3		-3	5	6	-4	-29	1
Gross inland deliveries (Calculated)	202	212	234	228	261	285	327	306	345
Statistical difference	-1	6	15	0	9	3	24	-17	-7
Gross inland deliveries (Observed)	203	206	219	228	252	282	303	323	352
1AA3b Road transport	203	206	219	228	252	282	303	323	352

	2008	2009	2010	2011	2012				
Refinery gross output					0				
Imports (Balance)	372	380	402	376	364				
Stock changes	9	-2	-9	0	0				
Gross inland deliveries (Calculated)	381	378	393	376	364				
Statistical difference	8	-5	3	-9	-8				
Gross inland deliveries (Observed)	373	383	390	385	372				
1AA3b Road transport	373	383	390	385	372				

Jet kerosene (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	19	27	23	30	34	16	3	5	4
Imports (Balance)	279	253	249	260	401	290	286	252	260
Stock changes				-18	8	-4	3	-5	4
Gross inland deliveries (Calculated)	298	280	272	272	443	302	292	252	268
Statistical difference	62	0	0	41	206	42	43	7	10
Gross inland deliveries (Observed)	236	280	272	231	237	260	249	245	258
1C1A International aviation	230	275	266	224	230	253	242	237	250
1AA3a Domestic aviation	6	5	6	7	7	7	7	8	8

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output	11	18	13	7					
Imports (Balance)	264	268	314	295	323	297	306	321	269
Stock changes	-4	-4	10	-1	-3		-4	-18	16
Gross inland deliveries (Calculated)	271	282	337	301	320	297	302	303	285
Statistical difference	7	14	23	-1	-3	2	11	3	-2
Gross inland deliveries (Observed)	264	268	314	302	323	295	291	300	287
1C1A International aviation	256	259	304	292	313	285	281	290	277
1AA3a Domestic aviation	8	9	10	10	10	10	10	10	10

	2008	2009	2010	2011	2012				
Refinery gross output					0				
Imports (Balance)	286	285	277	284	265				
Stock changes	-3		-8	5	4				
Gross inland deliveries (Calculated)	283	285	269	289	269				
Statistical difference	-3	19	-2	-7	4				
Gross inland deliveries (Observed)	286	266	271	296	265				
1C1A International aviation	275	255	260	285	256				
1AA3a Domestic aviation	11	11	11	11	9				

Other kerosene (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	12	12	14	14	15	14	18	20	23
Imports (Balance)			3	2		3			
Stock changes				-2	2				-2
Gross inland deliveries (Calculated)	12	12	17	14	17	17	18	20	21
Statistical difference	0	0	0	-2	0	0	0	0	0
Gross inland deliveries (Observed)	12	12	17	16	17	17	18	20	21
1AA4b Residential	12	12	17	16	17	17	18	20	21

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output	20	19	24	29	38	11			
Imports (Balance)		5					15	10	13
Stock changes				2	-5	3	-1		1
Gross inland deliveries (Calculated)	20	24	24	31	33	14	14	10	14
Statistical difference	0	0	0	0	2	-10	-2	-6	-2
Gross inland deliveries (Observed)	20	24	24	31	31	24	16	16	16
1AA4b Residential	20	24	24	31	31	24	16	16	16

	2008	2009	2010	2011	2012				
Refinery gross output									

Imports (Balance)	18	19	8	16	13				
Stock changes	-2			-1	2				
Gross inland deliveries (Calculated)	16	19	8	15	15				
Statistical difference	2	0	-6	-1	-2				
Gross inland deliveries (Observed)	14	19	14	16	17				
1AA4b Residential	14	19	14	16	17				

Biodiesel (kt)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Primary product receipts					7	7	6	6	7
Imports (Balance)				1	9	10	11	12	12
Stock changes				-1					1
Gross inland deliveries (Calculated)	0	0	0	0	16	17	17	18	20
Statistical difference	0	0	0	-1	0	0	0	0	2
Gross inland deliveries (Observed)	0	0	0	1	16	17	17	18	18
1AA3b Road transport				1	16	17	17	18	18

