AGÊNCIA PORTUGUESA DO AMBIENTE
Ministério do Ambiente e do Ordenamento do Território

SHORT PORTUGUESE NATIONAL INVENTORY REPORT

ON GREENHOUSE GASES, 1990 - 2008

SUBMITTED UNDER

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Preface

The National Environmental Agency (Agência Portuguesa do Ambiente)/ Ministry for the Environment and Land Use Planning (Ministério do Ambiente e do Ordenamento do Território), in accordance to its attributions as national entity responsible for the overall coordination of the Portuguese inventory of air pollutants emissions, has prepared the National Inventory of Greenhouse Gas (GHGs) Emissions and Sinks to comply with international commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and the European Commission.

The Conference of Parties to the UNFCCC and the Council Decision 280/2004/EC, concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, define that each Party should provide each year an update of its inventory of emissions and removals of Greenhouse Gases (GHG) not controlled by the Montreal Protocol, taking into account the UNFCCC Reporting Guidelines on Annual Inventories. This includes a report on annual emissions estimates (CRF tables), accompanied by a National Inventory Report (NIR), describing the input data, methodologies, background information and explanation on the whole process of inventory preparation. The report describes all formulas used for calculation of emissions, and is an important piece in the process of consultation with sectorial experts in the National System, as well as people who want to learn and get a general view of the methods and data used in the Portuguese inventories.

The Short 2009 NIR objective is to present a general overview of the inventory, overall results for 2008 and trends since 1990. More detailed information about emissions, activity data and emission factors are presented in the CRF tables that are also part of the 2010 Portuguese Submission on GHG emissions. A complete NIR will be provided in March together with the final version of the 2010 submission.

As a Party to the Kyoto Protocol, Portugal is also obliged to submit information under Article 5, paragraphs 1 and 2, and Article 7, paragraphs 1 and 4 of the Kyoto Protocol. This report aims also to fulfil these commitments.

Data on KP-LULUCF will be included in the March 15th submission.

Ministry for Environment and Land Use Planning

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EXECUTIVE SUMMARY

Background information

As a Party to the United Nations Framework Convention on Climate Change (UNFCCC), Portugal is requested to provide each year an update of its inventory of emissions and removals of greenhouse gas not controlled by the Montreal Protocol, taking into account the adopted Reporting Guidelines on Annual Inventories (FCCC/SBSTA/2004/8).

The UNFCCC Guidelines require that Parties prepare a National Inventory Report (NIR) as one part of their annual submissions. The NIR should contain detailed and complete information related to methodologies, emission factors, activity data, and should give explanations concerning any recalculations of historical inventories, in order to ensure transparency and enable the inventory review.

This report was prepared in order to comply with the international commitments under the UNFCCC and the European Commission (EC). It presents a description of the methods, assumptions and background data used in the preparation of the 2010 national inventory submission of GHG. The Revised (1996) IPCC Guidelines for National Greenhouse Gas Inventories (IPCC,1997) and the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC,2000) have been applied as far as possible.

The report presents estimates for the 6 gaseous air pollutants included in Annex A to the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF_6), as well as estimates for indirect GHGs, including carbon monoxide (CO), nitrogen oxides (NO_x), and non-methane volatile organic compounds (NMVOC). Data are also reported for sulphur oxides (SO_x). The period covered is 1990-2008.

The report is structured generally in accordance with the adopted UNFCCC Reporting Guidelines on Annual Inventories (FCCC/SBSTA/2004/8).

The inventory covers the whole Portuguese territory, i.e., mainland Portugal and the two Autonomous regions of Madeira and Azores Islands. Included are also the emission estimates from air traffic and navigation bunkers realized between all national areas.

Changes in methodology, source coverage or scope of the data were reflected in the estimation of the emissions for all years in the period from 1990 to 2008, i.e., the inventory is internally consistent.

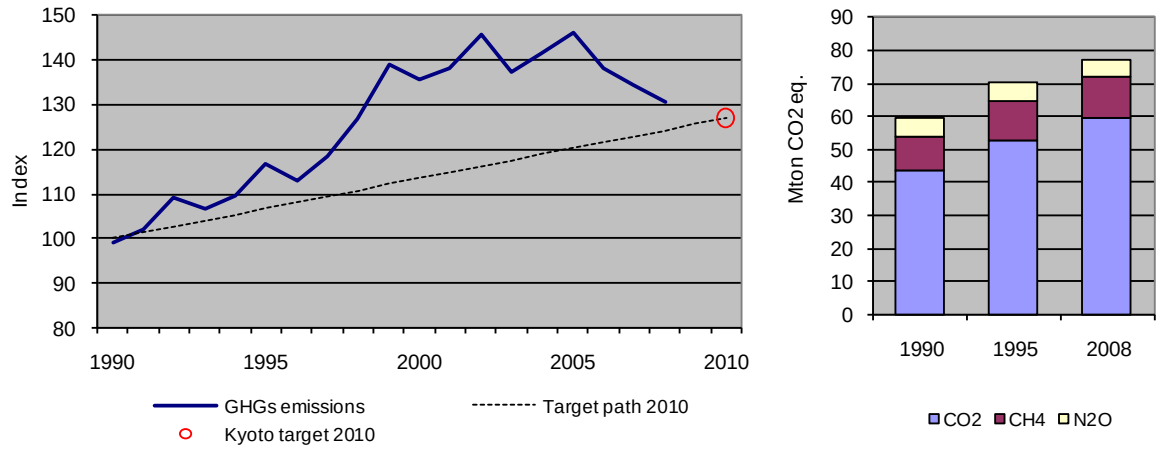
The report is structured according to the following source sectors: energy production and transformation, combustion in industry, domestic, agriculture, fisheries, institutional and commerce sectors, transportation (road, rail, maritime and air), industrial production and industrial and non industrial use of solvents, waste production (urban, industrial and hospitals solid wastes, and domestic and industrial waste water treatment), agriculture and animal husbandry emissions, as well as emissions and sinks from forestry.

Summary of national emissions and removal related trends

In 2008, total Portuguese GHG emissions without land-use, land-use change and forestry (LULUCF) were estimated at about 78.5Mton CO2eq., representing an increase of 30 per cent compared to 1990 levels (Assigned Amount level). Under the EU burden-sharing agreement, Portugal is bind to

limit its emissions in the first commitment period to +27 per cent compared to the 1990 level. Comparing the 1990-2008 growth with the linear target path from 1990 to 2010, Portuguese GHG emissions were, in 2008, 6.2 per cent above this target path.(Figure ES. 1).

Figure ES. 1 – GHG emissions (without LULUCF)

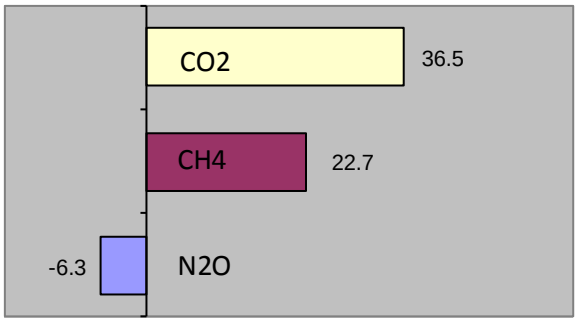


After a steady increase of the Portuguese emissions during the 90s, the growth of emissions thereafter has been more moderate and even appears to be a sort of stagnation in the more recent years. This situation is in part consequence of the implementation of some measures, such as the introduction of natural gas (1997), the installation of combined cycle thermoelectric plants using natural gas (1999), the progressive installation of co-generation units, the amelioration of energetic and technologic efficiency of industrial processes, the improvement in car efficiency and the improvement of fuels quality. Furthermore, in most recent years there has been an expressive development of renewable sources with a particular expansion of windmills. The installed capacity of renewable electrical generation has grown from 8.28 MW in 1995 to 8151 MW in 2008. The eolian installed capacity in 2008 was about 2800 MW, distributed by 175 parcs and 1526 aerogenerators. The windmill production is increasing importance in electrical production. In the last 5 years (2004-2008) the eolian production rose 86%. In 2006 eolian production increase 67%, in 2007, 38%, and in 2008 42%. Within electric production from renewable sources, windmill production represented 38% of the 2008 production.

The principal source of GHGs in Portugal in 2008 is the energy sector. The largest gas emitted is CO_2 representing 75.8 per cent of total GHGs emissions expressed as global warming potential (GWP) weighted emissions. The majority of these emissions are generated in energy-related activities, which are responsible for 90 per cent of total CO_2 emissions. This situation is primarily related to the pattern of energy sources used in Portugal. In average, during the period 1990-2008, 84 per cent of the primary energy consumed was produced from fossil fuel combustion (coal, oil and natural gas) whereas the renewable energy represents the remaining part, i.e. 16 per cent in average. (Figure 2-2) The situation is however changing in the most recent years, with a progressive increase of the renewable energy sources such as wind. Figure ES. 2 illustrates the growth of GHG in the period 1990-2008. CO_2 is the gas having registered the biggest increase, 36.5 per cent[1].

[1] Portugal has chosen 1995 as the base year for fluorinated gases. However, F-gases are excluded from the figure as they represent a small fraction of the emissions total (in 2007: 1.2 per cent)

Figure ES. 2– Increase of emissions by gas over the 1990-2008 period (percent)



The overall trend for direct GHG emissions in the 1990-2008 period is presented in Table ES. 1.

Table ES. 1 – GHG emissions and removals in Portugal by gas: 1990-2008

GHGs EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
CO2 emissions including net CO2 from LULUCF	44,961	45,536	47,560	45,587	45,589	48,976	44,782	47,813	51,849	59,203
CO2 emissions excluding net CO2 from LULUCF	43,595	45,316	49,413	48,002	49,105	53,000	50,163	53,394	58,066	64,875
CH4 emissions including CH4 from LULUCF	10,488	10,849	10,825	10,794	11,245	11,606	11,609	11,775	12,309	12,493
CH4 emissions excluding CH4 from LULUCF	10,351	10,632	10,756	10,753	11,219	11,454	11,556	11,755	12,209	12,439
N2O emissions including N2O from LULUCF	5,605	5,607	5,595	5,448	5,727	5,817	6,119	6,110	5,749	6,175
N2O emissions excluding N2O from LULUCF	5,565	5,559	5,562	5,418	5,698	5,776	6,087	6,081	5,713	6,143
HFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	55	77	110	152	209
PFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NO	NA,NO	1	6	12
SF6	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	6	6	6	6	6
Total (including LULUCF)	**61,054**	**61,992**	**63,981**	**61,830**	**62,561**	**66,460**	**62,592**	**65,815**	**70,072**	**78,097**
Total (excluding LULUCF)	**59,510**	**61,507**	**65,731**	**64,173**	**66,022**	**70,291**	**67,889**	**71,348**	**76,153**	**83,684**

	2000	2001	2002	2003	2004	2005	2006	2007	2008
	CO_2 equivalent (Gg)								
CO2 emissions including net CO2 from LULUCF	57,560	58,641	62,194	73,943	64,613	75,081	62,204	59,726	57,357
CO2 emissions excluding net CO2 from LULUCF	63,696	64,406	68,400	63,724	65,910	68,384	63,888	61,587	59,516
CH4 emissions including CH4 from LULUCF	11,694	12,468	12,939	13,449	12,921	13,602	13,366	13,049	12,715
CH4 emissions excluding CH4 from LULUCF	11,576	12,390	12,827	12,953	12,823	13,234	13,300	13,030	12,703
N2O emissions including N2O from LULUCF	6,107	5,891	5,969	5,407	5,611	5,412	5,138	5,242	5,241
N2O emissions excluding N2O from LULUCF	6,069	5,857	5,931	5,331	5,575	5,348	5,105	5,214	5,213
HFCs	303	391	498	610.48	687.29	785.68	873.07	937.79	1,033.42
PFCs	6	13	10	9.53	9.31	9.97	6.55	5.72	9.02
SF6	6	6	7	7.07	7.79	7.41	8.41	8.04	8.14
Total (including LULUCF)	**75,678**	**77,410**	**81,617**	**93426**	**83849**	**94898**	**81596**	**78969**	**76363**
Total (excluding LULUCF)	**81,656**	**83,063**	**87,673**	**82634**	**85013**	**87769**	**83181**	**80783**	**78483**

NA- Not aplicable; NE - Not estimated; NO - Not occurring

Overview of source and sink category emission estimates and trends

According to the UNFCCC Reporting Guidelines, emissions estimates are grouped into six large sectors: Energy, Industrial Processes, Solvent use, Agriculture, Land-Use Change and Forestry, and Waste. Figure ES. 3 and Figure ES. 4 represent direct GHG emissions by sector for 1990 and 2008, respectively.

Throughout this report, the reference to "total emissions" is meant to refer to "total emissions without LULUCF on a carbon equivalent basis". Furthermore the references to 1990 represent the year 1990 as estimated for this submission which is different from the assign amount (except when specify otherwise). This difference is mainly due to revision on the time series or methodology improvements).

Figure ES. 3 – GHG emissions in Portugal by sector: 1990

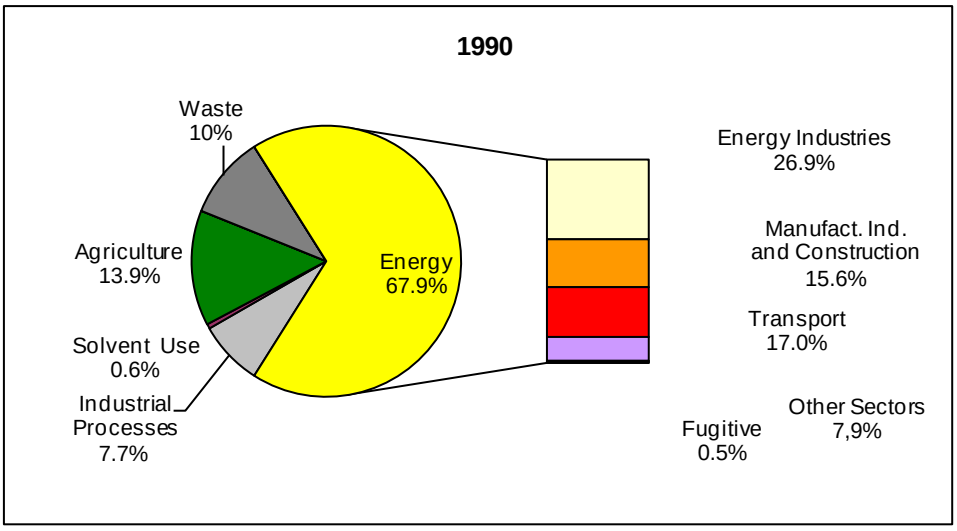
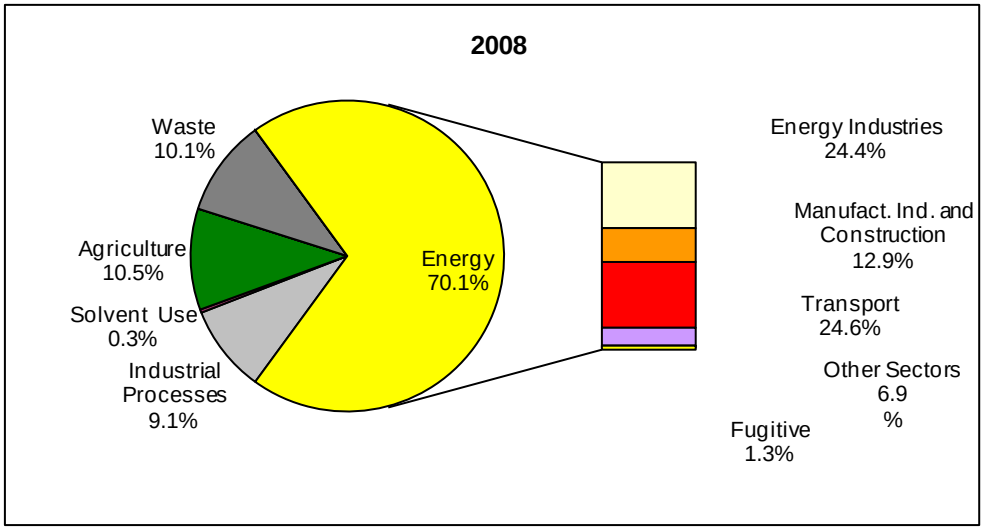


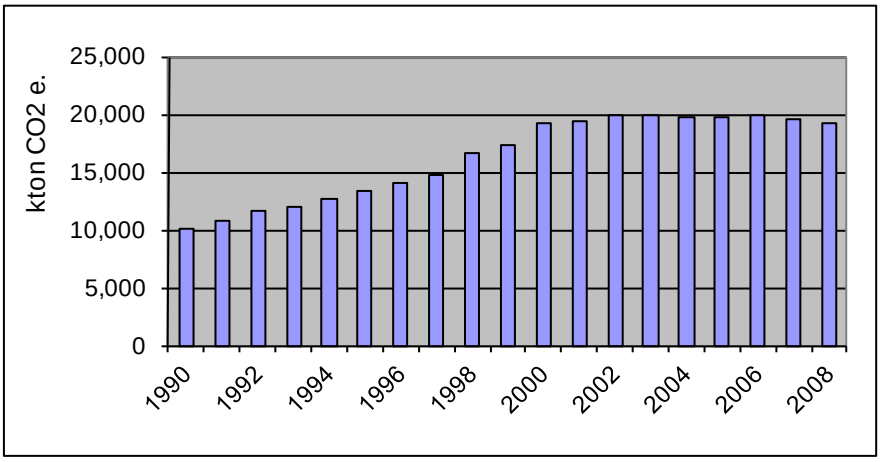
Figure ES. 4 – GHG emissions in Portugal by sector: 2008



Energy is by far the most important sector, accounting for 70 per cent of total emissions in 2008, and presenting an increase of 36.2 per cent over the 1990-2008 period. Energy industries and transport are the two most important sources representing approximately 24 per cent of total emissions. This reflects the country heavy dependence on fossil fuels for electricity generation and transportation, which have grown steadily until the mid 2000s due to the continued increase of electricity demand driven in particular by the residential/commercial sector, and the growth of mobility. The situation seems to have changed in the most recent years were we can observe stagnation or even decrease of these trends.

Transport sources, which are largely dominated by road traffic, are one of the sectors that have risen faster. In the period 1990-2008 these emissions increased 91 per cent, due to the steady growth of vehicle fleets and road travel, in association with the increase in family income and the strong investment in road infrastructure in the 90s. Indirectly the increase in road traffic activity also augmented the emissions from fossil fuel storage, handling and distribution. However, this situation has changed in the last years, as may be seen in Figure ES. 5, as the growth of transport emission has first stabilised and even started to decline in most recent years.

Figure ES. 5 – Transport emissions (1990-2008)



Agriculturewas, in the period analysed, the second most significant sources of GHGs emissions, with 10.5 per cent of the Portuguese emissions in 2008, registering a slight decrease of 0.5 per cent since 1990.

The waste and industrial processes sectors represented, respectively, 10.1 and 9.1 per cent of Portuguese emissions in 2008, recording an increase of approximately 33 per cent since 1990 and 54 per cent . Solvent use represents less than 1 per cent of total emissions, and is mainly related to NMVOC emissions[2].

Estimates of emissions and sinks from land use change and forestry category, show that this category has changed from being a net emitter in 1990 (1.5 Mt CO2 eq.) to becoming a carbon sink in 1992 and the following years until 2002. The situation was again reverted in 2003 and 2005, when this category was again estimated as a net emitter. This pattern of variation is explained by the exceptional occurrences and extension of forest fires in specific years, and the use of the burnt materials as inputs to the industry.

Table ES. 2 presents the overall sectoral trend for direct GHG emissions in the 1990-2008 period.

[2] These are converted into ultimate carbon dioxide after being emitted to atmosphere.