No activity associated to biodiesel before 2007

Gas-Diesel oil (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	230	278	252	253	324	300	258	365	382
Imports (Balance)	118	32	182	168	85	152	225	146	175
Stock changes	24	20	21	14	12	15	25	27	35
Gross inland deliveries (Calculated)	0	0	0	0	0	0	0	0	0
Statistical difference	324	290	413	407	397	437	458	484	522
Gross inland deliveries (Observed)	16	-21	24	12	-7	-9	-7	-5	-4
1AA1A Main activity producer electricity plants	1	1	1	1	1	1	1	1	1
1AA3B Road	1	1	1	1	1	1	1	1	1
1AA2C Chemical and petrochemical	3	3	3	3	3	3	3	3	3
1AA2F2 Non-metallic minerals	12	12	13	12	12	12	12	13	12
1AA3E Food, beverages and tobacco	32	32	36	33	32	33	33	34	32
1AA2F1 Not elsewhere specified (Industry)	1	1	1	1	1	1	1	1	1
1AA4A Commercial and public services									
1AA4B Residential									
1AA4C Agriculture/forestry									
1AA5 Not elsewhere specified (Other)									

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output	411	406	390	362	327	88			
Imports (Balance)	165	194	198	194	252	480	603	629	606
Stock changes	46	50	47	33	36	27	67	106	104
Gross inland deliveries (Calculated)	30	-1	2	-3	2	-16	17	46	-20
Statistical difference	500	551	539	526	541	557	519	477	522
Gross inland deliveries (Observed)	-46	-9	-13	-2	-5	24	0	-26	7
1AA1A Main activity producer electricity plants	21	19	4	2	5	8	16	7	16
1AA3B Road	340	350	355	341	351	354	346	323	337
1AA2C Chemical and petrochemical	1	1	1	1	1	1	1	2	1
1AA2F2 Non-metallic minerals	11	11	11	11	11	10	10	12	11
1AA3E Food, beverages and tobacco	7	7	7	7	7	6	6	8	6
1AA2F1 Not elsewhere specified (Industry)	3	3	3	3	3	2	3	3	3
1AA4A Commercial and public services	21	22	22	21	22	20	20	19	18
1AA4B Residential	104	107	108	104	107	96	83	98	89
1AA4C Agriculture/forestry	32	33	33	32	33	30	27	28	28

1AA5 Not elsewhere specified (Other)	7	7	7	7	7	6	6	4	6
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	2008	2009	2010	2011	2012				
Refinery gross output									
Imports (Balance)	615	629	680	620	704				
Stock changes	88	73	53	58	69				
Gross inland deliveries (Calculated)	2	19	34	-7	2				
Statistical difference	525	537	593	569	633				
Gross inland deliveries (Observed)	17	-25	-29	-5	1				
1AA1A Main activity producer electricity plants	23	92	158	112	214				
1AA3B Road	330	321	329	313	277				
1AA2C Chemical and petrochemical	1	1	1	1	1				
1AA2F2 Non-metallic minerals	9	9	7	10	10				
1AA3E Food, beverages and tobacco	6	6	4	5	5				
1AA2F1 Not elsewhere specified (Industry)	2	2	2	2	2				
1AA4A Commercial and public services	20	19	23	20	16				
1AA4B Residential	78	83	70	80	78				
1AA4C Agriculture/forestry	26	24	23	25	24				
1AA5 Not elsewhere specified (Other)	13	5	5	6	5				

RFO (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Imports (Balance)	460	510	509	577	546	539	599	476	515
International marine bunkers	34	36	38	36	50	54	65	71	63
Stock changes		-12	41	-44	52	-63	52	-3	10
Gross inland deliveries (Calculated)	577	685	763	797	850	722	864	809	889
Statistical difference	0	0	0	0	13	-37	50	-4	10
Gross inland deliveries (Observed)	577	685	763	797	837	759	814	813	879
1AA1B Refinery fuel	11	12	13	13	14	17	16	14	15
1AA1A Main activity producer electricity plants	540	561	645	697	727	662	703	743	811
1AA2A Iron and steel	4	12	12	10	11	10	11	7	7
1AA2F2 Non-metallic minerals	17	58	55	47	51	45	52	33	32
1AA2E Food, beverages and tobacco	11	37	35	30	33	29	33	21	20
1AA2F1 Not elsewhere specified (Industry)	1	4	4	3	4	3	4	2	2
1AA4A Commercial and public services	4	12	12	10	11	10	11	7	7