Table ES. 2 – GHG emissions and removals in Portugal by sector: 1990-2008

GHGs SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
1. Energy	40,388	42,103	46,429	45,031	45,588	48,921	46,339	49,003	53,350	60,740
2. Industrial Processes	4,611	4,584	4,352	4,202	4,926	5,654	5,459	6,082	6,292	6,184
3. Solvent and Other Product Use	332	319	339	298	328	323	344	367	299	299
4. Agriculture	8,252	8,361	8,214	8,073	8,311	8,335	8,679	8,584	8,593	8,754
5. Land-Use Change and Forestry (7)	1,543	486	-1,750	-2,343	-3,461	-3,831	-5,297	-5,533	-6,080	-5,587
6. Waste	5,928	6,139	6,397	6,567	6,868	7,058	7,068	7,312	7,619	7,706
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GHGs SOURCE AND SINK	2000	2001	2002	2003	2004	2005	2006	2007	2008
	CO_2 equivalent (Gg)								
1. Energy	59,446	60,699	64,652	60,136	61,659	64,614	60,232	57,513	55,007
2. Industrial Processes	6,080	5,880	6,161	6,207	6,749	6,768	6,600	6,986	7,104
3. Solvent and Other Product Use	306	307	297	278	303	306	270	269	265
4. Agriculture	9,013	8,867	8,921	8,283	8,544	8,325	8,208	8,312	8,213
5. Land-Use Change and Forestry (7)	-5,979	-5,653	-6,056	10,791	-1,163	7,129	-1,585	-1,814	-2,120
6. Waste	6,811	7,310	7,641	7,731	7,758	7,756	7,871	7,702	7,895
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA- Not aplicable; NE - Not estimated; NO - Not occurring

Information on indirect GHG and SOx emissions

Several gases do not have a direct influence in climate change but affect the formation or destruction of other GHG. CO, NO_x, and NMVOCs are precursor substances for ozone which is a GHG. SO_x produce aerosols, which are extremely small particles or liquid droplets that can also affect the absorptive characteristics of the atmosphere.

Table ES.3– Indirect GHG and SO_x emissions: 1990-2008

Gas emissions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(Gg)									
CO	854	870	902	850	826	810	802	771	761	737
NOx	259	274	294	281	283	293	291	295	306	321
NMVOC	326	324	331	305	299	292	289	288	286	280
SO2	320	311	373	317	297	333	273	293	342	345

Gas emissions	2000	2001	2002	2003	2004	2005	2006	2007	2008	% change
	(Gg)									1990-08
CO	704	632	622	612	592	577	546	529	516	-39.6
NOx	321	321	331	309	313	316	294	282	270	4.2
NMVOC	268	255	254	247	241	232	228	220	220	-32.5
SO2	306	289	287	193	194	200	176	171	159	-50.2

In 2008, SO_x, CO and NMVOC emissions have decreased from 1990 levels: -50.2%, –39.6% and -32.5%. NOx emissions registered a positive trend: +4.2%, (Table ES.3).

Energy is the major responsible sector for emissions of NO_x, SO_x and CO. Its contribution for NMVOC emissions is also significant, together with Solvent use and Industrial processes.

Within energy, transportation is responsible for the major share of NO_x, and CO emissions, respectively 43.7% and 29.6% of 2008 totals. Despite the fast growing trends of the transport sector (mainly road) since the 90s, the introduction of new petrol-engine passenger cars with catalysts converters and stricter regulations on diesel vehicles emissions, limited the growth of these emissions or even its decrease. In fact, the situation started to change in the last years, as transport emissions growth has first stabilised and even started to decline in the most recent years. Since the early 2000, NO_x emissions from transport has been presenting a decreasing tendency; and CO and NMVOC emissions recorded real reductions in the 1990-2008 period, respectively, –69.2% and –80.3%.

Other sectors (commercial/institutional, residential and agriculture/ Forestry) is a primary source of CO emissions representing 49.9% of the 2008 totals.

SO_x emissions are mainly generated in the energy industry sector (approx. 64% of total emissions in 2008) and combustion in manufacturing industries (20.2% of total emissions in 2008), which are major consumers of fossil fuels. Oil and coal represent the biggest share of the fuel mix used in thermal electrical production in the country, and they are in majority imported. The situation is however improving with a significant development of renewable sources (mainly wind) and some energy efficiency measures, among other factors as reflect the introduction of new stricter laws regulating the residual fuel oil (Decree-Law 281/2000 of 10th November). The introduction of natural gas and its increasing use, since 1997, is also another positive factor that has contributed to control of SO_x emissions. The emissions variation in the period 1990-2008 shows in fact a decrease in SO_x emissions in both sub-categories: manufacturing industries –56.8% and energy industries –49.1%.

1 INTRODUCTION

1.1 Background information

1.1.1 Global Warming and Climate Change

Although key greenhouse gases - CO_2, CH_4, N_2O, Ozone – occur naturally in the atmosphere, human activities have increased the atmospheric concentrations of greenhouse gases since the pre-industrial era. Other substances which are exclusively produced by industrial activities are also greenhouse gases: stratospheric ozone depleting substances (CFCs, HCFCs and halons which are covered by the Montreal Protocol), and some other fluorine-containing halogenated substances – HFCs, PFCs and SF6. There are also several gases that do not have a direct effect in global warming but affect the formation or destruction of other GHG. CO, NO_x, and NMVOCs are precursor substances for ozone which is a GHG. SO_x produce aerosols, which are extremely small particles or liquid droplets that can also affect the absorptive characteristics of the atmosphere.

Land-use and Land-use change, particularly deforestation, is another factor that contributes to the phenomenon of global warming and climate change as it changes carbon stocks and carbon sequestration and consequentely the CO_2 fluxes from and to the atmosphere.

According to the IPCC, the average surface temperature of the earth has risen by about 0.6-0.7°C in the past 100 years and will rise by another 1.4-5.8°C in the next 100 years, depending on the emission scenario.

An increase in global temperatures can result in a cascade of environmental effects, including the rise of sea level and changes in the amount and pattern of precipitation. These changes may increase the frequency and intensity of extreme weather events, such as floods, droughts, heat waves, hurricanes, and tornados. Other consequences include higher or lower agricultural yields, glacial retreat, reduced summer stream flows, species extinctions and increases in the ranges of disease vectors.

1.1.2 Climate Change in Portugal

The mean temperature has risen in all regions of Portugal since the 1970s, at a rate of approximately 0.45 ºC per decade. The time-series analysis of the mean annual temperature since 1931, shows that 1997 was the warmest of the last 75 years and that 7 of the 10 warmest years occurred after 1990s (1997, 1995, 2006, 1996, 1990, 1998 and 2003).

Also an observation of temperature indices indicates that the increase of the mean temperature was accompanied by a change in the frequency of very hot days and a decrease in the frequency of very cold ones.

The heat wave duration index has also been rising. Heat waves are defined when, in a period of at least 6 consecutive days, the daily maximum temperature is 5 ºC higher than the daily mean value of the reference period (1961-1990). Although they can occur at any time of the year, heat waves have a more significant impact in the summer months. Heat waves were more frequent in the 1990s. The heat waves of 1981, 1991, 2003 and 2006 were of particular significance due to their duration and spatial extension.

The last 2 decades of the 20th century were particularly dry in mainland Portugal as opposed to the average values registered between 1961 and 1990. In fact, only in 6 of the last 20 years of the past century was the annual precipitation higher than the average. In 2001 and 2002, however, the annual precipitation values were higher than the average observed in the

reference period. The driest of the past 75 years was 2005, and 2004 was the second driest on record.

The seasonal trend in the mean precipitation values recorded since 1931 shows a systematic and statistically significant reduction in precipitation in the spring over the last three decades of the 20th century, with slight increases during the other seasons. In 2000 and 2001, spring precipitation rose to values not observed since the late 1960s.

Annual variability of winter precipitation increased over the last 30 years, with the occurrence of both drier and rainier winters. The winter of 2000/2001 was particularly rainy (the third most rainy of the last 30 years), and winter of 2001/2002 was the fifth driest of the last 3 decades. The winter of 2004/2005 was the driest winter observed in the last 75 years. The autumn of 2006 was the third most rainy since 1931.

All models from the different scenarios forecast a significant increase in the mean temperature for all regions of Portugal until the end of the 21st century. In the mainland, summer maximum temperature increases are estimated to vary between 3 ºC and 7 ºC in coastal and interior areas, respectively, accompanied by a strong increment in the frequency and intensity of heat waves.

With regard to precipitation, future climatic uncertainty is considerably stronger. Nevertheless, most models project a reduction in total precipitation in all regions, with more intense periods of rain in shorter time frames in the winter.

1.1.3 The Convention, the Kyoto Protocol and national commitments

The United Nations Framework Convention on Climate Change (UNFCCC) appeared as an answer of the international community to the emerging evidences of climate change and was adopted and was opened for signature in Rio de Janeiro in 1992.

Portugal has ratified the United Nations Framework Convention on Climate Change (UNFCCC) on May 31, 1994. 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 Kyoto Protocol, adopted some years later in 1997, represents a deepening in the commitments inscribed in the Convention. The Protocol introduced legally binding commitments for developed countries to reduce their collective emissions of greenhouse gases by at least 5 per cent by the period 2008-12 (first commitment period of the Protocol), below their 1990 level.

Portugal signed and ratified the Kyoto Protocol on April 29, 1998, and 31 May, 2002, respectively. The EU as a whole agreed to a -8 per cent reduction. Under the EU burden-sharing agreement Portugal is committed to limiting its emissions during the first commitment period to no more than +27 per cent compared to the 1990 level.

The KP entered into force on 16 February 2005, after Russia’s ratification in November 2004 which fulfilled the requirement that at least 55 Parties to the Convention, including developed countries accounting for at least 55 per cent of that group’s CO_2 emissions in 1990.

Detailed rules for the implementation of the Protocol were set out at the 7th Conference of the Parties (in Marrakech) and are described in the Marrakech Accords adopted in 2001. At the first Conference of the Parties serving as the Meeting of the Parties to the Protocol (COP/MOP) held in Canada (December 2005) the rules for the implementation of the Protocol agreed at COP7 were adopted.

At present, international negotiations are focused on future commitments for the period after 2012.

1.1.4 History of national inventories

Air emission inventories in Portugal were only initiated in the late ninety-eighties/ early nineties when the first estimates of NO_x, SO_x and VOC emissions from combustion where made under the development of the National Energetic Plan (PEN - Plano Energético Nacional), and emissions from combustion and industrial processes were made under OECD inventory and under CORINAIR85 program. A major breakthrough occurred during the CORINAIR90 inventory realized during 1992 and 1993 by General-Directorate of Environment (DGA, renamed now IA). This inventory exercise, aiming also EMEP and OECD/IPCC, extended the range of the pollutants (SO_x, NO_x, NMVOC, CH_4, CO, CO_2, N_2O and NH_3) and emission sources covered, including not only combustion activities but also storage and distribution of fossil duels, production processes, use of solvents, agriculture, urban and industrial wastes and nature (forest fires and NMVOC from forest). Information received under the Large Combustion Plant (LCP) directive was also much helpful to improve inventory quality and the individualization of Large Point Sources, as well as statistical information received from the National Statistical Institute (INE) allowing the full coverage of activity data for most emission sources. The CORINAIR90 Default Emission Factors Handbook (second edition), updating the first edition from CORINAIR85 was used extensively in the development of the current inventory and it was also a key point in the amelioration of the inventory.

The fulfilment of international compromises under conventions UNFCCC and CLRTAP, together with the publication of the IPCC Draft Guidelines for National Greenhouse Gas Inventories (IPPC, 1995) and latter of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), has result in substantial improvement of the methodologies that are used in the inventory, particularly for agriculture and wastes, and that were included at first time in the First National Communication in 1994. The inventory that resulted from CORINAIR90 (CEC,1992) and subsequent modifications from IPCC methodology still structures the present day methodology in what concerns activity data and methodology. Under the evaluation of the first communication the inventory was subjected to a review made by an international team. The second and third communications was also reviewed by international experts. These exercises had an important role in problem detection and contribute to overall improvement.

Since its first compilation, the Portuguese inventory has been continuously amended mainly from the use of more detailed methodologies, better access to underlying data allowing the development of the comprehensiveness of the inventory, and better database storage and calculation structure. Changes in methodology, source coverage or scope of the data were reflected in the estimation of the emissions for the different years considered (1990-2007), i.e., the inventory is internally consistent. Some major studies have contributed to the improvement of the inventory:

- Study of VOC emissions in Portugal, in 1995. This study made in collaboration with FCT (Faculdade de Ciências e Tecnologia) led to an important improvement in emission estimates from solvent sector, which is still used as basic information source for this sector;

- Study of Emission and Control of GHG in Portugal (Seixas et al, 2000). This project aimed the first development of projections toward 2010 and the identification of control measures to accomplish the Kyoto Protocol. This also led to improvements in the inventory: extension of the inventory including for the first time also carbon dioxide sinks (forest); a fist attempt to estimate solid waste methane emissions from urban solid wastes using a Tier2 approach and, in general terms, a better insight into

additional parameters used in the inventory methodologies, and that has resulted from interaction with several institutional agents: General Directorate of Energy, Ministry of Agriculture; and the inter-ministerial transport group;

- Study (Pereira et al,2002) for the quantification of carbon sinks in Portugal, made under the development of PNAC and PTEN national programmes;

- Revision of the Energy Balances with comparison of information collected at IA (LCP Directive) and Statistical Information received at DGGE: Energy Balances. The 1990s – DGE (2003);

- PNAC 2004 (National Plan for Climate Change) approved by Ministers Council and published recently in the National Official Journal (OJ nº 179, 31 July 2004, I Série B/ Resolução do Conselho de Ministros nº 119/2004);

- PNAC 2006 (National Plan for Climate Change) approved by Ministers Council and published in the National Official Journal (OJ nº 162, 23 August 2006, I Série B/ Resolução do Conselho de Ministros nº 104/2006)

- Sectorial Studies and Proposal for a PTEN (National Plan on Emission Ceilings);

- PNALE (National Plan for Allocation of Emissions) 2005-2007 or Portuguese PNALE I, adopted by Ministers Council (Resolução do Conselho de Ministros n.o 53/2005) and published in the National Official Journal (OJ nº 44, 3 March 2005, I Série B);

- Bilateral meetings (IA/UE) for the determination of the Baseline Scenario under the CAFE program (IA,2004);

- Methodological Development Programme (PDM) under the implementation of the National Inventory System;

- UNFCCC reviews, in particular the in-depth review (September/October 2004), and the centralised reviews (October 2005 and September 2008).

- UNFCCC in-depth review of the Initial Report in May 2007 which fixed the Assigned Amount for the first commitment period.

1.1.5 Greenhouse gas emissions inventories

Parties to the Convention (Article 4(1)(a)) “shall develop, periodically update, publish and make available to the COP,…., national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies…”.

Portugal, as a Party to the Convention, is required to produce and regularly update National Greenhouse Gas Inventories. Furthermore Parties shall submit a National Inventory Report (NIR) containing detailed and complete information on their inventories, in order to ensure the transparency of the inventory.

The inventory covers the 6 gaseous air pollutants included in Annex A to the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6), as well as estimates for indirect GHGs, including carbon monoxide (CO), nitrogen oxides (NO_x), and non-methane volatile organic compounds (NMVOC). Data are also reported for sulphur oxides (SO_x). Emissions are estimated for each civil year from 1990 to 2007.

As a general rule the inventory covers emissions occurring in the whole Portuguese territory, i.e., mainland Portugal and the two autonomous regions of Madeira and Azores Islands. The only exception to this rule, which results in an inconsistency, refers to data for the two Portuguese islands in what concerns Land Use Change and Forestry (IPCC category 5) which have not been compiled; therefore this category refers only to mainland Portugal, with the exception of fires emissions which includes the Islands. Emissions from air traffic and navigation realized between places in territorial Portugal, including movements between mainland and islands, are also include in national emission total.

The economic sectors covered are the following: energy production and transformation, combustion in industry, domestic, agriculture, fisheries, institutional and commerce sectors, transportation (road, rail, maritime and air), industrial production and industrial and non industrial use of solvents, waste production (urban, industrial and hospitals solid wastes, and domestic and industrial waste water treatment), agriculture, animal husbandry emissions, as well as emissions and removals from forestry and land use change.

1.1.6 Global warming potentials

A Global Warming Potential (GWP) is defined as the cumulative radiative forcing over a specified time horizon resulting from the emission of a unit mass of gas relative to some reference gas (IPCC, 1997). The reference gas used is CO_2. The mass emission of each gas multiplied by its GWP gives the equivalent emission of the gas as carbon dioxide (CO_2 equivalents – CO2 Eq.). The parties to the UNFCCC have agreed to use GWPs based on a 100-year time horizon (Table 1-1)

Table 1-1 – Global Warming Potentials (100-year time horizon)

GHG	GWP
CO2	1
CH4	21
N2O	310
HFC	
HFC-23	11 700
HFC-32	650
HFC-41	150
HFC-43-10mee	1 300
HFC-125	2 800
HFC-134	1 000
HFC-134[a]	1 300
HFC-152[a]	140
HFC-143	300
HFC-143[a]	3 800
HFC-227ea	2 900
HFC-236fa	6 300
HFC-245ca	560
PFC	
CF4	6 500
C2F6	9 200
SF6	23 900

1.2 Institutional arrangements for inventory preparation

1.2.1 Institutional arrangements in place

In order to comply with the commitments at the international and EC levels, respectively, the Article 5(1) of the Kyoto Protocol and Decision 280/2004/EC of the European Parliament and of the Council, a National Inventory System of Emissions by Sources and Removals by Sinks of

Air Pollutants - (SNIERPA) was created. This system contains a set of legal, institutional and procedural arrangements that aim at ensuring the accurate estimation of emissions by sources and removals by sinks of air pollutants, as well as the communication and archiving of all relevant information.

The principal objective of the system is to prepare in a timely fashion the inventory of air pollutants (INERPA), in accordance with the directives defined at international and EC levels, in order to make easier and more cost-effective the tasks of inventory planning, implementation and management.

The system was established through Council of Ministers Resolution 68/2005, of 17 March, which defines the entities relevant for its implementation, based on the principle of institutional cooperation. This clear allocation of responsibilities is essential to ensure the inventory takes place within the defined deadlines.

For the sake of efficiency, the Portuguese national system has been broadened to include a wider group of air pollutants than just GHG not covered by the Montreal Protocol, allowing for improvements in information quality, as well as an optimisation of human and material resources applied to the preparation of the inventory.

Three bodies are established with differentiated responsibilities. These are:

The Responsible Body appointed is the Portuguese Enviornmental Agency (APA) (former Institute for the Environment), being responsible for: overall coordination and updating of the National Inventory of Emissions by Sources and Removals by Sinks of Air Pollutants (INERPA); the inventory's approval, after consulting the Focal Points and the involved entities; and its submission to EC and international bodies to which Portugal is associated, in the several communication and information formats, thus ensuring compliance with the adopted requirements and directives;

The sectoral Focal Points work with IA in the preparation of INERPA, and are responsible for fostering intra and inter-sectoral cooperation to ensure a more efficient use of resources; and

The involved entities are public or private bodies which generate or hold information which is relevant to the INERPA, and which actions are subordinate to the Focal Points or directly to the Responsible Body.

Table 1-2 lists the main focal points and involved entities, by sector of activity.

Table 1-2 – Bodies that contribute information relevant to the preparation of the INIERPA

Sector of Activity	Focal Point	Involved Entities
National Statistics[3]	National Statistics Institute	
Environment Statistics[4]	Institute for the Environment	
Energy Statistics	Directorate-General for Geology and Energy	
Energy:		
Industry and civil construction.....	Directorate-General for the Enterprise	
Transport.....		
Road.....	Environmental Auditor of the Ministry of Public Works, Transport and Communications and Directorate-General for Driver Licensing	Studies and Planning Office of the Institute of Portugal´s Roads, Directorate-General of Land and Water Transport
Rail.....	Environmental Auditor of the Ministry of Public Works, Transport and Communications	Studies and Planning Office, National Institute of Rail Transport, "*Comboios de Portugal*", National Railway Network
Aviation.....	Environmental Auditor of the Ministry of Public Works, Transport and Communications	Studies and Planning Office, National Civil Aviation Institute
Sea.....	Environmental Auditor of the Ministry of Public Works, Transport and Communications	Studies and Planning Office, Port and Sea Transport Institute, Port Administration
Fugitive Emissions from Fossil Fuels.....	Directorate General for Geology and Energy	
Industrial Processes	Directorate-General for Enterprise	
Solvent Use and Other Products.....	Directorate-General for Enterprise	
Agriculture	Environmental Auditor of the Ministry for Agriculture, Fisheries and Forestry	Zootechnical Station Rebelo da Silva Agro-Chemical Laboratory
Forestry and Land Use Change		
Forestry	Directorate-General of Forestry	
Land Use Change.....	Portuguese Geographical Institute	
Waste		
Disposal/incineration of waste	Institute for Waste Management	
Wastewater...	Water Institute	Directorate-General for Health

1.2.2 Institutional arrangements for Kyoto Protocol

Additional provisions to deal with the supplementary information under Kyoto Protocol refer mainly to arrangements to account for further requirements concerning Art. 3.3 and 3.4.

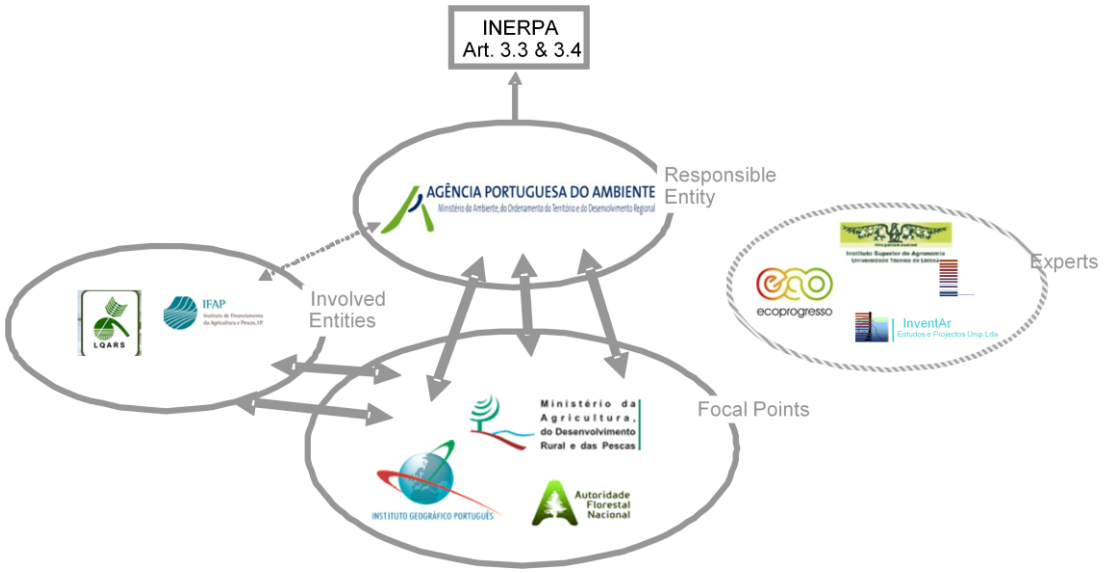
An inter-institutional work group was created (WG 3.3&3.4) in the scope of the National Inventory System (SNIERPA) in order to work on the definition of the methodology to identify the areas and account for the emissions/removals. This group includes the following entities:

- APA – Portuguese Agency for the Environment (www.apambiente.pt)
- MADRP - Ministry of Agriculture/ Ministério da Agricultura, do Desenvolvimento Rural e das Pescas
    - GPP – Gabinete de Planeamento e Políticas (http://www.gpp.pt)
    - AFN - Forestry National Authority/ Autoridade Florestal Nacional estais/MADRP (http://www.afn.min-agricultura.pt)
    - IFAP (ex-INGA) - Instituto Financiamento da Agricultura e Pescas (www.ifap.min-agricultura.pt)

  - LQARS - Laboratório Químico Agrícola Rebelo da Silva (http://www.iniap.min-agricultura.pt)

- ISA - Instituto Superior de Agronomia / Technical University of Lisbon (http://www.isa.utl.pt)
- IGP – Portuguese Geographic Institute/ Instituto Geográfico Português (http://www.igeo.pt/gdr/projectos/prek/)
- IST – Instituto Superior Técnico/ Technical University of Lisbon (http://www.ist.utl.pt)
- UE – Universidade de Évora
- Ecoprogresso (http://www.ecoprogresso.pt/)
- InventAr

The representation of these multiple entities in WG 3.3&3.4 aims at gathering the necessary competences, data and knowledge required to comply with the reporting and accounting requirements of these activities.



1.3 Inventory Preparation Process

1.3.1 Responsibility

The Portuguese Environmental Agency (*Agência Portuguesa do Ambiente* - APA) is the national entity responsible for the overall coordination of the Portuguese inventory of air pollutants emissions. According to these attributions, APA makes an annual compilation of the Portuguese Inventory of air emissions which includes Greenhouse Gas (GHGs) and sinks, acidifying substances as well as other pollutants. The reporting obligations to the EU and the international instances are also under the responsibility of the APA.

The designated representative is:

Agência Portuguesa do Ambiente

Departamento de Alterações Climáticas, Ar e Ruído (Department of Climate Change, Air and Noise)

Address: Rua da Murgueira, 9/9A, 2610-124 Amadora, Portugal

Telephone: +351 21 472 83 82

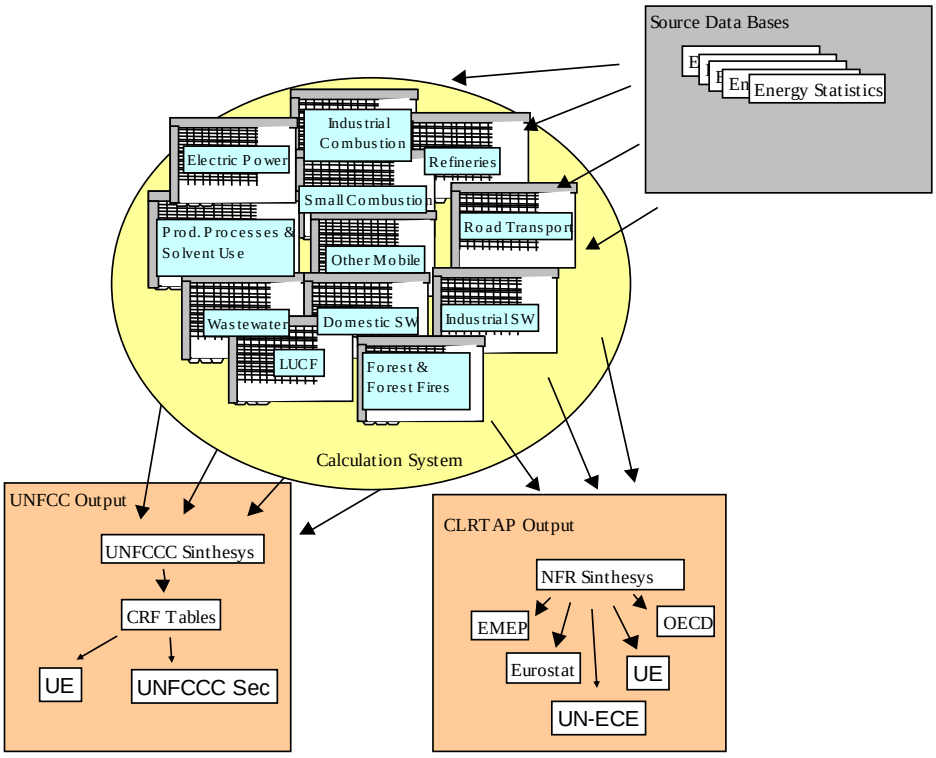
Fax: + 351 21 471 90 74

Filomena Boavida - filomena.boavida@apambiente.pt

1.3.2 Calculation, data archiving and documentation system

The emissions calculations have been performed by APA and INVENTAR[3], which also provides technical advice concerning all aspects of inventory development: methodologies, sources of information and emission factors, and participates in the annual definition of priorities concerning the Methodological Development Programme (PDM). However many other institutions and agencies contributed to the inventory process, providing activity data, sectoral expert judgement, technical support and comments. All calculation and reporting rely in a set of different Excel spreadsheet workbooks which had been developed in order that all information and calculations occur automatically. The structure of the information system is outlined below.

Figure 1-1 – Electronic System Structure of the estimation and reporting system



The information received from the several data suppliers is stored in its original format (paper or magnetic). A copy of this information is converted into the working workbooks, where data is further processed, linkage made and calculations performed, maintaining hence the integrity of the original data sources.

[3] InventAr, Estudos e Projectos Unip Lda

The informatics system has been developed to answer to the various international obligations and national needs. At present, the different demands refer to: UNFCCC (CRF format); UNECE/CLRTAP (NFR format); LCP Directive (NFR format); as well national needs such as the State of Environment Reports. There is independency between emission calculations and the required structure necessary for each obligation which allows flexibility in the inventory.

In what refers to the maintenance of the annual inventory documentation, the information is archived in a way that enables each inventory estimate to be fully documented and reproduced if necessary. When major changes are done in methodology and emission factors, older spreadsheets are frozen and work restarts with copies of those spreadsheets, making a clear reference to the period when they were used. Minor corrections, which do not affect the estimations, are not stored due to storage area limitations.

Annually reported data, e.g. CRF tables, are stored both in paper and magnetic format. IA plans to rebuild this informatics system, having found some limitations for its expansion, namely in what concerns the storage of large amounts of data. This problem will be aggravated in the future with the implementation of inventory improvements: spacialization of emission data, connection to plant-specific monitoring programs and uncertainty analysis. The restructuring of all the inventory system is under study and discussion.

1.4 General overview of methodologies and data sources used

The inventory has been compiled, to the extent as possible, in accordance with the recommendations from the UNFCCC Reporting Guidelines on Annual Inventories (SBSTA 1999 and SBSTA 2002). The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC,1997) and the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC,2000) have been applied as far as appropriate and feasible. Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003) has been implemented, as far as possible, for the compilation of this 2010 submission.

Table 1-3 gives an overview of the methodologies and emission factors used in the inventory. Default methods and emission factors used and the choice between Tier 1 and Tier 2 approaches, were case by case dictated by the availability of proper background information and from national circumstances.

Table 1-3 – Summary of methods and emission factors (CRF summary 3 table)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
1. Energy	**CR,D,T1,T2**	**CR,D,OTH,PS**	**CR,OTH,T1,T2,T3**	**CR,D,OTH**	**CR,T1,T2,T3**	**CR,D**						
A. Fuel Combustion	CR,T1,T2	CR,D,OTH,PS	CR,T1,T2,T3	CR,D,OTH	CR,T1,T2,T3	CR,D						
1. Energy Industries	T2	CR,D,PS	T2	CR,D	T2	CR,D						
2. Manufacturing Industries and Construction	T2	CR,D,PS	T2	CR,D,OTH	T2	CR,D						
3. Transport	CR,T1,T2	CR,D,OTH	CR,T1,T2,T3	CR,D,OTH	CR,T1,T2,T3	CR,D						
4. Other Sectors	T2	CR,D	T2	CR,D	T2	CR,D						
5. Other	T1	CR,D	T1	CR	T1	D						
B. Fugitive Emissions from Fuels	D	D	CR,OTH	CR,OTH	NA	NA						
1. Solid Fuels	NA	NA	NA	NA	NA	NA						
2. Oil and Natural Gas	D	D	CR,OTH	CR,OTH	NA	NA						
2. Industrial Processes	**CR,D,OTH,T2**	**CR,CS,D,OTH,PS**	**D,OTH**	**CR,OTH**	**D**	**CR,OTH**			**NA**	**NA**		
A. Mineral Products	CR,D,OTH,T2	CR,CS,D,OTH	OTH	OTH	NA	NA						
B. Chemical Industry	D,T2	CS,PS	D	CR,OTH	D	CR,OTH					NA	NA
C. Metal Production	D,T2	D,PS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Other Production	CR	CR										
E. Production of Halocarbons and SF6							NA	NA	NA	NA	NA	NA
F. Consumption of Halocarbons and SF6									NA	NA		
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**D**	**CR,CS,OTH**			**NA**	**NA**						
4. Agriculture			**D,T2**	**CS,D**	**D,T1a**	**D**						
A. Enteric Fermentation			T2	CS								
B. Manure Management			T2	CS	D	D						
C. Rice Cultivation			D	CS								
D. Agricultural Soils			NA	NA	T1a	D						
E. Prescribed Burning of Savannas			NA	NA	NA	NA						
F. Field Burning of Agricultural Residues			D	D	D	D						
G. Other			NA	NA	NA	NA						
5. Land Use, Land-Use Change and Forestry	**CS,D,T2**	**CS,D**	**D**	**D**	**D,T2**	**CS,D**						
A. Forest Land	CS,T2	CS,D	D	D	D	D						
B. Cropland	T2	CS,D	NA	NA	D	D						
C. Grassland	T2	CS,D	NA	NA	NA	NA						
D. Wetlands	D,T2	CS,D	NA	NA	NA	NA						
E. Settlements	D,T2	CS,D	NA	NA	NA	NA						
F. Other Land	D,T2	CS,D	NA	NA	NA	NA						
G. Other	NA	NA	NA	NA	T2	CS,D						
6. Waste	**D**	**CS,D**	**D,T2**	**CR,CS,D**	**D**	**CR,D**						
A. Solid Waste Disposal on Land	NA	NA	T2	CS,D	NA	NA						
B. Waste-water Handling			D	CS,D	D	CR,D						
C. Waste Incineration	D	CS,D	D	CR	D	CR						
D. Other	NA	NA	NA	NA	NA	NA						
7. Other (as specified in Summary 1.A)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Notes: (1) Methods applied: D (IPCC default), RA (Reference Approach), T1 (IPCC Tier 1), T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively), T2 (IPCC Tier 2), T3 (IPCC Tier 3), C (CORINAIR), CS (Country Specific), M (Model).

(2) Emission Factors: D (IPCC default), C (CORINAIR), CS (Country Specific), PS (Plant Specific), M (Model), MB-Mass Balance.

Table 1-4 gives an overview of the institutions and data sources providing data for the compilation of the Portuguese emission inventories.

Table 1-4 – Inventory Data Sources

IPCC category	IPCC sub-category	Sources of data
CRF 1 A – Energy. Fuel Combustion	CRF 1A1 – Energy Industry	• Large Point Source Surveys (LPS) • Large Combustion Plants (LCP) • EDP Sustainability Annual Reports • General Directorate for Geology and Energy (DGEG): energy balances • Autonomous Gov. of Azores • National Statistical Institute (INE)
	CRF 1A2 - Manufacturing Industries and Construction	• LPS, LCP, EPER/PCIP • Regional Air Inventories • DGEG: energy balances
	CRF 1A3 – Transport	• DGEG: energy balances • ACAP • ANECRA • Road Institute (IEP) • INE • General Directorate of Terrestrial Transportation (DGTT) • INAC
	CRF 1A4 – Other Sectors	• DGEG: energy balances
CRF 1 B – Fugitive Emissions from Fuels		• DGEG: energy balances and statistical yearbooks • GALP
CRF 2 – Industrial Processes	CRF 2A – Mineral Products	• LPS, LCP • CIMPOR, SECIL • DGEG: energy balances • Portuguese Association of Producers of Bitumen Materials (APORBET) • European Asphalt Pavement Association (EAPA) • Technology Centre for Ceramics and Glass (CTCV)
	CRF 2B – Chemical Industry	• DGEG: energy balances • LCP • INE • Regional Air Inventories
	CRF 2C – Metal Production	• DGEG: energy balances • LCP • SN • INE • Regional Air Inventories
	CRF 2D – Other Production	• LCP • DGEG: energy balances • CELPA
	CRF 2F – Consumption of Halocarbons and SF6	• INE • APIRAC • Data from Industry Importers· • EDP, REN
CRF 3 – Solvent and Other Product Use		• DGEG: energy balances • Gen-Dir for Economic Activities nterprise (DGAE) • INE
CRF 4 – Agriculture		• Ministry of Agriculture • National Forest Authority (AFN) • INE: agriculture survey
CRF 5 – Land Use Change and Forestry		• AFN • IGP • ISA
CRF 6 – Waste	CRF 6A – Solid Waste Disposal on Land	• APA • INE • Quercus Survey
	CRF 6B – Wastewater Handling	• National Institute for Water (INAG) • INE
	CRF 6C – Waste Incineration	• APA • General Direction for Health/Ministry of Health • Data from Incineration Units

1.5 Brief description of key source categories

Key category analysis to the 2009 Portuguese inventory estimates (1990-2008) was conducted using Tier 2 approach with the LULUCF sector. Level assessment was undertaken for all years; the trend assessment was performed for the 1990-2008 period. A qualitative assessment has also been used.

The Tier 2 analysis with LULUCF resulted in the identification of 52 key categories, listed in the following table.

Table 1-5 – Summary overview of Portuguese key categories (1990-2008) based on Tier 2 approach

IPCC CATEGORIES	ACTIVITY	GHG	Key source Categor	Criteria for Identificat	Comments on level assessment	2008 emissions estimate (kton CO2 eq.)
1A 3 b Road Transportation	All Fuels	CO2	√	Level Trend	All years	18346
1A 1a Public Electricity and Heat Production	Solid Fuels	CO2	√	Level	All years	8949
1A 1a Public Electricity and Heat Production	Gaseous Fuels	CO2	√	Level Trend	1999, 2004, 2005, 2006, 2007, 2008	5153
2 A 1Cement Production	Production Quantities	CO2	√	Level	All years	4110
1A 2 f Other	Liquid Fuels	CO2	√	Level	All years	3950
6 A Municipal SWDL	SW Disposal on Land	CH4	√	Level Trend	All years	3149
4 A ENTERIC FERMENTATION	Population size	CH4	√	Level	All years	2967
1A 2 f Other	Gaseous Fuels	CO2	√	Level Trend	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	2035
1A 1a Public Electricity and Heat Production	Liquid Fuels	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1995, 1998, 1999, 2000, 2001, 2002, 2005	1944
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	√	Level Trend	All years	1851
6 A 3 Industrial SWDL	Industrial Waste Disposal on Land	CH4	√	Level Trend	All years	1768
6 B 1Industrial Wastewater	Wastewater	CH4	√	Level	All years	1655
1A 4 b Residential	Liquid Fuels	CO2	√	Level	1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006	1412
1A 4 a Commercial / Institutional	Liquid Fuels	CO2	√	Level	1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007	1392
4 B MANURE MANAGEMENT	Animal Excretion	CH4	√	Level Trend	All years	1371
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	√	Level Trend	All years	1138
5 E 2 Land converted to Settlements	Emissions/Removals	CO2	√	Level	All years	1108
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	CO2	√	Level Trend	1990, 1991, 1993	1051
2 F 1Refrigeration and Air Conditioning Equipment	Consumption	HFC	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	981
6 B 2 Domestic and Commercial wastewater	Wastewater	CH4	√	Level Trend	All years	754
2 B 1Ammonia Production	Production Quantities	CO2	√	Level	1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005,	652
1B 2 a Oil	Liquid Fuels	CO2	√	Level Trend	1995, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	629
4 C RICE CULTIVATION	Culture Surface	CH4	√	Level	2004, 2006, 2007, 2008	386
2 A 2 Lime Production	Production Quantities	CO2	√	Level Trend	1990, 1991, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	378
1A 3 a ii Domestic	Liquid Fuels	CO2	√	Level	1990, 1991, 1992, 1994, 1995, 1996, 1997, 1998, 2005, 2006, 2007	360
5 B 2 Land converted to Cropland	Emissions/Removals	CO2	√	Level	1990, 1997, 1998, 2000, 2001, 2002, 2007	354
1A 4 b Residential	Biomass	CH4	√	Level Trend	All years	310
6 B 1Industrial Wastewater	Wastewater	N2O	√	Level Trend	All years	226
1A 2 f Other	Solid Fuels	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1995, 1996	195
2 A 7 Other	Production Quantities	CO2	√	Level Trend	2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008	181
1B 2 b Natural gas	Gaseous Fuels	CH4	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	148
1B 2 d Other (Geothermal)	Energy Production	CO2	√	Level Trend	1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005,	126
3 D OTHER	Other Use of Chemicals	CO2	√	Level	All years	102
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	N2O	√	Level Trend	All years	102
1A 4 b Residential	Biomass	N2O	√	Level Trend	All years	65
3 A PAINT APPLICATION	Paint application	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2006	63
3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING	Chemical manufacture and processing	CO2	√	Level	All years	56
2 F 2 Foam Blowing	Consumption	HFC	√	Level Trend	2003, 2004, 2005, 2006, 2008	45
1A 1a Public Electricity and Heat Production	Solid Fuels	N2O	√	Level	All years	42
1A 1a Public Electricity and Heat Production	Gaseous Fuels	N2O	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	40
1A 2 f Other	Biomass	N2O	√	Level	1990, 1991, 1992, 1993, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	26
1A 1a Public Electricity and Heat Production	Biomass	N2O	√	Level Trend	2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008	20
1A 2 d Pulp, Paper and Print	Biomass	N2O	√	Level	2007, 2008	18
1A 2 f Other	Gaseous Fuels	N2O	√	Trend		16
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CH4	√	Level	2003	12
1A 1a Public Electricity and Heat Production	Other Fuels	N2O	√	Trend		11
2 F 1Refrigeration and Air Conditioning Equipment	Imports/Potential	PFC	√	Qualitative		9
1A 1a Public Electricity and Heat Production	Liquid Fuels	N2O	√	Level Trend	1992	5
2 A 6 Road Paving with Asphalt	Production Quantities	CO2	√	Level Trend	All years	4
5 B 1Cropland remaining Cropland	Emissions/Removals	CO2	√	Trend		-164
5 A 2 Land converted to Forest Land	Emissions/Removals	CO2	√	Level Trend	All years	-577
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CO2	√	Level Trend	All years	-2999
Sub-total with LULUCF		All gases				**65928**
% of total with LULUCF		All gases				86.3
TOTAL EMISSIONS WITH LULUCF		All gases				**76363**

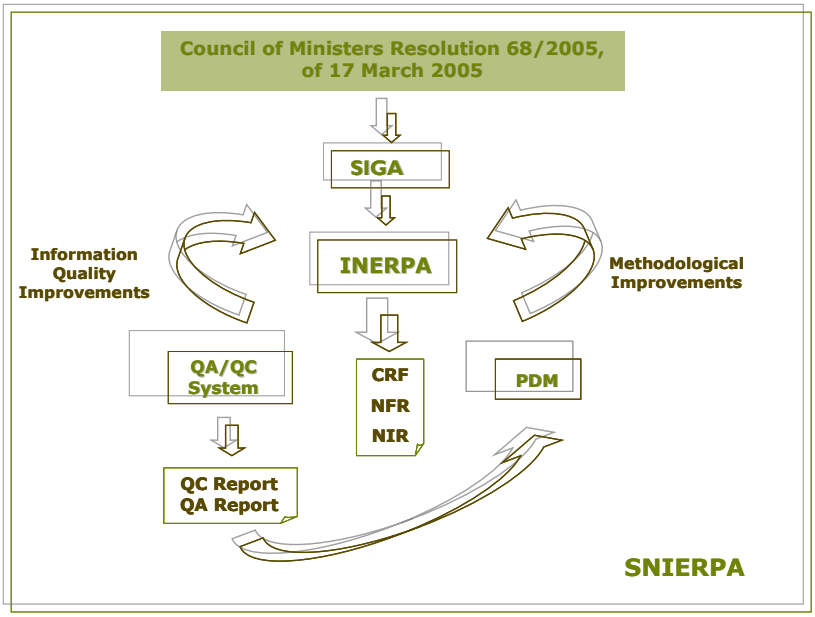
1.6 Information on QA/QC

A Plan for Quality Assurance/ Quality Control (QA/QC) has been developed. The Institute for the Environment is the national responsible entity for the Quality Assurance and Quality Control System of the inventory. The conceptualization of the system has been however done under an external consultancy with Ecoprogresso.