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Imports (Balance)	586	637	585	690	821	925	1298	1404	1403
International marine bunkers	108	143	145	105	88	27	225	190	171
Stock changes	-59	11	22	-23	49	-20	-49	-11	10
Gross inland deliveries (Calculated)	898	980	944	985	1144	990	1024	1203	1242
Statistical difference	-26	8	-7	-2	-15	-129	-152	3	-17
Gross inland deliveries (Observed)	924	972	951	987	1159	1119	1176	1200	1259
1AA1B Refinery fuel	16	16	0	0	0	0	0	0	0
1AA1A Main activity producer electricity plants	856	902	897	932	1095	1046	1104	1137	1174
1AA2A Iron and steel	7	7	5	6	6	7	6	4	6
1AA2F2 Non-metallic minerals	32	33	25	26	30	34	43	42	56
1AA2E Food, beverages and tobacco	20	21	16	17	19	22	19	13	19
1AA2F1 Not elsewhere specified (Industry)	2	2	2	2	2	2	2	1	2
1AA4A Commercial and public services	7	7	5	6	6	7	1	2	2

	2008	2009	2010	2011	2012				
Imports (Balance)	1479	1356	1317	1153	1072				
International marine bunkers	165	146	134	141	128				

Stock changes	4	37	-66	85	-24				
Gross inland deliveries (Calculated)	1318	1247	1117	1097	920				
Statistical difference	19	22	7	-16	-6				
Gross inland deliveries (Observed)	1299	1225	1110	1113	926				
1AA1B Refinery fuel	0	0	0	0	0				
1AA1A Main activity producer electricity plants	1219	1163	1053	1058	896				
1AA2A Iron and steel	6	4	5	8	3				
1AA2F2 Non-metallic minerals	53	43	35	19	14				
1AA2E Food, beverages and tobacco	17	12	14	24	9				
1AA2F1 Not elsewhere specified (Industry)	2	1	2	3	1				
1AA4A Commercial and public services	2	2	2	2	3				

Lubricants (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Imports (Balance)				8	11	11	13	12	6
International marine bunkers							1	1	1
Stock changes				-2					-1
Gross inland deliveries (Calculated)	0	0	0	6	11	11	12	11	4
Statistical difference	0	0	0	-2	0	0	0	0	-3
Gross inland deliveries (Observed)	0	0	0	8	11	11	12	11	7
1AA3B Road transport				6	8	8	9	8	5
1AA2F1 Not elsewhere specified (Industry)				2	3	3	3	3	2

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Imports (Balance)	6	7	9	10	9	11	12	12	11
International marine bunkers	1	1	1	1	1	1	1	1	1
Stock changes		1	1	-1		1	-1		
Gross inland deliveries (Calculated)	5	7	9	8	8	11	10	11	10
Statistical difference	-2	0	2	0	0	1	4	5	4
Gross inland deliveries (Observed)	7	7	7	8	8	10	6	6	6
1AA3B Road transport	5	5	5	6	6	7	2	2	2
1AA2F1 Not elsewhere specified (Industry)	2	2	2	2	2	3	4	4	4

	2008	2009	2010	2011	2012				
Imports (Balance)	11	10	10	10	9				
International marine bunkers	1								
Stock changes			1						
Gross inland deliveries (Calculated)	10	10	11	10	9				
Statistical difference	4	4	5	4	4				
Gross inland deliveries (Observed)	6	6	6	6	5				
1AA3B Road transport	2	2	2	2	1				
1AA2F1 Not elsewhere specified (Industry)	4	4	4	4	4				

Bitumen (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	33	23	24	34	35	37	30	37	37
Imports (Balance)			28	21	23	17	25	21	38
Stock changes		-4	-2	4		-3		2	
Gross inland deliveries (Calculated)	33	19	50	59	58	51	55	60	75
Statistical difference	0	-4	0	0	1	-3	-2	-2	0
Gross inland deliveries (Observed)	33	23	50	59	57	54	57	62	75
1AA2F1 Not elsewhere specified (Industry)	33	23	50	59	57	54	57	62	75