The QA/QC system is an integral part of the National System for the Inventory of Emission by Sources and Removal by Sinks of Air Pollutants (SNIERPA), which was created by the March, 17th Resolution of the Council of Ministers nr. 68/2005, and includes three technical instruments (Figure 1-2):

- Quality Control and Quality Assurance System (SCGQ)
- Methodological Development Programme (PDM)
- Integrated Management System (SIGA).

Figure 1-2 – SNIERPA 's main elements relations



The SCGQ is composed of a Quality Control and Quality Assurance Programme and a Procedures Manual. The first schedules the application of the general (QC1) and specific (QC2) Quality Control as well as Quality Assurance (QA) procedures, described in detail in a Manual. The procedures were defined according to Good Practice and Uncertainty Management Guide (IPCC, 2000) and adapted to the specific National Inventory (INERPA) characteristics.

Quality Control tier 1 procedures defined in the QA/QC Manual include a series of checklists, which consider basic checks on the accuracy of data acquisition processes (including, e.g, transcription errors) and checks on calculation procedures, data and parameters.

It includes also cross-checking among subcategories in terms of data consistency, verification of NIR and CRF tables. Documentation and archiving procedures include checks on information handling which should enable the recalculation of the inventory. QC tier 2 procedures, on the other hand, include technical verifications of emission factors, activity data, comparison of results among different approaches. A report on the application QC tier 2 procedures to the 2009 inventory is at the APA´s internet site (http://www.apambiente.pt/).

1.7 General uncertainty assessment

Emission estimates from the GHG inventory pretend to express the best estimate of emissions, which should not be over-estimated neither under-estimated. Nevertheless, natural variability of

certain emission processes, incomplete knowledge of emission sources and definition, errors and gaps in data collection and statistical information, incorrect determination and choice of emission factors and parameter due to errors in original monitoring data, reference studies and expert judgement, all this factors lead to a certain error or level of uncertainty in emission estimates. However, the main purpose of the realization of the uncertainty assessment is not to contest the validity of the inventory estimates, but to help prioritise efforts to improve the accuracy of future inventories and guide future methodological developments. The uncertainty analysis was performed only for the direct GHG: CO_2, CH_4, N_2O, HFC and SF_6, considering all emissions in CO_2 equivalent (CO_2e). The uncertainty of all source activities was determined including the LULUCF categories.

A tier 1 methodology was used to estimate total uncertainty for the inventory, for each individual year and also the uncertainty in trend. Basically this method of classical analysis, which is explained in more detail in IPCC(2000) and in Annex B, attributes uncertainty values to activity data and emission factors, for each of the pollutants, and uses error propagation rules to combine uncertainty estimates for each individual source into total uncertainty. In accordance with IPCC (2000) considerations the uncertainty in Global Warming Potentials (GWP) is not included in uncertainty quantification. A more detailed explanation of methodology is presented in Annex B. The uncertainty values, both for activity data and emission factors, are discussed in the detailed analysis of emission estimates for each individual source sector.

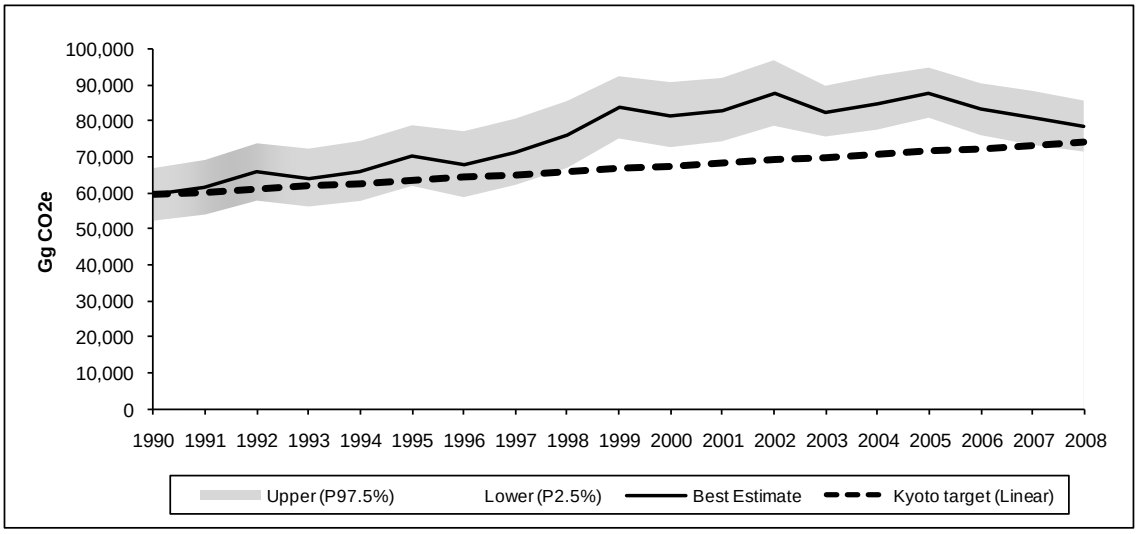
The uncertainty assessment was performed using inventory data for all years from 1990 to 2008. The results are presented in Table 1-6. The full range of emission possibilities, considering the confidence limit may be observable in Figure 1-3.

Total uncertainty varies along years from a minimum value of 7.9 per cent up to 13.5 per cent, from 1990 to 2008. The uncertainty in trend from 1990 to 2008 is 12.7 per cent. Uncertainty values are defined as the range of 95% confidence interval (IPCC,1997; IPCC,2000), meaning that there is a 95% probability that the actual value of the quantity (activity data, emission factor or emission) is within the interval defined by the confidence limits.

Table 1-6 – Uncertainty of the annual emission estimates, by gas and total uncertainty

Year	CO2	CH4	N2O	LULUCF	F Gases	Total
	per cent					
1990	6.5	28.5	115.0	60.8	-	12.3
1991	6.5	28.2	115.4	287.0	-	12.3
1992	6.4	28.4	115.9	77.6	-	12.1
1993	6.3	28.8	119.1	62.7	-	12.5
1994	6.3	28.1	114.5	53.5	-	12.6
1995	6.1	27.8	109.9	62.0	77.5	12.0
1996	6.6	27.6	112.2	49.6	73.5	13.5
1997	6.4	27.7	112.5	47.6	71.1	12.9
1998	6.1	27.3	115.0	50.3	76.1	12.2
1999	3.7	27.3	108.1	49.1	78.5	10.3
2000	3.8	23.3	117.2	51.5	64.5	11.1
2001	3.9	25.9	116.9	50.2	72.0	10.6
2002	3.7	27.1	117.6	51.1	70.8	10.4
2003	4.0	27.2	112.0	34.2	68.2	8.5
2004	3.9	26.4	113.2	109.2	66.1	8.8
2005	3.7	27.4	113.0	34.1	67.5	7.9
2006	4.0	27.0	113.3	82.8	66.2	8.7
2007	4.6	27.3	114.9	67.9	66.2	9.3
2008	3.3	26.7	113.0	62.4	66.8	9.0

Figure 1-3 - Trend of total GHG emissions without LULUCF and lower and upper estimates considering the 95% confidence interval



1.8 Overview of the completeness

CRF Table 9 (Completeness) gives an overview of the level of completeness of the 2009 submitted inventories to the UNFCCC and EC. Additional information on this issue is given in the subchapters.

The inventory covers the 6 gaseous air pollutants included in Annex A to the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6), as well as estimates for indirect GHGs, including carbon monoxide (CO), nitrogen oxides (NO_x), and non-methane volatile organic compounds (NMVOC). Data are also reported for sulphur oxides (SO_x).

As a general rule the inventory covers emissions realized in the whole Portuguese territory, i.e., mainland Portugal and the two autonomous regions of Madeira and Azores Islands.

1.9 Future developments

Future improvements are defined under the Methodological Development Plan (PDM) which is settled each year in the context of the National Inventory System (SNIERPA) and is developed under the responsibility of the APA under an external consultancy with Ecoprogresso and InventAr, in cooperation with the sectoral Focal Points. The PDM pretends to reflect the results of the various review processes, in particular the UNFCCC reviews, the annual inventory compilation process (all experts and entities involved can make proposals for methodological development), and generally the results of the application procedures of Quality Control and Quality Assurance which have been defined under the Control and Quality Assurance System.

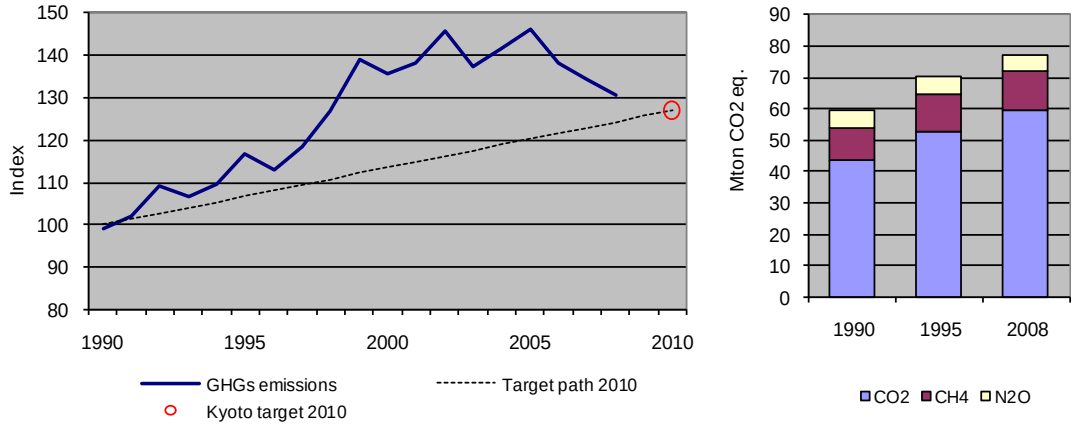
A detailed explanation of the sectoral future improvements are presented in each source specific sub-chapter.

2 TRENDS IN PORTUGUESE GHG EMISSIONS

2.1 Trends of Total Emissions

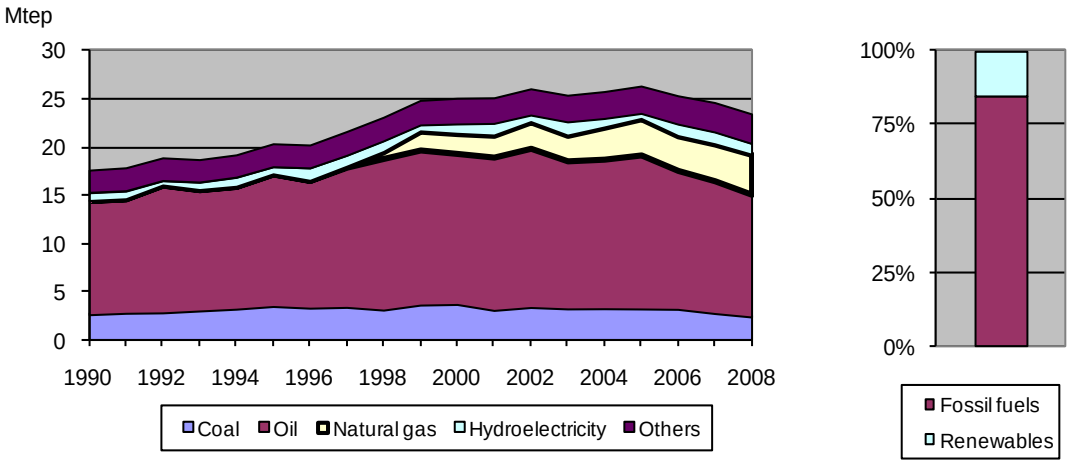
In 2008, total Portuguese GHG emissions without land-use, land-use change and forestry (LULUCF) were estimated at about 78.5Mton CO2eq., representing an increase of 30 per cent compared to 1990 levels (Assigned Amount level). Under the EU burden-sharing agreement, Portugal is bind to limit its emissions in the first commitment period to +27 per cent compared to the 1990 level. Comparing the 1990-2008 growth with the linear target path from 1990 to 2010, Portuguese GHG emissions were, in 2008, 6.2 per cent above this target path.

Figure 2-1– GHG emissions (without LULUCF)



The principal source of GHGs in Portugal in 2008 is the energy sector. The largest gas emitted is CO_2 representing 75.8 per cent of total GHGs emissions expressed as global warming potential (GWP) weighted emissions. The majority of these emissions are generated in energy-related activities, which are responsible for about 90 per cent of total CO_2 emissions. This situation is primarily related to the pattern of energy sources used in Portugal. In average, during the period 1990-2008, 84 per cent of the primary energy consumed was produced from fossil fuel combustion (coal, oil and natural gas) whereas the renewable energy represents the remaining part, i.e. 16 per cent in average. (Figure 2-2) The situation is however changing in the most recent years, with a progressive increase of the renewable energy sources such as wind.

Figure 2-2 – Primary energy consumption



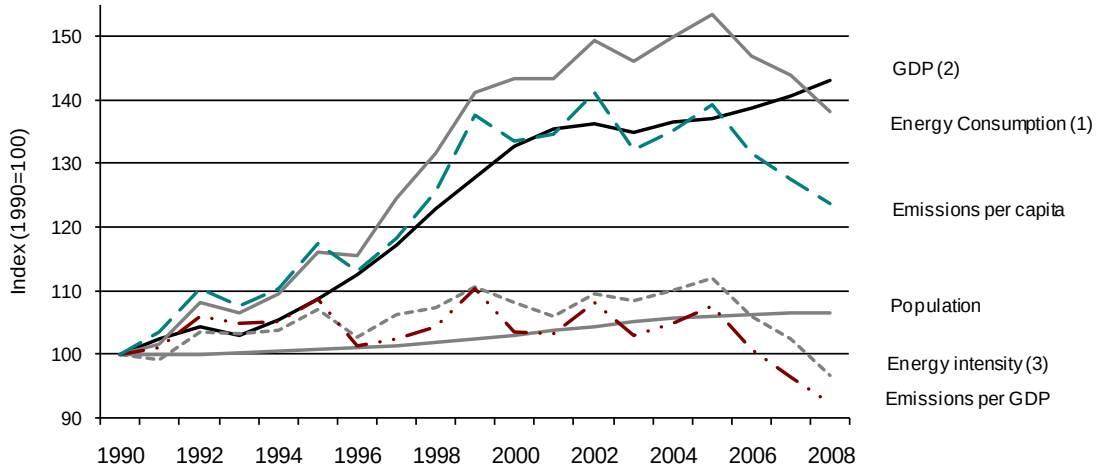
Notes: Hydroelectricity: domestic production. Others: includes fuelwood, wastes, and biogas. Fossil fuels: includes coal, oild and natural gas. Renewables: includes domestic hydroelectricity and others.
Source: DGGE.

The average annual emissions growth rate for the overall period 1990-2008 is about 2 per cent. However, as illustrated in there are roughly three different periods that can be identified in terms of the annual average rate evolution: from 1990 to 1995 3.7 per cent; from 1995 to 1999 4.7 per cent, and since 2000 a more moderate increase and even a decreasing tendency recently can be recognised.

Driving factors for emissions growth are amongst others, economic growth and higher energy demand, increasing road transport volume and distance driven supported by strong development of road infrastructure and rapid growth in private car ownership. Climatic variables, such as precipitation, which vary to years have also a significant effect on hydropower generation and then produces substantial inter-annual variations in emissions.

During the 1990s Portugal experienced a rapid economic growth with an increase in GDP of about 43 per cent in the period 1990-2008, corresponding to an average annual increase of 2.4 per cent. The most rapid growth occurred from the years 1993 to 2000, where the average annual growth rate reached the 4.1 per cent. Since 2001, economic growth slowed considerably, contributing, at least partially, to the more moderate emissions growth registered in the most recent years.

Figure 2-3– GHG emissions per capita, per unit of GDP and energy consumption

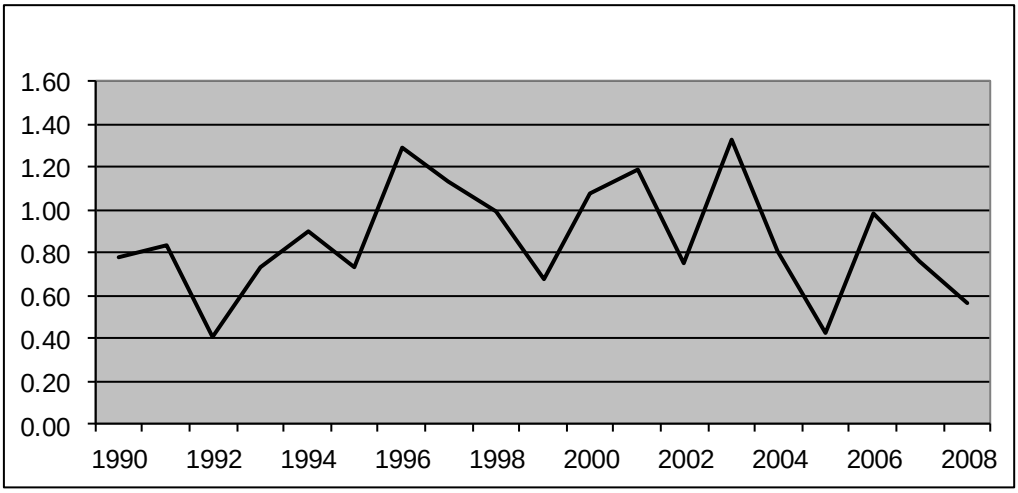


Notes:
Primary Energy Consumption.
2000 prices.
Energy Consumption per GDP.
Sources: INE, DGEG.

During the period analysed, the country has achieved a slight decoupling of emission trends from economic growth, in particular for the most recent years. The decrease of carbon intensity (emissions per GDP unit) observed in the recent years (see previous figure), is surely related to the implementation of some important measures that had a positive effect in the emissions levels, such as the introduction of natural gas (1997), the installation of new combined cycle thermoelectric plants using natural gas (1999), the progressive installation of co-generation units, the amelioration of energetic and technologic efficiency of industrial processes, the improvement of car efficiency and fuels quality.

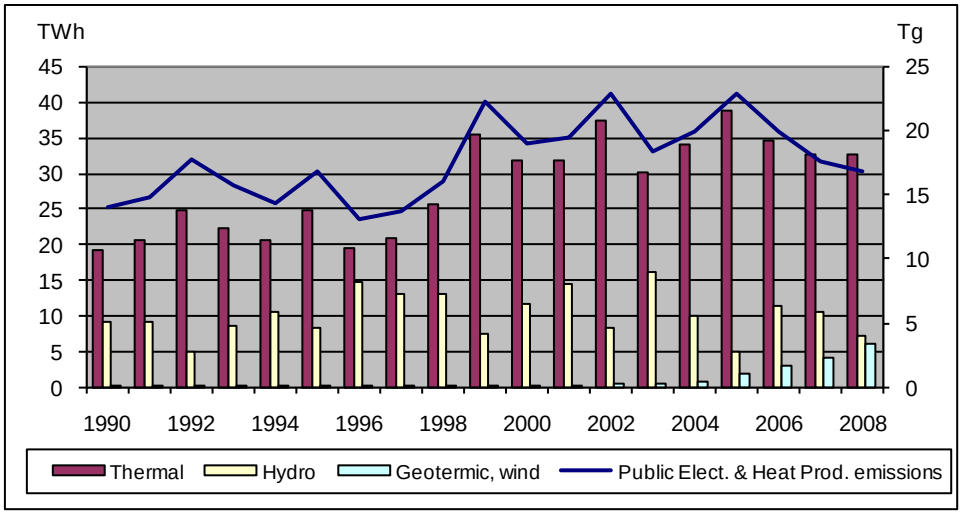
The level of emissions in the period analysed show significant inter-annual variations, which are related to the pronounced fluctuations of hydroelectric power generation, that is highly affected by annual variations in precipitation. Concerning recent years, year 2003 had a higher value of total annual water availability (hydraulic index (HI) of 1.33, meaning that it rained 33 per cent more than an average hydrologic year) (see Figure 2-4) which has allowed a considerable increase of hydroelectric power production and the subsequent reduction in CO2 emissions from electricity production in thermal plants (see Figure 2-5). As compared to 2003, hydroelectric power production decreased in 2004 (HI of 0.81) and 2005 leading to the increase in GHG emissions. The year 2005 recorded in fact one the lowest figures on record concerning water availability (HI of 0.42), which resulted in a significant increase in fossil fuel consumption and consequently on emissions. The latest years 2007 and 2008 present nevertheles a change in this relation, since the precipitation was lower (respectively, HI of 0.76 and 0.56) than the previous year (2006 HI of 0.98) and the emissions from the energy sector were lower in both years. This is due to a conjunction of factors as the decrease in the primary energy consumption, the bigger importance of electricity importation, the proliferation of renewable and low-carbon fuels.

Figure 2-4 – Hydraulic index



Note: HI = 1 corresponds to the average hydrologic availability.
Source: EDP, REN

Figure 2-5 – Gross electric power production and emissions from electricity and heat generation



Source: DGGE.

2.2 Trends by Gas

Over the 1990-2008 period, all GHG emission levels grew (Figure 2-6). CO_2 is the gas having registered the biggest increase (36.5 Per cent). F-gases are excluded from the figure as they represent a small fraction of the emissions total (in 2008: 1.3 per cent).

Figure 2-6 – Increase of GHG emissions by gas over the 1990-2008 period

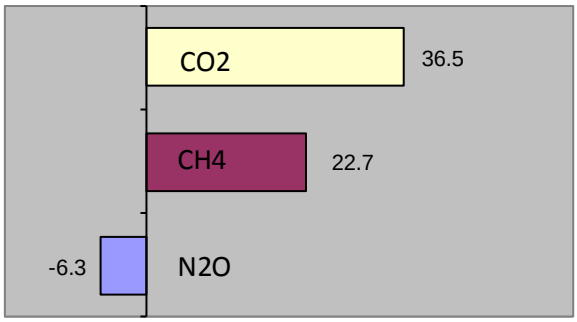


Figure 2-7 illustrates the relative contribution of direct GHG to the total emissions for 1990 and 2008, being evident CO_2 as the primary GHG, accounting for about 76 per cent of Portuguese emissions on a carbon equivalent basis in 2008 (LULUCF excluded). The second most important gas is CH_4, followed by N_2O, representing, respectively, 16 per cent and 7 per cent of total emissions in 2008. Portugal has chosen 1995 as the base year for fluorinated gases. In 2008 these gases represented about 1 per cent of total GHG emissions.

Throughout the report, the reference to "total emissions" is meant to refer to "total emissions without CO_2 from LUCF on a carbon equivalent basis". Furthermore the references to 1990 represent the year 1990 as estimated for this submission which is different from the assign amount (except when specify otherwise). This difference is mainly due to the revision of the time series or methodology improvements.

Figure 2-7 – GHG emissions by gas: 1990 and 2008

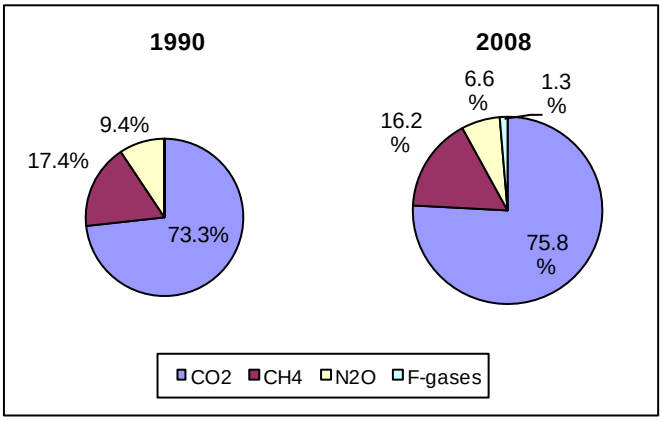


Table 2-1 – GHG emissions and removals in Portugal by gas: 1990-2008

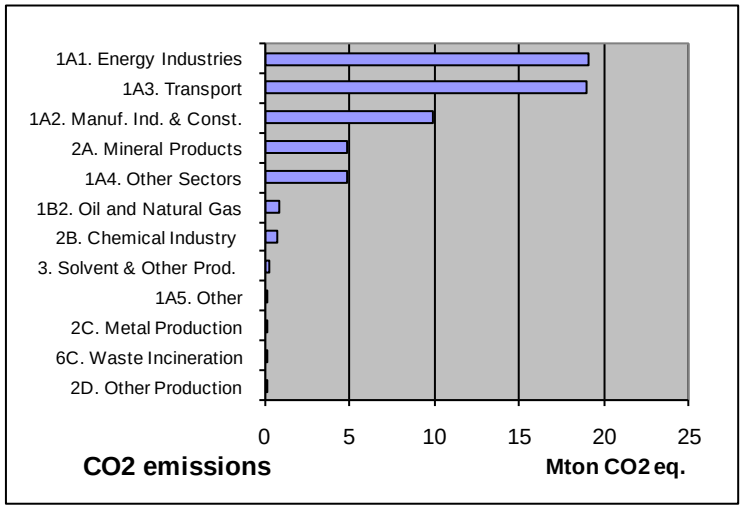
GHGs EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
CO2 emissions including net CO2 from LULUCF	44,961	45,536	47,560	45,587	45,589	48,976	44,782	47,813	51,849	59,203
CO2 emissions excluding net CO2 from LULUCF	43,595	45,316	49,413	48,002	49,105	53,000	50,163	53,394	58,066	64,875
CH4 emissions including CH4 from LULUCF	10,488	10,849	10,825	10,794	11,245	11,606	11,609	11,775	12,309	12,493
CH4 emissions excluding CH4 from LULUCF	10,351	10,632	10,756	10,753	11,219	11,454	11,556	11,755	12,209	12,439
N2O emissions including N2O from LULUCF	5,605	5,607	5,595	5,448	5,727	5,817	6,119	6,110	5,749	6,175
N2O emissions excluding N2O from LULUCF	5,565	5,559	5,562	5,418	5,698	5,776	6,087	6,081	5,713	6,143
HFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	55	77	110	152	209
PFCs	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NO	NA,NO	1	6	12
SF6	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	6	6	6	6	6
Total (including LULUCF)	**61,054**	**61,992**	**63,981**	**61,830**	**62,561**	**66,460**	**62,592**	**65,815**	**70,072**	**78,097**
Total (excluding LULUCF)	**59,510**	**61,507**	**65,731**	**64,173**	**66,022**	**70,291**	**67,889**	**71,348**	**76,153**	**83,684**

	2000	2001	2002	2003	2004	2005	2006	2007	2008
	CO_2 equivalent (Gg)								
CO2 emissions including net CO2 from LULUCF	57,560	58,641	62,194	73,943	64,613	75,081	62,204	59,726	57,357
CO2 emissions excluding net CO2 from LULUCF	63,696	64,406	68,400	63,724	65,910	68,384	63,888	61,587	59,516
CH4 emissions including CH4 from LULUCF	11,694	12,468	12,939	13,449	12,921	13,602	13,366	13,049	12,715
CH4 emissions excluding CH4 from LULUCF	11,576	12,390	12,827	12,953	12,823	13,234	13,300	13,030	12,703
N2O emissions including N2O from LULUCF	6,107	5,891	5,969	5,407	5,611	5,412	5,138	5,242	5,241
N2O emissions excluding N2O from LULUCF	6,069	5,857	5,931	5,331	5,575	5,348	5,105	5,214	5,213
HFCs	303	391	498	610.48	687.29	785.68	873.07	937.79	1,033.42
PFCs	6	13	10	9.53	9.31	9.97	6.55	5.72	9.02
SF6	6	6	7	7.07	7.79	7.41	8.41	8.04	8.14
Total (including LULUCF)	**75,678**	**77,410**	**81,617**	**93426**	**83849**	**94898**	**81596**	**78969**	**76363**
Total (excluding LULUCF)	**81,656**	**83,063**	**87,673**	**82634**	**85013**	**87769**	**83181**	**80783**	**78483**

NE - Not Estimated; NO - Not Occurring; NA – Not Applicable

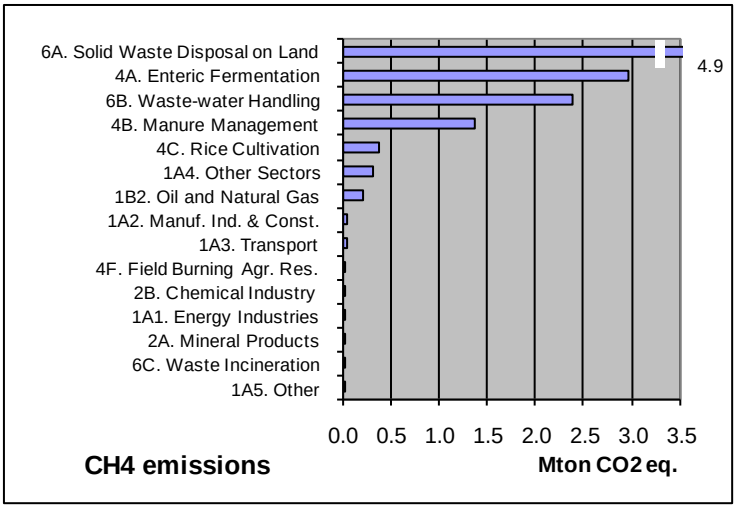
Next figures summarise the sources categories of emissions by gas (F-gases not presented).

Figure 2-8 – 2008 sources categories of CO_2



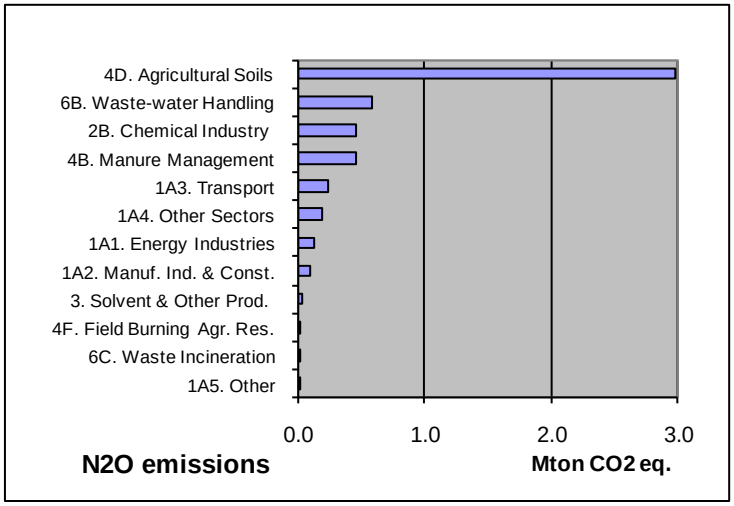
The largest GHG gas emitted is CO_2 which is mainly generated from fossil fuel combustion in energy-related activities (IPCC categories 1). Some other non-energy production processes such as cement production (included in category 2A), are also responsible for considerable quantities of CO_2 emissions.

Figure 2-9 – 2008 sources categories of CH_4



CH_4 is primarily generated through anaerobic decomposition of organic matter in biological systems, like decomposition of municipal and animal wastes, waste-water handling systems, or enteric fermentation in animals. Other sources are also responsible for these emissions, such as biomass burning, the distribution of natural gas and petroleum, and the incomplete fossil fuel combustion.

Figure 2-10 – 2008 sources categories of N_2O



N_2O emissions are associated with direct and indirect emissions from agricultural soils, mainly related to the use of synthetic and manure fertilizers, manure deposition by livestock, nitrogen fixation by N-fixing crops (leguminous plants), and incorporation of crop residues into soils. Other significant sources are fossil fuel combustion particularly in the transport sector, chemical industry (nitric acid production), wastewater treatment, and biomass burning (agricultural residues and residential combustion, and waste incineration).

2.3 Trends by Sector

According to the UNFCCC Reporting Guidelines, emissions estimates are grouped into six large IPCC categories: Energy, Industrial Processes, Solvent use, Agriculture, Land-Use Change and Forestry, and Waste. Emissions (Figure 2-11, Table 2-2) have risen for all these sectors with the exception of Agriculture. The interpretation of the LULUCF sector is somehow different, with positive figures representing that the sector is a net emitter, and negative values meaning that the source is estimated as a sink.

Figure 2-11 – GHG emissions and removals by sector: 1990-2008

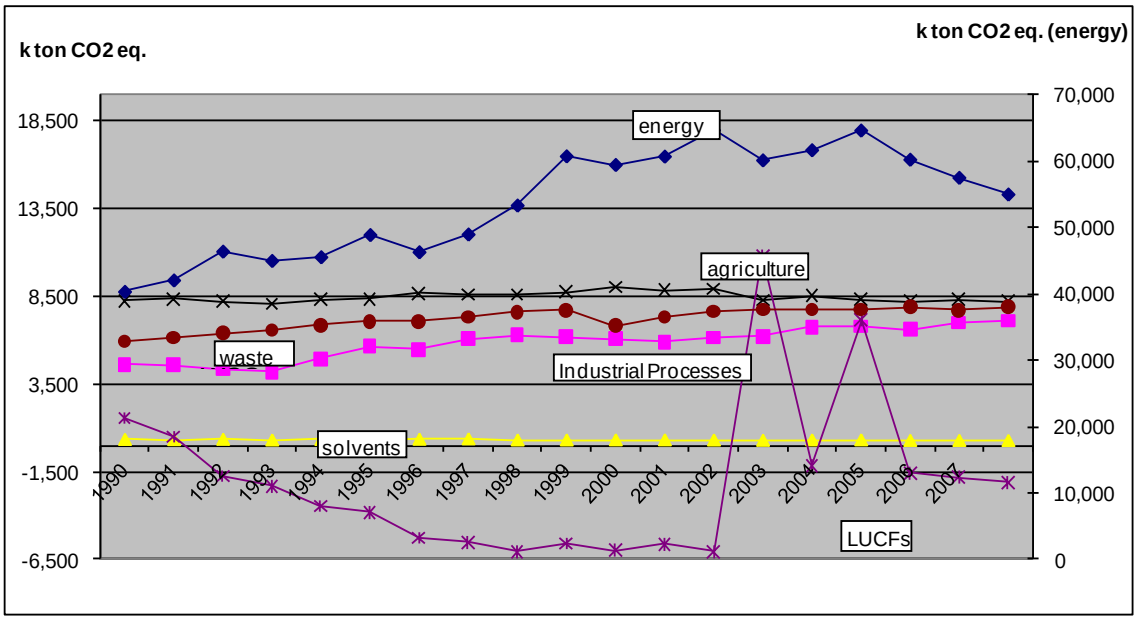


Figure 2-12 – GHGs emissions percentage change (1990-2008) by IPCC category (LULUCF excluded)

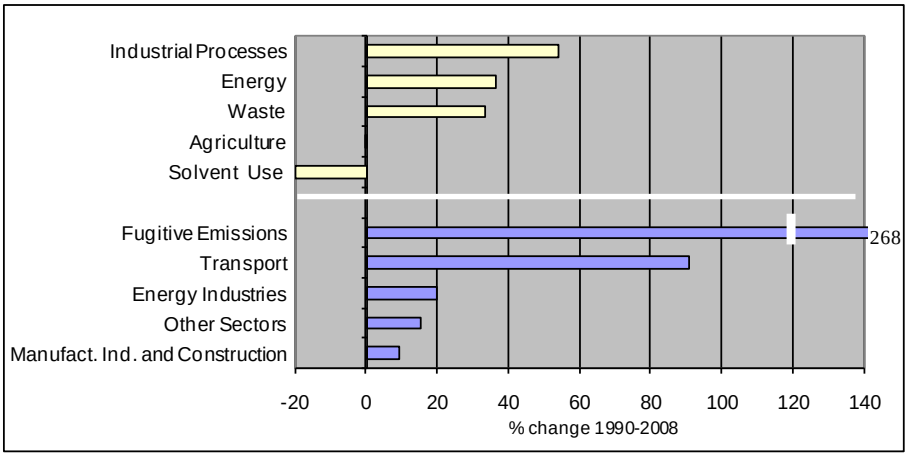


Table 2-2 – GHG emissions and removals by sector: 1990-2008

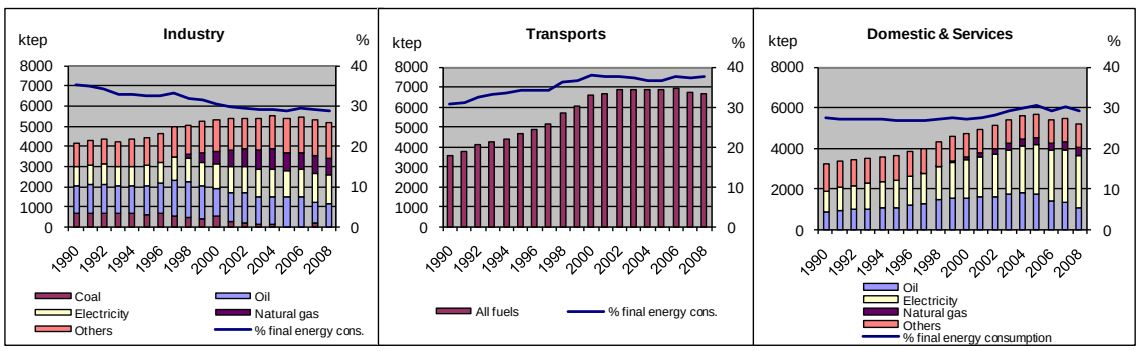
GHGs SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
1. Energy	40,388	42,103	46,429	45,031	45,588	48,921	46,339	49,003	53,350	60,740
2. Industrial Processes	4,611	4,584	4,352	4,202	4,926	5,654	5,459	6,082	6,292	6,184
3. Solvent and Other Product Use	332	319	339	298	328	323	344	367	299	299
4. Agriculture	8,252	8,361	8,214	8,073	8,311	8,335	8,679	8,584	8,593	8,754
5. Land-Use Change and Forestry (7)	1,543	486	-1,750	-2,343	-3,461	-3,831	-5,297	-5,533	-6,080	-5,587
6. Waste	5,928	6,139	6,397	6,567	6,868	7,058	7,068	7,312	7,619	7,706
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GHGs SOURCE AND SINK	2000	2001	2002	2003	2004	2005	2006	2007	2008
	CO_2 equivalent (Gg)								
1. Energy	59,446	60,699	64,652	60,136	61,659	64,614	60,232	57,513	55,007
2. Industrial Processes	6,080	5,880	6,161	6,207	6,749	6,768	6,600	6,986	7,104
3. Solvent and Other Product Use	306	307	297	278	303	306	270	269	265
4. Agriculture	9,013	8,867	8,921	8,283	8,544	8,325	8,208	8,312	8,213
5. Land-Use Change and Forestry (7)	-5,979	-5,653	-6,056	10,791	-1,163	7,129	-1,585	-1,814	-2,120
6. Waste	6,811	7,310	7,641	7,731	7,758	7,756	7,871	7,702	7,895
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA

Energy is by far the most important sector, accounting for 70 per cent of total emissions in 2008, and presenting an increase of 36 per cent over the 1990-2008 period. Energy industries and transport are the two most important sources representing each one approximately 24 per cent of total emissions. Within the energy industries, public electricity and heat production represents alone 21 per cent of the total emissions. This reflects the country important dependence on fossil fuels for electricity generation and transportation, which have grown steadily until the mid 2000s due to the continued increase of electricity demand driven in particular by the residential/commercial sector, and the growth of mobility. The situation seems to have changed in the most recent years, were we can observe stagnation or even decrease of these trends.