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output	37	36	42	38	30	9			
Imports (Balance)	48	50	41	46	40	53	70	70	62
Stock changes	1	-1	-2		-1	4	1	-5	-2
Gross inland deliveries (Calculated)	86	85	81	84	69	66	71	65	60
Statistical difference	0	2	0	0	-1	1	2	-4	3
Gross inland deliveries (Observed)	86	83	81	84	70	65	69	69	57
1AA2F1 Not elsewhere specified (Industry)	86	83	81	84	70	65	69	69	57

	2008	2009	2010	2011	2012				
Refinery gross output									
Imports (Balance)	69	61	68	60	36				
Stock changes		-4	6	4	-1				
Gross inland deliveries (Calculated)	69	57	74	64	35				
Statistical difference	3	-17	-9	0	-1				
Gross inland deliveries (Observed)	66	74	83	64	36				
1AA2F1 Not elsewhere specified (Industry)	66	74	83	64	36				

Pet-coke (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Imports (Balance)		93	85	121	110	152	153	142	133
Stock changes			-22	-7	2	-27	-6	10	17
Gross inland deliveries (Calculated)	0	93	63	114	112	125	147	152	150
Statistical difference	0	0	-22	0	0	0	0	0	0
Gross inland deliveries (Observed)	0	93	85	114	112	125	147	152	150
1AA2F2 Non-metallic minerals	40	93	85	114	112	125	147	152	150

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Imports (Balance)	144	180	93	188	113	135	143	153	149
Stock changes	10	-39	40	-49	24	11	11	-7	-6
Gross inland deliveries (Calculated)	154	141	133	139	137	146	154	146	143
Statistical difference	0	0	0	0	0	0	0	0	0
Gross inland deliveries (Observed)	154	141	133	139	137	146	154	146	143
1AA2F2 Non-metallic minerals	154	141	133	139	137	146	154	146	143

	2008	2009	2010	2011	2012				
Imports (Balance)	163	118	123	78	102				
Stock changes	-11	26	-7	23	-8				
Gross inland deliveries (Calculated)	152	144	116	101	94				
Statistical difference	0	0	0	1	0				
Gross inland deliveries (Observed)	152	144	116	100	94				
1AA2F2 Non-metallic minerals	152	144	116	100	94				

Other products (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Refinery gross output	5	5						1	
Refinery fuel									
Imports (Balance)	33								
Gross inland deliveries (Calculated)	40	5	0	0	0	0	0	1	0
Statistical difference	0	0	0	0	0	0	0	0	0
Gross inland deliveries (Observed)	40	5	0	0	0	0	0	1	0
1AA2F1 Not elsewhere specified (Industry)	0	5						1	

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refinery gross output				16	16	1			
Refinery fuel				16	16				
Imports (Balance)				5	5	6			
Gross inland deliveries (Calculated)	0	0	0	5	5	7	0	0	0
Statistical difference	0	0	0	5	5	1	0	0	0
Gross inland deliveries (Observed)	0	0	0	0	0	6	0	0	0
1AA2F1 Not elsewhere specified (Industry)						6			

Refinery gas (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
1AA1B Refinery fuel	18	17	17	13	24	13	12	16	16

	1999	2000	2001	2002	2003	2004	2005	2006	2007
1AA1B Refinery fuel	20	19	19	21	21	9	NO	NO	NO

White spirit (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Imports (Balance)				1		1	1	1	
Gross inland deliveries (Calculated)	0	0	0	1	0	1	1	1	0
Statistical difference	0	0	0	0	0	0	0	0	0
Gross inland deliveries (Observed)	0	0	0	1	0	1	1	1	0
Not elsewhere specified (Industry)				1		1	1	1	

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Imports (Balance)	1		1				1	1	1
Gross inland deliveries (Calculated)	1	0	1	0	0	0	1	1	1
Statistical difference	0	0	0	0	0	0	0	0	0
Gross inland deliveries (Observed)	1	0	1	0	0	0	1	1	1
Not elsewhere specified (Industry)	1		1				1	1	1