The sectoral evolution of energy consumption presented in the next figure, shows that the sectoral structure of the energy demand has been changing. The share of the industrial sector, which represented in 1990, 35 per cent of the final energy demand, decreased to 29 per cent since 2003. On the other hand, as previously mentioned, transports have been increasing importance, having raised from 31 per cent in 1990 to 38 per cent of the final energy consumption in the early 2000s. The increase of energy consumption of this sector was 91 per cent from 1990 to 2005, but the variation dropped to 87 in the 1990-2008 period. Also, the services is one of the sectors that have increased the most, having registered a 218 per cent rise of energy consumption from 1990 to 2005, and having decrease to 170 per cent from 1990 to 2008. In 2008, this sector together with the domestic sector, represented 29 per cent of the share of the total energy consumed.

Figure 2-13 – Final energy consumption by main sectors and fuel



Mobile sources, which are largely dominated by road traffic, are one of the sectors that have risen faster. The overall energy consumed for transportation is supplied by petroleum-based products, with nearly one third being gasoline (29 per cent in 2004). This fuel has been losing relatively importance since 1990, when the share was 40 per cent of the sectoral energy consumption. In the period 1990-2008 the emissions of transportation sources increased 91 per cent, due to the steady growth of vehicle fleets (in particular with more powerful engines) and road travel from 1990 to the early 2000s, reflecting the increase in family income and the strong investment in the road infrastructure of the country in the 1990s decade. Indirectly the increase in road traffic activity also augments the emissions from fossil fuel storage, handling and distribution. As previously said, the situation seems to have stabilised in the mid 2000s.

Still within the energy sector, the category "other sectors", which include the residential and commercial activities, also registered a significant increase in the 1990-2005 period (with almost 53.5 per cent rise), but this tendency have decelerate (around 15 per cent increase in the 1990-2008 period), due to a certain extent to the stagnation of the economic growth, and also to other factors as energy conservation measures.

Agriculture, was in the period analysed, the second most significant sources of GHGs emissions, with 10.5 per cent of the Portuguese emissions in 2008, and presents a slight decrease of 0.5 per cent since 1990, This fact is related to the relatively decrease of importance of the sector in terms of the national economy, and is associated for instance with the reduction of the livestock production of certain categories of animals (e.g. swine), the extensification of cattle production and the decrease of fertilizer consumption.

Waste represented approximately 10.1 per cent of Portuguese emissions in 2008, recording an increase of approximately 33 per cent since 1990. The emissions for this sector have grown significantly in the period 1990-1999. This increase in emissions is primarily related to the rise of waste generation (associated with development of the family income and the urbanisation growth registered in the country during the last decade) and the deposition of waste in landfills.

Industrial processes represented 9.1 per cent of the Portuguese emissions in 2008, and have grown 54% since 1990. These emissions which are generated as by-product of many non-energy-related activities, are mostly related to the increase of cement production, road paving, limestone and dolomite use, lime production, glass and ammonia production.

Solvent use represents less than 1 per cent of total emissions, and is mainly related to NMVOC emissions4.

Estimates of emissions and sinks from land use change and forestry category, show that this category has changed from being a net emitter in 1990 (1.5 Mt CO2 eq.) to becoming a carbon sink in 1992 and the following years until 2002. The situation was again reverted in 2003 and 2005, when this category was again estimated as a net emitter. This pattern of variation is explained by the exceptional occurrences and extension of forest fires in specific years, and the use of the burnt materials as inputs to the industry.

2.4 Indirect GHG and SOx emissions

Several gases do not have a direct influence in climate change but affect the formation or destruction of other GHG. CO, NOx, and NMVOC are precursor substances for ozone which is a GHG. SOx produce aerosols, which are extremely small particles or liquid droplets that can also affect the absorptive characteristics of the atmosphere.

[4] These are converted into ultimate carbon dioxide after being emitted to atmosphere.

Figure 2-14 – Indirect GHG and SO_x emissions: 1990-2008 variation

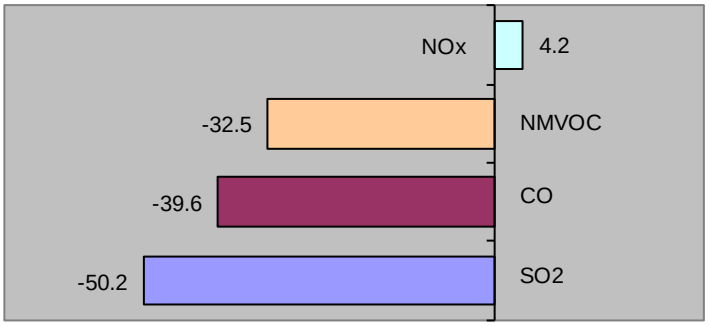


Table 2-3 – Indirect GHG and SOx emissions: 1990-2008

Gas emissions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(Gg)									
CO	854	870	902	850	826	810	802	771	761	737
NOx	259	274	294	281	283	293	291	295	306	321
NMVOC	326	324	331	305	299	292	289	288	286	280
SO2	320	311	373	317	297	333	273	293	342	345

Gas emissions	2000	2001	2002	2003	2004	2005	2006	2007	2008	% change
	(Gg)									1990-08
CO	704	632	622	612	592	577	546	529	516	-39.6
NOx	321	321	331	309	313	316	294	282	270	4.2
NMVOC	268	255	254	247	241	232	228	220	220	-32.5
SO2	306	289	287	193	194	200	176	171	159	-50.2

In 2008, SO_x, CO and NMVOC emissions have decreased from 1990 levels: -50.2%, –39.6% and -32.5%. NOx emissions registered a positive trend: +4.2%, (Table ES.3).

Energy is the major responsible sector for emissions of NO_x, SO_x and CO. Its contribution for NMVOC emissions is also significant, together with Solvent use and Industrial processes.

Within energy, transportation is responsible for the major share of NO_x, and CO emissions, respectively 43.7% and 29.6% of 2008 totals. Despite the fast growing trends of the transport sector (mainly road) since the 90s, the introduction of new petrol-engine passenger cars with catalysts converters and stricter regulations on diesel vehicles emissions, limited the growth of these emissions or even its decrease. In fact, the situation started to change in the last years, as transport emissions growth has first stabilised and even started to decline in the most recent years. Since the early 2000, NO_x emissions from transport has been presenting a decreasing tendency; and CO and NMVOC emissions recorded real reductions in the 1990-2008 period, respectively, –69.2% and –80.3%.

Other sectors (commercial/institutional, residential and agriculture/ Forestry) is a primary source of CO emissions representing 49.9% of the 2008 totals.

SO_x emissions are mainly generated in the energy industry sector (approx. 64% of total emissions in 2008) and combustion in manufacturing industries (20.2% of total emissions in 2008), which are major consumers of fossil fuels. Oil and coal represent the biggest share of the fuel mix used in thermal electrical production in the country, and they are in majority imported. The situation is however improving with a significant development of renewable sources (mainly

wind) and some energy efficiency measures, among other factors as reflect the introduction of new stricter laws regulating the residual fuel oil (Decree-Law 281/2000 of 10th November). The introduction of natural gas and its increasing use, since 1997, is also another positive factor that has contributed to control of SO_x emissions. The emissions variation in the period 1990-2008 shows in fact a decrease in SO_x emissions in both sub-categories: manufacturing industries –56.8% and energy industries –49.1%.

3 RECALCULATIONS AND IMPROVEMENTS

This section presents an overview of the recalculations made in the 2010 submission.

The recalculations made result mostly from the recommendations issued during the UNFCCC reviews and updates of activity data.

Table 3-1 Overview of the responses to the UNFCCC reviews

CRF	Comment	Portugal's response	Where in NIR
Sent to ERT in 19-10-2009 Mail: 1st centralized review 2009 - Portugal: Underestimates and completeness issues Doc: Completeness (NE) and underestimates email to PRT_20091019_excel 2003.doc			
Energy	Categories reported as "NE": CO2, CH4 and N2O emissions from other transportation (1.A.3.e) are reported as NO. Since Portugal is reporting fugitive emissions from transmission of natural gas and distribution of oil products, the ERT considers that emissions should be occurring under this category, for example emissions from compressor stations for natural gas transport	For characterizing fugitive emission from Natural Gas we use activity data from the Energy Balance (EB) reported under Losses in Transport and Distribution. This EB category already includes losses in compressor stations. The associated emissions are reported in 1B2. Accordingly, the notation key "NO" used for 1.A.3.e was wrong and was changed to "IE"	
Industrial Processes	Categories reported as "NE": N2O emissions from the use of N2O for anaesthesia (3.D.1), fire extinguishers (3.D.2), aerosol cans (3.D.3)	N2O emissions were estimated first reported in submissions from January 15th 2010	
Industrial Processes	Categories reported as "NE": Actual emissions of PFCs for refrigeration and air conditioning (2.F.1). Potential emissions for this category are reported, but notation key "NO" is used for actual emissions	The notation key used "NO" is wrong; it should be changed to "NE"	
4.B manure management - N2O 4.D.1 Direct soil emissions - N2O 4.D.3 Indirect emissions - N2O	Possible underestimates of GHG: The N2O emission from cattle and pigs in Portugal are partly based on national data collected by Laboratorio Quimico Agricola Rebelo da Silva (LQARS) and partly based on expert information from LQARS. Dairy cows: For dairy cows is used a standard Nitrogen excretion rate (Nex) of 87.6 kg/dairy cow/yr for all years since 1990 regardless that the average milk yield in the same period growth from app. 4800 litres/diary cow/yr to 6000 litres/dairy cow/yr. The need for increased feed to produce the increased milk production is well reflected in the calculation of energy intake for enteric fermentation but not in the calculation of nitrogen intake and a subsequently increase in Nex. The default Nex for Western European conditions in the 1996 Revised IPCC	These questions were addressed in this inventory submission. The Nex rates for all animal types were revised.	

CRF	Comment	Portugal's response	Where in NIR
	guidelines is 100 kg Nex/dairy cow/yr. During the review in 2008 as written in the ARR, Portugal was "encouraged to make efforts to generate country-specific values for the N excretion rate of dairy cattle for each year in the time series". In the 2009 submission for the year 2007 no changes have occurred in the estimation of Nex and no further references to scientific literature on how Nex has been estimated were included in the NIR. The ERT raised the same question to Portugal during the 2009 centralized review. The answer from Portugal was: "These questions are being revised by both the INERPA team and the GPP experts (from the Agriculture Ministry). We expect to arrive at a conclusion soon. Because of this, the recommendations presented in theses paragraphs will only be included in the 2010 submission." Despite this the ERT considers this issue as a potential problem for underestimating the N2O emission from manure management and a subsequently underestimation of N2O emission from agricultural soils, both direct emissions and indirect emissions.		
4.B manure management - N2O 4.D.1 Direct soil emissions - N2O 4.D.3 Indirect emissions - N2O	Possible underestimates of GHG: Pigs: For pigs Portugal used a country specific methodology where Nex is based on "Results of analysis of Manure Composition" made by LQARS, Table 6.23 in the NIR. The figures are used to estimate the average Nex from all pigs in Portugal to 7.99 kg N/head/yr in 1990 and to 7.89 kg N/head/yr in 2007. The default IPCC value is 20 kg N/head/yr. The figures in Table 6.23 are not followed by a thoroughly documentation. The ERT has requested a full documentation for the used values. Portugal has not been able to supply the ERT with the requested documentation. The Portuguese values for Nex, according to Table 6.23, are taken from fattening pigs. The ERT believes that this value for nitrogen content in the manure, total N of 0.49 % w/w, is more likely a value for the N content in liquid pig slurry after ammonia volatilisation in stables and storages, which can be very high and not a proper value for the nitrogen excretion	These questions were addressed in this inventory submission. The Nex rates for all animal types were revised.	

CRF	Comment	Portugal's response	Where in NIR
Sent to ERT in 19-10-2009 Mail: 1st centralized review 2009 - Portugal: Underestimates and completeness issues Doc: Energy_Additional Answers By DGEG_20090910.doc			
Energy	NIR page 3-75. In figure 3.46, total energy consumption in the extractive industry, a large jump in energy consumption is shown for 2007 but not explained in the NIR. Could you please check this this figure and provide an explanation for the increase in 2007?	PT inventory team previous answer: We found a problem in the column label (the values are correct). From left to right should read: Year, LPG, Gasoline, Kerosene, Gas Oil, Residual Oil, Natural Gas, Lignite and Biodiesel. Fuel consumption data for the extractive industry was obtained solely from the Energy Balance (EB) publication. From what we know DGEG (EB producer) uses data from fuel suppliers to derive fuel consumption values for all industrial sectors. It´s difficult to explain the extractive industry fuel consumption behaviour because of this lack of facility level data. However we will contact DGEG for expert judgment on this matter. PT inventory team additional comments: After revising the EB data, DGEG found that a fuel supplier inadvertently mixed the fuel consumption data from different economic activity classes. DGEG assured that the 2007 energy balance has been corrected.	
Energy	NIR section 3.2.5.4.4 page 3-174 Geothermal production in 2007 has more than doubled. As written in the NIR, you indicated that you will contact the data provider (DGEG) for an explanation. The ERT would like to know if you have received any response yet?	PT inventory team previous answer: We have no new information to provide about this issue. However we will contact DGEG to try to obtain an answer. PT inventory team additional comments: DGEG explained that this increment results from the fact that the installed power capability in the Azores Islands has doubled from 2006 to 2007. Additional Comments: We received data directly from the Azores Autonomous Regions environmental authorities that confirms the DGEG values.	

CRF	Comment	Portugal's response	Where in NIR
Energy	NIR section 3.5.4 page 3-179 The observed difference between the Reference approach and the sectoral approach are for most years more than 2 per cent. It is indicated in the NIR that this is probably due to the fact that the split domestic/international bunkers is done according to the flag of the airship or vessel. As you state, this is not according to the IPCC guidelines. Could you please specify what are your plans for improving this and get data that are according to the guidelines?	PT inventory team previous answer: This issue was addressed in a meeting with DGEG early 2009. DGEG and the inventory team agreed in the following procedures to resolve this issue: Maritime transports – in future Energy Balances DGEG will contact the fuel supplier for data on the ship origin/destiny sea ports. To complement this information the inventory team will supply DGEG with data concerning ship movement (compiled for sectoral approach calculations). Aviation – the inventory team will supply data to DGEG concerning domestic/international ship movements (database used for sectoral approach calculations). No new information concerning this issue has been transmitted by DGEG. We will request a status update to DGEG. PT inventory team additional comments: DGEG has no new developments concerning this issue. Because of this, we do not expect to have a full revision of this issue in the next submission as planned. Additional Comments: No new developments were made concerning this issue.	
Energy	Reiterating question from S&A report about CRF 1B2b: The inter-annual changes of CH4 emissions from Transmission for 1997-2007 (ranging from -42.2% to 207.6%) have been identified as outliers. The trend is unstable and fluctuates. We have not recieved any response on this. When studying the time series, it seems that something might be wrong with the data, at least for 2004. - Could you please verify the data for this source? - What procedures do you use for QA/QC for this source?	PT inventory team previous answer We actually report together the categories Transmission and Distribution. The identified inter-annual changes result from the Transport/Distribution Losses reported in the Energy Balance. We will contact DGEG to obtain further clarification on this matter. PT inventory team additional comments DGEG doesn't see the 2000 value as a problem. As specified in the response given by DGEG to our inquiry, from 2000 to 2004 there was a great increase in the NG distribution infrastructure (domestic consumption almost tripled). This resulted in an increase in the distribution losses.	
Sent to ERT in 5-9-2009 Mail: 1st centralized review 2009 - ERT questions to Portugal: Energy and LULUCF			

CRF	Comment	Portugal's response	Where in NIR
LULUCF	The uncertainties for areas of land converted to forest have been reported in the 2009 NIR as ranging from 12.5 to 20.4 %. However, considering the fact that a fixed annual rate of conversion to forest land (137,000 ha) has been assumed and that the spatial resolution of CLC data is relatively low (25 ha), it seems unlikely that estimates have such low uncertainties. Could the Party provide additional information on how the uncertainties were derived for areas of land converted to forest? The ERT would also appreciate any comments from Portugal on the planned improvements of the accuracy of these estimates.	The uncertainties presented in NIR table 7.28 page 7-43 were calculated from the combination of the common error from remote sensing methods, 12.5% according to GP-LULUCF, with the error of not considering areas below 5ha, which were determined from extrapolation of the probability of areas under this interval until the lower identification limit. The following figure that was taken from 2009 Portuguese Voluntary Submission on Artº.3.3 and 3.4 under the UNFCCC resumes the methodology/sources foreseen to account for activities under Artº. 3.3. and 3.4 in the 1st CP. These Land Use Maps (COS) are based on aerial images: Minimum mapping unit: 1 ha; minimum distance between lines: 20 m For details about the technical COS2007 specifications please see: http://www.igeo.pt/gdr/projectos/cos/ Portugal is performing a deep revision of the current CRF 5 estimates using these new cartographic products and on the basis of the ongoing studies under development by the SNIERPA/WG on 3.3_3.4 (e.g. forest simulators, C on soil). The thematic accuracy of COS2007 which is at present under production by IGP (Portuguese Geographic Institute) is expected to be >= 85 %. The existing COS90 is envisaged to be further geometrically corrected. Specific studies are foreseen in order to estimate the uncertainties and sensitivity analyses of the estimates.	
	Emissions from application of lime: Could Portugal indicate the reasons for not having reported this category?	Data are not yet available to estimate this source. Portugal intends to develop efforts to estimate CO2 emissions from this source in future submissions, and has included this issue in its Methodological Development Programme (PDM).	
Sent to ERT in 4-9-2009 Mail: First Centralized Review 2009 - Questions to Portugal: Agriculture Doc: AGRIC_v2_Prel ERT			

CRF	Comment	Portugal's response	Where in NIR
Questions_PRT_20090904_Word 2003.doc			
Agriculture	When will an update of stable type and manure management distribution be available?	We expect to have stable values (acknowledged by all SNIERPA sectoral experts) in the next submission Additional Comments: Adding to the Nex revision, improvements were made to the percentage of manure management systems (MMS) attributed to each animal type.	
	Mineral fertiliser The NIR states: "There are no available records of statistical information concerning the annual quantity of nitrogen used to agricultural soils or even available statistical information concerning sales of synthetic fertilisers". The Portuguese inventory is mainly based on data from INE. Why is there used an estimated for N in mineral fertiliser based on IAPI data for 2003 to 2007 as INE has annually published the consumption of "Azoto" in its annual statistical agricultural publication: Estatisticias Agricolas (www.ine.pt) . The data from Statistics Portugal are higher than the used ones in the inventory. Which data are the most precise, which data will be used in future what is the explanation for this choice?	We acknowledge the need to improve the NIR concerning the descriptions of the procedures to gather activity data for this sector. Data from 1995-2003 was available from the study described in the NIR (INE – page 6-55). Fertilizer consumption was back-cast for the 1990-1994 time period using data from the INE study. Since 2002 data for the consumption of "Azoto" was available from the publication "Estatísticas Agricolas" (also from INE). As this document is published every year, we adopted it as our may source of information for this sector (since 2002). In this way there are two sources both from INE: OECD/EUROSTAT study (1990-2001), "Estatísticas Agricolas" (2002-2007). The difference between the values from the latest "Estatísticas Agricolas" (2008) and the 2009 NIR, resulted from annual INE revisions for the values for the previous 2 years. The values used in the NIR 2009 were the following (from "Estatísticas Agricolas" (2007)) According to INE´s explanation received on 3rd Sept.2009, data has been revised either because the figures were provisional (2006 and 2007) or because they have suffered a revision based on new information received from the enterprises. Accordingly the emissions estimates were revised for the 2010 submission to consider the most updated data (please see the following table from "Estatísticas Agricolas 2008").	

CRF	Comment	Portugal's response	Where in NIR
	FracR is in the CRF tables given to 0.71. This should be 0 as no crop residues are removed from the field according the estimation methodology in the NIR (made by definition). Despite this is it recommended Portugal to include relevant data on removed crop residues as this takes place in future submissions	The inventory team has no further comments to add concerning this issue. Additional Coments: No new developments were made concerning this issue.	
Sent to ERT in 4-9-2009 Mail: First Centralized Review 2009 - Questions to Portugal: Industrial Processes Doc: IP questions to PRT_20090904_Word 2003.doc			
Industrial Processes	The NIR states that there is currently not enough data on CaO and MgO contents to derive a country-specific EF. In light of the currently available data, does the default look reasonable?	This issue is still under development	
	The NIR states that the AD will be updated for the years 2001 - 2007. Do you plan to do this in the 2010 submission?	This question was addressed in the 2010 inventory submission.	
	The 2001 - 2007 data is based on extrapolation, but the report states that the AD will be updated for these years. Do you plan to do this in the 2010 submission?	This question was addressed in the 2010 inventory submission.	
	The NIR states that the AD will be updated for the years 2001 - 2007. Do you plan to do this in the 2010 submission?	This question was addressed in the 2010 inventory submission.	
	The N2O emission factor is based on monitoring data from one of the three production units. Did you evaluate the applicability of the EF to the other two plants?	Efforts are being made in order to obtain monitoring data for all units.	
	The NIR describes lack of activity data and subsequently the need to use surrogate methods, intrapolation and extrapolation. The NIR also states that the main activities have been stopped. Do you think it is possible to improve data, given the closure of production?	Efforts are being made in order to improve the quality of emission estimates, in particular those related to electric arc furnaces.	

CRF	Comment	Portugal's response	Where in NIR
	The following "percentage change from previous year" are observed in the reported HFC data: 182.7% (2003), -34.7% (2006). Are these due to new production plant (2003) and calculation error (2006)?	This question was addressed in the 2010 inventory submission.	
	In table 2(II)s2, the amount of potential SF6 reported is about 28.9 million tonnes CO2-eq. for 2007. Similar magnitudes are reported for other years. This leads to a potential to actual emissions ratio of about three million. Are the potential SF6 emissions reported correctly?	This question was addressed in the 2010 inventory submission.	
Sent to ERT in 3-9-2009 Mail: 1st centralized review 2009 - ERT questions to Portugal: Energy Doc: ENERGY_2_3_questions_PRT_Energy v3 clean_20090904_word 2003.doc			
	Reiterating question from S&A report about CRF 1B2a: The inter-annual changes of CO2 emissions from Refining/storage for 1991-1992, 1993-1997, 1999-2001 and 2002-2003 (ranging from -12.8% to 400.2%) have been identified as outliers. The 2007 value is 1180.2% higher than the 1990 value. The trend is unstable after 1993 and fluctuates. Your response to this was that cracking units data should be discussed with refineries. Could you please tell us, did you recieve any answers yet?	We did not receive any answers yet	
Sent to ERT in 2-9-2009 Mail: 1st centralized review - Preliminary ERT questions: Energy Doc: ENERGY_Prel_ERT questions_PRT_Energy_20090902.docx			

CRF	Comment	Portugal's response	Where in NIR
	It is not clear from the NIR how the migration from COPERT 3 to COPERT 4 will influence N2O emissions from road transport. Could Portugal provide more explanations on this based on the preliminary results obtained?	N2O emissions calculated with COPERT IV are expected to be lower when comparing with results using COPERT III. This results from new emissions factors provided by COPERT IV which are more reliable than the ones from COPERT III. The preliminary results were obtained from the COPERT IV methodology. As stated in EMEP/CORINAIR Guidebook (2009 version), there were "several methodological revisions, including extended vehicle classification and pollutant coverage, emission factors and corrections for road gradient and vehicle load, etc, as well as new PM, N2O, NH3 emission information and new emission factors for passenger cars including hybrids, heavy-duty vehicles and two-wheel vehicles." Under COPERT III, N2O emissions were "roughly estimated on the basis of literature review for all vehicle categories". The guidebooks states that N2O data is "quite unreliable and need further confirmation by measurements". In 2007, N2O emissions estimates using COPERT IV were about 66% lower when compared with estimated made with COPERT III. On the other hand NOx emissions have increased about 28%.	
	Given that Portugal is migrating to COPERT 4 (currently under implementation) for estimating road transport related CO2 emissions and that under COPERT 3 it uses country-specific lower-heating values, could Portugal explain how it intends to use country specific carbon content for each fuel that corresponds to the country specific lower-heating value so as to improve the consistency of the inventory?	CO2 emissions should be calculated on an energy basis using country specific emissions factors expressed in kgCO2/GJ. These emissions factors are provided by fuel type and are published in national legislation (Despacho nº 17313/2008).	
ERT Review Report 2008			

CRF	Comment	Portugal's response	Where in NIR
Energy	Emissions have been estimated and reported for practically all categories, except for N2O from flaring.	This question should be addressed in the near future.	
	The ERT encourages Portugal to continue its efforts to incorporate plant-specific data into its inventory and recommends that Portugal continue to provide detailed explanations, in its next annual inventory submission, on how exactly these data have been incorporated, the resulting changes and its efforts to maintain time-series consistency	More plant specific data has been added to the inventory with every submission. However for this particular submission no new data has been incorporated since the last submission.	
	The CO2 implied emission factors (IEFs) for solid fuels for public electricity and heat production for 1990–2006 (ranging from 90.16 to 90.60 t/TJ) were found to be below the IPCC default range (94.6 to 106.7 t/TJ). The value of 90.16 t/TJ was kept constant for the period 1998–2006. During the centralized review, Portugal explained that 1997 was the year in which an old coal power plant was decommissioned in northern Portugal. The EFs used for this power plant differed from those applied to the other two plants, hence the variation in the IEF from 1990 to 1997. Since, for the remaining two coal power plants, the CO2 EFs used were the same (values validated with direct monitoring data), the CO2 IEFs remained constant between 1998 and 2006. The net calorific value (NCV) varied from plant to plant and within the period 1990–2006. Taking into account this information, the ERT considers that CO2 EFs cannot be constant. The ERT recommends that Portugal provide clear trend-related explanations and revise its estimates, if necessary, in its next annual inventory submission.	No new developments were made concerning this issue.	
	Emissions of CO2 and sulphur oxides may occur as a result of mining activity when burning of coal deposits occurs or when flaring is used to control air emissions or recover energy. Currently, Portugal reports the occurrence of coal burning on-site and flaring in its mines as unknown and hence emissions of these gases for this category are not included in the inventory. The ERT recommends that Portugal make an effort to acquire the related AD in order to be able to include estimates of the	No new developments were made concerning this issue.	

CRF	Comment	Portugal's response	Where in NIR
	corresponding emissions in its next annual inventory submission.		
Agriculture Manure management – CH4	After the centralized review, Portugal provided information which confirmed that: (a) breeding cows for beef are mostly kept outdoors all year, as the winters are mild in Portugal; and (b) liquid systems refer to "Open pits below animal confinements" as noted in the NIR, that, according to the experts from the Ministry of Agriculture, refer typically to short retention time pits. For this reason an MCF of 0 per cent was used in the estimates following the recommendation in the IPCC good practice guidance for "Pit storage below confinements < 1 month". Nevertheless, the ERT believes that the period for which manure is stored (more or less than one month) has a major effect on the level of CH4 emissions and recommends that Portugal document this assumption more thoroughly in the NIR of its next annual inventory submission. The distribution of animal waste management systems (AWMS) applied in the Portuguese inventory is based on expert judgement from the Ministry of Agriculture and is predominately a reflection of the situation in 1990. Portugal is aware, however, that the real shares of the different AWMS have changed since then. In the course of the centralized review, Portugal explained to the ERT that an extensive agricultural survey, beginning in 2009 and conducted by the INE, will enable it to monitor the actual situation and future developments. The ERT welcomes Portugal's intention to update this information and recommends that Portugal document the relevant results of this survey in detail in its future NIRs	The MCF for pigs has been revised in this submission.	

CRF	Comment	Portugal's response	Where in NIR
Waste Solid waste disposal on land – CH4	The amount of industrial solid waste disposed decreased sharply in 2000. During the centralized review, Portugal explained to the ERT that this was a result of the market demand for different types of waste, and of policies and measures implemented in the waste sector. The ERT recommends that Portugal make efforts to use country-specific parameters in the FOD model for its next annual inventory submission		
Waste Wastewater handling – CH4 and N2O	The ERT recommends that Portugal make efforts to update the country-specific data used in its calculations and verify its assumptions on CH4 recovery in its next annual inventory submission.		
Waste Human sewage – N2O	Emissions of N2O from human sewage were estimated following the methodology from the Revised 1996 IPCC Guidelines. AD on protein intake were taken from the FAO database. The ERT recommends that Portugal make efforts to obtain country-specific data on protein intake and use these data in its calculations for this category in its next annual inventory submission		
Other Recalculations			
Energy		A revised 2007 EB has been given by DGEG since the last submission. The corresponding values were update in the inventory.	
Energy		Update of the fuel consumption time series for several industrial plants (mainly pulp/paper production). In some cases this update affects values for the 2004-2007 time series.	
Agriculture		Crop data revision for the years 2006 and 2007.	

CRF	Comment	Portugal's response	Where in NIR
LULUCF		Wildfires: revision/updates of burnt areas (2005-2008); revision of burnt areas by species. Harvest data: revisions/updates for the period 2004-2008	
Waste		Recalculations refer to updates of AD.	

3.1 Implications in emissions levels

The implications of recalculations for emission levels by category and for the national totals by gas are presented in the following tables.

Table 3-2 – Recalculation difference of CO_2 emissions

GHG SOURCE AND SINK CATEGORIES		1990	2007
		kton CO2 eq.	
Total National Emissions and Removals		11	-696
1. Energy		-3	327
1.A.	Fuel Combustion Activities	-3	344
1.A.1.	Energy Industries		-118
1.A.2.	Manufacturing Industries and Construction		-89
1.A.3.	Transport	-3	457
1.A.4.	Other Sectors		94
1.A.5.	Other		
1.B.	Fugitive Emissions from Fuels		-18
1.B.1.	Solid fuel		
1.B.2.	Oil and Natural Gas		-18
2. Industrial Processes			-1,421
2.A.	Mineral Products		-97
2.B.	Chemical Industry		-1,324
2.C.	Metal Production		
2.D.	Other Production		
2.G.	Other		
3. Solvent and Other Product Use		14	-111
4. Agriculture			
4.A.	Enteric Fermentation		
4.B.	Manure Management		
4.C.	Rice Cultivation		
4.D.	Agricultural Soils (2)		
4.E.	Prescribed Burning of Savannas		
4.F.	Field Burning of Agricultural Res.		
4.G.	Other		
5. Land Use, Land-Use Change and Forestry			510
5.A.	Forest Land		510
5.B.	Cropland		
5.C.	Grassland		
5.D.	Wetlands		
5.E.	Settlements		
5.F.	Other Land		
5.G.	Other		
6. Waste			
6.A.	Solid Waste Disposal on Land		
6.B.	Wastew ater Handling		
6.C.	Waste Incineration		
6.D.	Other		
Memo Items:			
International Bunkers		-1	2
Multilateral Operations			
CO_2 Emissions from Biomass			-508

Table 3-3 - Recalculation difference of CH_4 emissions

GHG SOURCE AND SINK CATEGORIES		1990	2007
		kton CO2 eq.	
Total National Emissions and Removals		231	215
1. Energy		27	-3
1.A.	Fuel Combustion Activities	27	-2
1.A.1.	Energy Industries		0
1.A.2.	Manufacturing Industries and Construction		0
1.A.3.	Transport	27	-2
1.A.4.	Other Sectors		0
1.A.5.	Other		
1.B.	Fugitive Emissions from Fuels		-1
1.B.1.	Solid fuel		
1.B.2.	Oil and Natural Gas		-1
2. Industrial Processes			-2
2.A.	Mineral Products		0
2.B.	Chemical Industry		-2
2.C.	Metal Production		
2.D.	Other Production		
2.G.	Other		
3. Solvent and Other Product Use			
4. Agriculture		203	203
4.A.	Enteric Fermentation		
4.B.	Manure Management	203	204
4.C.	Rice Cultivation		-1
4.D.	Agricultural Soils (2)		
4.E.	Prescribed Burning of Savannas		
4.F.	Field Burning of Agricultural Res.		0
4.G.	Other		
5. Land Use, Land-Use Change and Forestry (n			0
5.A.	Forest Land		0
5.B.	Cropland		
5.C.	Grassland		
5.D.	Wetlands		
5.E.	Settlements		
5.F.	Other Land		
5.G.	Other		
6. Waste			17
6.A.	Solid Waste Disposal on Land		13
6.B.	Wastew ater Handling		4
6.C.	Waste Incineration		
6.D.	Other		
Memo Items:			
International Bunkers		0	0
Multilateral Operations			
CO_2 Emissions from Biomass			

Table 3-4 - Recalculation difference of N_2O emissions

GHG SOURCE AND SINK CATEGORIES		1990	2007
		kton CO2 eq.	
Total National Emissions and Removals		0	-64
1. Energy		-59	-393
1.A.	Fuel Combustion Activities	-59	-393
1.A.1.	Energy Industries		0
1.A.2.	Manufacturing Industries and Construction		-1
1.A.3.	Transport	-59	-396
1.A.4.	Other Sectors		4
1.A.5.	Other		
1.B.	Fugitive Emissions from Fuels		
1.B.1.	Solid fuel		
1.B.2.	Oil and Natural Gas		
2. Industrial Processes			-176
2.A.	Mineral Products		
2.B.	Chemical Industry		-176
2.C.	Metal Production		
2.D.	Other Production		
2.G.	Other		
3. Solvent and Other Product Use			
4. Agriculture		-40	471
4.A.	Enteric Fermentation		
4.B.	Manure Management	-39	-105
4.C.	Rice Cultivation		
4.D.	Agricultural Soils (2)	-1	575
4.E.	Prescribed Burning of Savannas		
4.F.	Field Burning of Agricultural Res.		0
4.G.	Other		
5. Land Use, Land-Use Change and Forestry (n			0
5.A.	Forest Land		0
5.B.	Cropland		
5.C.	Grassland		
5.D.	Wetlands		
5.E.	Settlements		
5.F.	Other Land		
5.G.	Other		
6. Waste			
6.A.	Solid Waste Disposal on Land		
6.B.	Wastew ater Handling		
6.C.	Waste Incineration	0	
6.D.	Other		
Memo Items:			
International Bunkers		0	0
Multilateral Operations			
CO_2 Emissions from Biomass			

Table 3-5 - Recalculation difference of F-gases emissions

GHG SOURCE AND SINK CATEGORIES	1990	2007
	kton CO2 eq.	
Total Actual Emissions		-3
HFCs		-3
PFCs		
SF6		
Potential Emissions from Consumption		-28936357
HFCs		-15
PFCs		
SF6		-28936342

3.2 Implications in emissions trends

A slighter difference upwards in the base year (1990: +0.4 per cent) as compared with the reduction in 2007: -1.3 per cent, resulted in a decrease of the growing trend from 38 per cent (2009 submission without LULUCFs) to 36 per cent (2010 submission without LULUCFs) .

Figure 3.3-1 – Recalculation of total emission levels (LULUCF excl.)

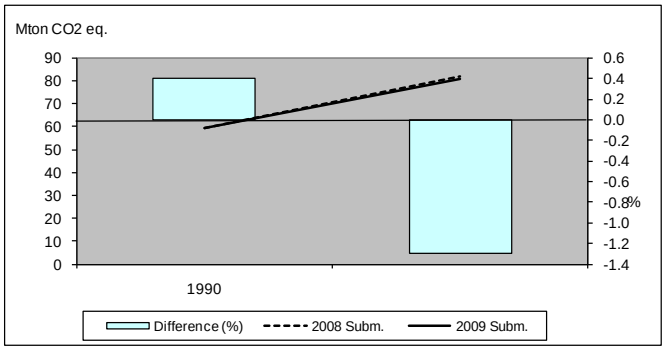


Table 3-6 – Recalculation of total emissions trends (LULUCFs excl.)

Year	2009 Submission (kton CO2 eq.)	2010 Submission (kton CO2 eq.)	Difference (%)
1990	59269	59510	0.4
2007	81841	80783	-1.3

If the LULUCF sector is considered, the comparison of 2010 GHG emissions with the previous 2009 submission, indicates a difference in the overall trend from 30.8 per cent to 29.3 per cent.

3.3 Future improvements

Future improvements are defined annually under the Methodological Development Plan (PDM) which is settled each year in the context of the National Inventory System (SNIERPA) and which is developed under the responsibility of the APA, under an external consultancy with Ecoprogresso and InventAr, in cooperation with the sectoral Focal Points. The PDM pretends to reflect the results of the various review processes, in particular the UNFCCC reviews, the annual inventory compilation process (all experts and entities involved can make proposals for methodological development), and generally the results of the application procedures of Quality Control and Quality Assurance which have been defined under the Control and Quality Assurance System.

4 KP-LULUCF

4.1 General information

4.1.1 Definition of forest and any other criteria

Portugal adopted a forest definition according to the following parameters:

- Minimum tree cover: 10%
- Minimum land area: 1.0 ha
- Minimum tree height: 5 m
- Minimum width: 20 m.

The parameters chosen for the definition of forest are within the agreed values in decision 16/CMP.1. Portugal states in the initial report that the threshold value selected for minimum area (1 ha) is higher than the value used for reporting to the FAO, which is 0.5 ha. The value selected corresponds to the most detailed information available from the national mapping of land-use and forest areas for 1990 and the commitment period.

4.1.2 Elected activities under Article 3.4

Portugal accounts for Article 3.3 activities (mandatory) – Afforestation, Reforestation and Deforestation (FRD), and has elected the following Article 3.4 activities – Forest Management (FM), Cropland Management (CM) and Grazing Land Management (GM) (FCCC/IRR/2007/PRT).

4.1.3 Description of how the definitions of each activity under Article 3.3 and each elected activity under Article 3.4 have been implemented and applied consistently over time

The methodological approach used is based on the overlay of the Land Cover Map of Continental Portugal for 1990 (COS'90) with a similar cartography for 2007 (COS2007), This overlay is used to assess the forest area in the beginning of the first commitment period (2008) and to identify the afforested/reforested and deforested areas between 1990 and the beginning of the commitment period; the later areas will be classified within the scope of Article 3.3.

A new COS will be produced with reference to 2010 or 2011, which will allow the results to be available in 2013. The comparison of COS2010/2011 with COS2007 will permit the determination of the land use changes occurred in the commitment period.

This cartographic products have similar characteristics and are fully compatible and in this way the consistency over time is assured.

4.1.4 Description of precedence conditions and/or hierarchy among Article 3.4 activities, and how they have been consistently applied in determining how land was classified

In cases of coexistence of agriculture and forestry practices, for reasons of methodology approach, GM and CM have precedence on FM. Therefore, the agro-forestry system *Montado*, predominant in the Southern Portugal, will be classified either as Cropland or Grassland, according to the agriculture practice.

This has three main justifications:

- agriculture activities (either crops or pastures) are developed under the canopy of trees, usually with a very low tree cover (up to 20%);
- the tree system is, in most cases, almost at equilibrium with a very low rate of carbon sequestration (Dominant Mature trees);
- carbon stock changes are mainly determinate from agricultural practices in under-cover

4.2 Land related information

IGP is the authority that has the major role in the production and analysis of geographical information in the scope of the WG3.3&3.4. The role of IGP in the reporting process is related essentially with land use and land-use change area estimation for use in further calculations by other entities, in view of obtaining the estimates of CO_2 and other Green House Gases (GHG) emissions and/or removals. Other land related information is also provided by AFN and IFAP, namely the NFI and the areas subjected to specific CM and GM activities.