Solid fuels

Other bituminous coal (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total imports (Balance)	97	97	26	33	27	20	18	19	21
Stock changes (National territory)	0	0	0	-2	0	0	0	0	5
	0	0	0	2	0	0	0	0	-5
Inland consumption (Calculated)	97	97	26	31	27	20	18	19	26
Total imports (Balance)	97	97	26	33	27	20	18	19	21
1AA2F2 Non-metallic minerals	97	97	26	31	27	20	18	19	26

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total imports (Balance)	26	50	59	66	51	39	63	63	33
Stock changes (National territory)	4	-1	-6	-13	2	18	-11	-9	16
	-4	1	6	13	-2	-18	11	9	-16
Inland consumption (Calculated)	30	49	53	53	53	57	52	54	49
Total imports (Balance)	30	49	53	53	53	57	52	54	49
1AA2F2 Non-metallic minerals	26	50	59	66	51	39	63	63	33

	2008	2009	2010	2011	2012				
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Total imports (Balance)	41	26	17	0	0				
Stock changes (National territory)	-1	-5	9	12	0				
	1	5	-9	-12	0				
Inland consumption (Calculated)	40	21	26	12	0				
Total imports (Balance)	40	21	26	12	0				
1AA2F2 Non-metallic minerals	41	26	17	0	0				

Lignite (kt)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total imports (Balance)	1	1	1	1	1	1	1	1	1
Inland consumption (Calculated)	1	1	1	1	1	1	1	1	1
1AA5 Not elsewhere specified (Other)	1	1	1	1	1	1	1	1	1

Renewables

Industrial waste (non-renewable) (TJ)

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Indigenous production	0	0	18	0	15	71	138	73	288
Inland consumption (calculated)	0	0	18	0	15	71	138	73	288
1AA2F2 Non-metallic minerals	0	0	18	0	15	71	138	73	288

	2008	2009	2010	2011	2012				
Indigenous production	239	276	299	0	0				
Inland consumption (calculated)	239	276	299	0	0				
1AA2F2 Non-metallic minerals	239	276	299	0	0				

Solid biofuels (TJ)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Indigenous production	257	232	230	229	490	479	464	358	378
Total imports (balance)	0	0	0	0	0	0	0	0	0
Inland consumption (calculated)	257	232	230	229	490	479	464	358	378
Charcoal production plants (transformation)	112	112	112	112	405	388	328	288	314
1AA2F2 Non-metallic minerals									
1AA4A Commercial and public services	19	15	15	15	11	12	17	9	8
1AA4B Residential	126	105	103	102	74	79	119	61	56

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Indigenous production	369	367	403	399	486	368	266	269	512
Total imports (balance)	0	0	0	0	1	4	4	6	4
Inland consumption (calculated)	369	367	403	399	487	372	270	275	516
Charcoal production plants (transformation)	281	248	253	235	209	184	174	135	274
1AA2F2 Non-metallic minerals		41	70	90	211	127	38	61	133
1AA4A Commercial and public services	11	10	10	10	9	8	7	5	14
1AA4B Residential	77	68	70	64	58	53	51	74	95

	2008	2009	2010	2011	2012				
Indigenous production	452	295	225	211	221				
Total imports (balance)	178	293	269	276	146				
Inland consumption (calculated)	630	588	494	487	367				
Charcoal production plants	211	47	48	45	82				

(transformation)									
1AA2F2 Non-metallic minerals	281	304	347	306	141				
1AA4A Commercial and public services	15	15	15	13	15				
1AA4B Residential	123	222	84	123	129				

Charcoal (kt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Indigenous production	1	1	1	1	5	4	4	3	4
Total imports (balance)	0	0	0	0	3	3	3	4	4
Inland consumption (calculated)	1	1	1	1	8	7	7	7	8
1AA4A Commercial and public services	0.5	0.5	0.5	0.5	1.0	4	4	4	4
1AA4B Residential	0.5	0.5	0.5	0.5	1.0	4	4	4	4

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Indigenous production	4	3	3	3	3	2	2	2	4
Total imports (balance)	3	2	2	4	4	6	8	8	9
Inland consumption (calculated)	7	5	5	7	7	8	10	10	13
1AA4A Commercial and public services	4	3	3	4	4	4	5	5	7
1AA4B Residential	4	3	3	4	4	4	5	5	6

	2008	2009	2010	2011	2012				
Indigenous production	3	1	1	1	1				
Total imports (balance)	10	10	10	11	11				
Inland consumption (calculated)	13	11	11	12	12				
1AA4A Commercial and public services	7	6	6	6	6				
1AA4B Residential	6	5	5	6	6				

Biogases (TJ)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Indigenous production	0	0	1	15	78	209	274	448	476
Inland consumption (calculated)	0	0	1	15	78	209	274	448	476
1AA4A Commercial and public services	0	0	0	0	0	11	12	11	11
1AA4C Agriculture/ Forestry	0	0	1	15	78	198	262	437	465

Annex V. Product imports used for the estimation of potential emissions from products

Product imports	2004	2005	2006	2007	2008	2009
Tractors/trailers	2141	3222	431	669	7845	1430
87161010	17	6	44	13	50	6
87161091	5	1	6		2	
87161092						
87161094	3	23	16	8	6	18
87161096	21	57	52	55	11	25
87161099	6		1			5
87162000	9	25	2	4	9	41
87163100	30	11	11	26	31	13
87163930	54	4	11	16	6706	92
87163950						
87163951	110	142	7	25	119	535
87163959	1516	2657	45	246	507	469
87163980	370	296	236	276	404	226
Public transport	36	102	119	139	196	68
87021011	6	21	31	19	31	23
87021019	17	28	51	40	114	30
87021091	9	44	9	21	31	1
87021099	2	4	4	37	8	8
87029011	1			1		
87029019		2	22	19	10	6
87029090	1	3	2	2	2	
Motor vehicles - passenger transport	56439	42590	46152	61813	54935	29014
87032110	499	1358	1378	1377	1768	905
87032190	2422	1180	562	267	340	285
87032210	10445	8342	11150	10512	9757	4905
87032290	11907	9460	8259	10416	10811	7709
87032311		4	2	1	2	2
87032319	16322	12117	12337	17499	13276	6209
87032390	10058	5956	9565	15536	13195	6402
87032410	225	233	410	638	324	71
87032490	198	34	75	323	223	113
87033110	151	73	130	1574	806	389
87033190	2	1	3	3	8	5
87033211			6	5	1	
87033219	2136	2627	1983	2803	2976	1111
87033290	376	262	39	212	454	419
87033319	1549	879	118	566	806	203
87033390	110	20	35	57	143	150
87039010					17	
87039090	39	44	100	24	28	136
Motor vehicles - transport of goods	7680	6295	5370	6537	8547	3263
87042110			15	4	14	10
87042131	1049	808	393	339	348	66
87042139	455	380	506	446	745	536
87042191	5129	3969	2772	3750	4567	995
87042199	447	570	899	1045	1619	1010

87042210	1	6	4	2	45	7
87042291	170	102	111	143	231	112
87042299	168	260	376	398	485	340
87042310	12	2				2
87042391	12		28	57	80	38
87042399	58	30	43	125	126	41
87043110					1	
87043131	1				1	
87043139	11	9		11	9	28
87043191	103	83	76	50	51	7
87043199	38	54	130	111	190	44
87043210		2				
87043291		13		16	10	2
87043299	3		7	1	4	7
87049000	23	7	10	39	21	18
Refrigerators-freezers	21627	25588	20781	18915	23822	24281
84181020			13509	13311	17387	12335
84181091	12969	13947				
84181099	8658	11641				
84181080			7272	5604	6435	11946
Household refrigerators	27132	29858	42041	43707	36671	24172
84182110	2483	3607	10134	7997	1075	4741
84182151	1314	1348	1097	1357	1384	1605
84182159	562	1346	2364	1863	3748	657
84182191	11901	11282	11619	10595	13535	8705
84182199	3751	2100	5341	5546	6630	4088
84182200		567	747			
84182900	7121	9608	10739	16349	10299	4376
Freezers (chest type)	4232	3391	3086	5291	6871	4790
84183020			2273	3539	2838	1930
84183080			813	1752	4033	2860
84183091	3069	2151				
84183099	1163	1240				
Freezers (upright)	2922	3477	3748	3884	1553	2833
84184020			2947	2989	994	1976
84184080			801	895	559	857
84184091	2112	1911				
84184099	810	1566				
Refrigerated show-cases and counters	2923	4897	5404	6301	6170	4913
84185011	1145	972	661	1149	1385	816
84185019	1778	3925	4743	5152	4785	4097
Air-conditions, kg	3057189	2113045	5903473	7643581	8739373	6184235
84151010	31072		32082	17361	53217	53921
84151090	3026117		5871391	7626220	8686156	6130314
84158190		1144980				
84158280		715936				
84158390		252129				
Air-conditions (units)*	68075	46957	131188	169857	194208	137427
Beverage/Vending machines	1090	712	1099	5148	4398	7755
84762100	115	197	131	598	1318	1195
84762900	707	145	776	44	244	4452
84768100	17	61	6	1	1703	1276
84768900	251	309	186	4505	1133	832
Product imports	2010	2011	2012			

Tractors/trailers	497	2645	2079			
87161010	6	2				
87161091						
87161092			6			
87161094	220	12				
87161096	19	18				
87161099	1	1				
87162000	20	1	2			
87163100	4	2	78			
87163930	4	19	1			
87163950			1961			
87163951	13	40				
87163959	27	2455				
87163980	183	95	31			
Public transport	285	78	73			
87021011	219	7	35			
87021019	26	45	21			
87021091	25	8	4			
87021099	10	12	7			
87029011						
87029019	5	6	6			
87029090						
Motor vehicles - passenger transport	32304	24808	18098			
87032110	890	897	839			
87032190	237	225	226			
87032210	4637	5710	4358			
87032290	6300	3688	2926			
87032311	9	8	8			
87032319	7945	6387	4527			
87032390	8266	4551	2743			
87032410	112	112	69			
87032490	74	44	34			
87033110	328	382	463			
87033190	17	40	57			
87033211						
87033219	2684	1997	1284			
87033290	433	400	349			
87033319	168	269	178			
87033390	99	86	32			
87039010	2	1	3			
87039090	103	11	2			
Motor vehicles - transport of goods	4338	2421	1475			
87042110	3	10				
87042131	59	124	50			
87042139	341	168	90			
87042191	2441	1312	1009			
87042199	894	474	203			
87042210	18	12				
87042291	74	69	33			
87042299	255	185	71			
87042310						
87042391	8	13	3			
87042399	19	15	4			
87043110		1	2			

87043131		2				
87043139	19	8	5			
87043191	141	3				
87043199	25	15	3			
87043210	1					
87043291						
87043299	1	2				
87049000	39	8	2			
Refrigerators-freezers	19258	23196	17828			
84181020	9023	9705	8802			
84181091						
84181099						
84181080	10235	13491	9026			
Household refrigerators	24963	23710	20226			
84182110	4941	2275	1778			
84182151	1579	1398	199			
84182159	459	559	340			
84182191	7210	8517	4877			
84182199	4217	4192	2060			
84182200						
84182900	6557	6769	10972			
Freezers (chest type)	4951	3153	1743			
84183020	3000	2798	1180			
84183080	1951	355	563			
84183091						
84183099						
Freezers (upright)	8497	3090	1357			
84184020	8153	1942	1023			
84184080	344	1148	334			
84184091						
84184099						
Refrigerated show-cases and counters	5130	6135	6068			
84185011	1957	1160	472			
84185019	3173	4975	5596			
Air-conditions, kg	4964021	4396237	3125776			
84151010	78844	46997	30954			
84151090	4885177	4349240	3094822			
84158190						
84158280						
84158390						
Air-conditions (units)*	110312	105024	69462			
Beverage/Vending machines	791	615	448			
84762100	395	325	208			
84762900	96	204	163			
84768100	1	10	34			
84768900	299	76	43			

* assuming average mass per unit 45 kg