The land cover/use data used and that will be used to identify and assess the national areas classified as Article 3.3 or 3.4 activities are:

COS'90	determine forest and "non-managed" areas in 1990
COS2007	determine forest and "non-managed" areas at the beginning of the commitment period identification of forested, deforested and "non-managed" areas since 1990
COS2010/2011	identification of forested, deforested and "non-managed" areas since the beginning of the commitment period determine changes in forest management areas in terms of surface and forest species during the commitment period
Additional Information	annual detection of fires, clear-cut and new plantations biomass at Deforestation, Harvesting and Fires - stocks, age from National Forest Inventory (NFI) (Plots) biomass increment - growth rates: NFI and Forest simulators (ISA) new forest plantations (FEADER) - agro-environmental incentives DB (units of land monitored annually; 5 years).

Art. 3.4 CM and GM activities will be assessed using a two tier methodology:

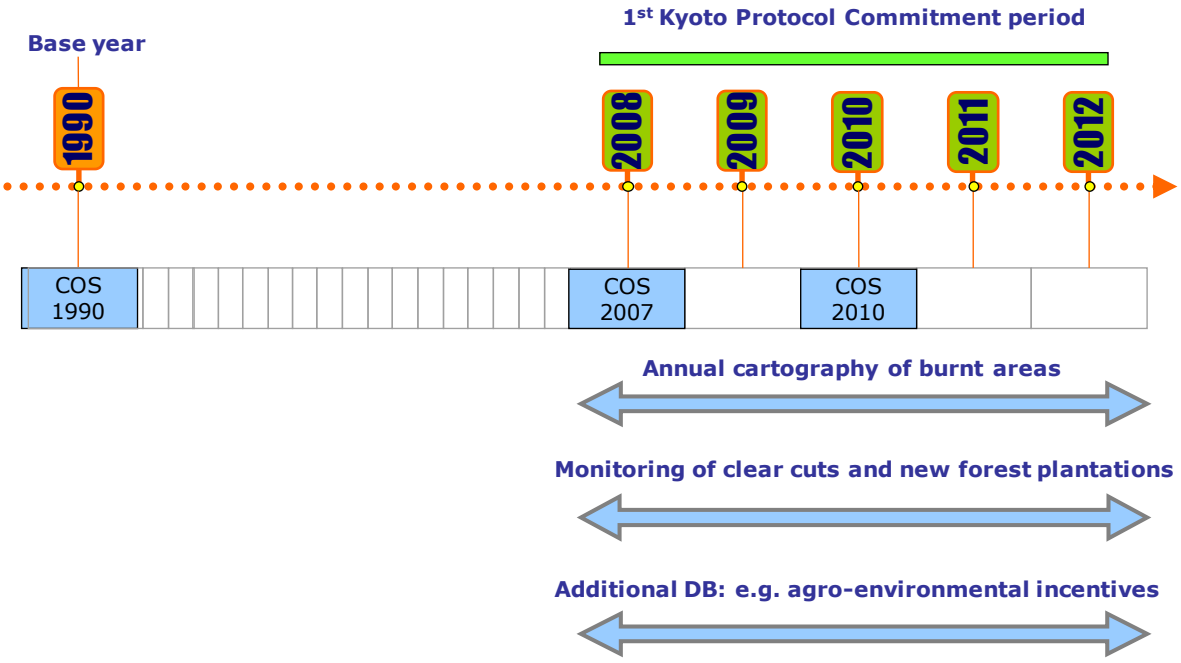
Georeferenced DB on agro-environmental incentives under FEADER and on other CAP support schemes (obtained from IFAP – Portuguese CAP payment agency) - Level Detail A - for Specific C Management Activities (No tillage; Sown biodiverse permanent pastures rich in legumes (SBPPRL)

- Annual identification of land units
- Land units continually tracked
- Identification of the beginning of the activity

COS - Level Detail B – "Non-Managed" Areas (Remaining Agriculture and Grassland areas - soil carbon is in equilibrium)

- Detection of change in land use according to the following types: 1) annual crop land irrigated/non-irrigated; 2) perennial crop land; 3) permanent pasture.

Figure 4-1 – Cartographic products and additional information for the identification of areas to be used in future submissions



The characteristics of both COS'90 and COS2007 are those described in Table 4-1.

Table 4-1. Main technical specifications of COS'90 and COS2007 (both covering Continental Portugal)

	COS2005/2007	COS90
Base images	Digital aerial ortho-images	False colour aerial photos
Reference year	2004/2005 or 2007	1990
Format	Polygon	Polygon
MCU (ha)	1	1
MDBL (m)	20	40
Nomenclature	Type: *A priori* and hierarchical (five levels)	Type: *A posteriori* and non-hierarchical
Accuracy	Thematic: ≥ 85 % Geometric: ≥ 5,5 m	Not determined at the time of production

It should be mentioned that the technical specifications of COS2007 (Caetano *et al.*, 2007) like the. Minimum Cartographic Unit (MCU), Minimum Distance Between Lines (MDBL), and nomenclature, were approved by the cartography's Advisory Committee, which included representatives from SNIERPA, in order to ensure that the cartography would match Portugal's reporting requisites under the UNFCCC and the KP.

In the case of CM and GM, for methodological reasons, the WG 3.3&3.4 has decided to identify separately the management practices with high potential for soil carbon sequestration, which constitute potential CO_2 sinks. In Portugal those practices (hereafter designated specific management practices) receive funding through the EU agro-environmental measures, under certain conditions, and correspond to no-tillage practice in CM and to biodiverse pastures in GM and are reported by IFAP.

4.2.1 Spatial assessment unit used for determining the area of the units of land under Article 3.3 (in accordance with paragraph 3 of the annex to decision 15/CP.1) and Article 3.45

The activities related to Art. 3.3 will be identified using various information sources (COS'90, COS2007 and COS2010/2011). These cartographic products have a MMU of 1 ha. This same sources will be used to identify FM areas. On what concerns CM and GM, besides those sources of information (for the areas with no specific management practices), the IFAP's database will be used to determine the areas with specific management practices.

The flowchart in Figure 4-2 represents the conceptual methodology developed for land use and land-use change area estimation. This methodology involves the production of the final land-use change matrix from 1990 to 2007 including the integration of the specific management areas.

[5] Article 3.4 is included since Portugal has elected the activities FM, CM and GM

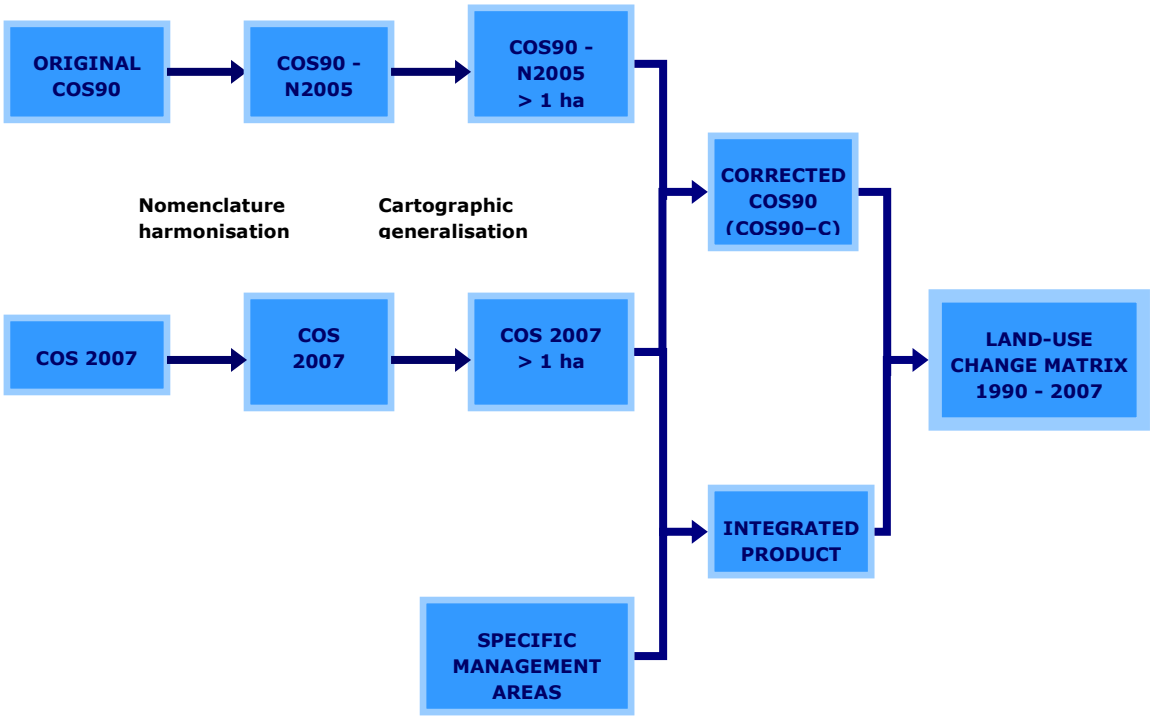


Figure 4-2. Conceptual methodology for land use and land-use change area identification

4.2.2 Methodology used to develop the land transition matrix (table NIR 2)

The land use change matrix is obtained through the use of various information sources that will be used to define the land use for 1990, 2007 and 2012. These will be compared in order to obtain the land use's transitions in the different time periods: base year (1990) and the commitment period (2008-2012).

4.2.3 Maps and/or database to identify the geographical locations, and the system of identification codes for the geographical locations

The maps and databases used to identify the geographical locations and the system of identification codes are described above.

4.3 Activity-specific information

The estimation of carbon stock changes in living biomass (above and belowground) in Forest Land is based on the resulting LUC matrix, using specific forest simulators/models for the main forest species (Eucalyptus, *Pinus pinaster* and new plantations of *Quercus suber*). Biomass accounting for the remaining species will be based on the use of average Production Yield Tables.

The simulators are based on yield tables that were built with NFI data in a way that reproduces the evolution of stands with an average site index and with a normal stock.

The identification of CM and GM areas will also be based on the LUC matrix, and the associated biomass will be accounted using national or IPCC default averages.

In what refers the soil pool, work has been developed in order to obtain country specific figures for soil organic carbon in forest, croplands and grassland.

This includes:

- analysis of data from a systematic network of sampling points. There are two sampling years for forestland, namely 1995 and 2007/08. As for croplands, all samples were collected in 1999;

- the statistical treatment of data in order to determine a model explaining the soil organic carbon;

- work referring to 2 specific activities: sown biodiverse permanent pastures rich in legumes (SBPPRL), under the grassland management item, and no-tillage, under the cropland management item.

Regarding SBPPRL, two research papers have been published to account its carbon sequestration potential. The first one, Teixeira *et al.* (2008a), focused on the determination of soil organic matter dynamics in different pasture types. The second one, Teixeira *et al.* (2008b), picks up on the first and converts soil organic matter increases into carbon sequestration, and discusses the carbon balance of the SBPPRL integrated system. Both studies use country-specific data.

Regarding no-tillage, several studies by the University of Évora in Portugal have measured soil organic carbon in test conditions for crops under conventional tillage and no-tillage. These studies show a significant difference in carbon stocks if crop residues are maintained as soil cover after harvesting. They are country-specific, since tests were conducted in Herdade da Revilheira (Évora, Portugal).

As regards dead organic matter (litter) data is available through the National Forestry Inventory and this data is presently being analyzed.

For dead wood there are available data from two pilot areas.

More information will be provided latter (15 March submission).

4.4 Article 3.3

4.4.1 Information that demonstrates that activities under Article 3.3 began on or after 1 January 1990 and before 31 December 2012 and are direct human-induced

Portugal considers that all its forest is managed; therefore, all the occurring changes in the period are human induced.

4.4.2 Information on how harvesting or forest disturbance that is followed by the re-establishment of forest is distinguished from deforestation

Deforestation will occur when the period of 5 years from the clear cut, according to the definition of forest above, is exceeded and the forest is not restored.

4.4.3 Information on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested.

It is planned to use image satellite data obtained through a COSMIC project to monitor the clear cuts. The minimum area will be at least 1 ha.

4.5 Article 3.4

4.5.1 Information that demonstrates that activities under Article 3.4 have occurred since 1 January 1990 and are human-induced

CM and GM areas will be assessed using IFAP database. These activities are subjected to incentives since 1994 (CM) and 2008 (GM) and are monitored on an annual basis, so only the ones occurring after 1990 will be identified and accounted once data was collected later.

4.5.2 Information relating to Cropland Management, Grazing Land Management and Revegetation, if elected, for the base year

In 1990, the areas of SBPPRL and no-tillage in Portugal were not yet reported. However, there were already other management practices associated with cropland and grasslands in place.

4.5.3 Information relating to Forest Management

Forest managed areas are identified using COS (90, 2007 and 2011), therefore FM areas are coherent with the definition of forest according to the definition given in section 4.1.1 above.

4.6 Other information

4.6.1 Key category analysis for Article 3.3 activities and any elected activities under Article 3.4

To be provided later.

4.7 Information relating to Article 6

Portugal has no activities of the Article 6 of the KP in its territory.

5 ACCOUNTING KYOTO UNITS

This chapter concerns information on accounting of Kyoto units.

This section includes supplementary information required under Article 7, paragraph 1, following the reporting requirements of the Annex of Decision 15/CMP.1. The paragraphs numbers refer to the Annex Decision.

Paragraph 11: **Standard electronic format**	**The standard electronic format (SEF) tables for providing information on ERUs, CERs, tCERs, lCERs, AAUs and RMUs for the year 2009 are presented below.**
Paragraph 12: List of discrepant transactions	No discrepancies identified by the transaction log.
Paragraph 13 & 14: List of CDM notifications	No CDM notifications were received by the National Registry during the reporting period.
Paragraph 15: List of non replacements	No non-replacements occurred during the reporting period.
Paragraph 16: List of invalid units	No invalid units during the reporting period.
Paragraph 17: Actions and changes to address discrepancies	No actions were necessary to undertake.
Paragraph 18: Commitment Period Reserve calculation	The CPR has not been changed. Portuguese assigned amount was fixed in 381 937 527 tonnes CO2 eq. The calculation of the CPR was based on the assigned amount (90% of the assign amount) and is estimated to be 343 743 774 tonnes of CO2 eq.
Paragraph 32 (g): Publicly accessible information	Public information is accessible in the RPLE site (https://rple.pt) and includes non-confidential information stated in Annex XVI of the Commission Regulation (EC) No 2216/2004 amended by Commission Regulation (EC) No 916/2007 and Commission Regulation (EC) No 994/2008, specifically account list, account holdings, project list, annex I & II projects, transaction info and user fees.

5.1 Standard Electronic Format 2009

Table 1. Total quantities of Kyoto Protocol units by account type at beginning of reported year

Account type	Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Party holding accounts	3.52E+08	NO	NO	NO	NO	NO
Entity holding accounts	2.58E+07	NO	NO	1245397	NO	NO
Article 3.3/3.4 net source cancellation accounts	NO	NO	NO	NO		
Non-compliance cancellation accounts	NO	NO	NO	NO		
Other cancellation accounts	NO	NO	NO	NO	NO	NO
Retirement account	NO	NO	NO	NO	NO	NO
tCER replacement account for expiry	NO	NO	NO	NO	NO	
lCER replacement account for expiry	NO	NO	NO	NO		
lCER replacement account for reversal of storage	NO	NO	NO	NO		NO
lCER replacement account for non-submission of certification report	NO	NO	NO	NO		NO
Total	3.78E+08	NO	NO	1245397	NO	NO

Table 2 (a). Annual internal transactions

Transaction type	Additions						Subtractions					
	Unit type						Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Article 6 issuance and conversion												
Party-verified projects		NO					NO		NO			
Independently verifed projects		NO					NO		NO			
Article 3.3 and 3.4 issuance or cancellation												
3.3 Afforestation and reforestation			NO				NO	NO	NO	NO		
3.3 Deforestation			NO				NO	NO	NO	NO		
3.4 Forest management			NO				NO	NO	NO	NO		
3.4 Cropland management			NO				NO	NO	NO	NO		
3.4 Grazing land management			NO				NO	NO	NO	NO		
3.4 Revegetation			NO				NO	NO	NO	NO		
Article 12 afforestation and reforestation												
Replacement of expired tCERs							NO	NO	NO	NO	NO	
Replacement of expired lCERs							NO	NO	NO	NO		
Replacement for reversal of storage							NO	NO	NO	NO		NO
Replacement for non-submission of certification report							NO	NO	NO	NO		NO
Other cancellation							NO	NO	NO	NO	NO	NO
Sub-total		NO	NO				NO	NO	NO	NO	NO	NO

Transaction type	Retirement					
	Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Retirement	27923069	NO	NO	1985373	NO	NO

Add registry | Delete registry

Table 2 (b). Annual external transactions

	Additions						Subtractions					
	Unit type						Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Transfers and acquisitions												
BE	NO	NO	NO	NO	NO	NO	27201	NO	NO	NO	NO	NO
CH	NO	NO	NO	721223	NO	NO	NO	NO	NO	117000	NO	NO
CZ	2607082	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
DE	3003316	NO	NO	1259	NO	NO	115691	NO	NO	49464	NO	NO
DK	12491009	NO	NO	134000	NO	NO	10953059	NO	NO	NO	NO	NO
ES	2065421	NO	NO	469029	NO	NO	7602846	NO	NO	NO	NO	NO
FR	930045	NO	NO	284000	NO	NO	6312292	NO	NO	15517	NO	NO
GB	4162000	NO	NO	712960	NO	NO	1462794	NO	NO	225000	NO	NO
IE	NO	NO	NO	NO	NO	NO	50000	NO	NO	NO	NO	NO
IT	131522	NO	NO	NO	NO	NO	21522	NO	NO	NO	NO	NO
LV	2000000	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
NL	629000	NO	NO	1304853	NO	NO	494410	NO	NO	198000	NO	NO
Sub-total	28019395	NO	NO	3627324	NO	NO	27039815	NO	NO	604981	NO	NO

Additional information

Independently verified ERUs								NO				

Table 2 (c). Total annual transactions

Total (Sum of tables 2a and 2b)	28019395	NO	NO	3627324	NO	NO	27039815	NO	NO	604981	NO	NO

Table 3. Expiry, cancellation and replacement

Transaction or event type	Expiry, cancellation and requirement to replace		Replacement					
	Unit type		Unit type					
	tCERs	lCERs	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Temporary CERs (tCERS)								
Expired in retirement and replacement accounts	NO							
Replacement of expired tCERs			NO	NO	NO	NO	NO	
Expired in holding accounts	NO							
Cancellation of tCERs expired in holding accounts	NO							
Long-term CERs (lCERs)								
Expired in retirement and replacement accounts		NO						
Replacement of expired lCERs			NO	NO	NO	NO		
Expired in holding accounts		NO						
Cancellation of lCERs expired in holding accounts		NO						
Subject to replacement for reversal of storage		NO						
Replacement for reversal of storage			NO	NO	NO	NO		NO
Subject to replacement for non-submission of certification report		NO						
Replacement for non-submission of certification report			NO	NO	NO	NO		NO
Total			NO	NO	NO	NO	NO	NO

Table 4. Total quantities of Kyoto Protocol units by account type at end of reported year

Account type	Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
Party holding accounts	3.21E+08	NO	NO	NO	NO	NO
Entity holding accounts	29212224	NO	NO	2282367	NO	NO
Article 3.3/3.4 net source cancellation accounts	NO	NO	NO	NO		
Non-compliance cancellation accounts	NO	NO	NO	NO		
Other cancellation accounts	NO	NO	NO	NO	NO	NO
Retirement account	27923069	NO	NO	1985373	NO	NO
tCER replacement account for expiry	NO	NO	NO	NO	NO	
lCER replacement account for expiry	NO	NO	NO	NO		
lCER replacement account for reversal of storage	NO	NO	NO	NO		NO
lCER replacement account for non-submission of certification report	NO	NO	NO	NO		NO
Total	3.79E+08	NO	NO	4267740	NO	NO

Table 5 (a). Summary information on additions and subtractions

	Additions						Subtractions					
	Unit type						Unit type					
Starting values	**AAUs**	**ERUs**	**RMUs**	**CERs**	**tCERs**	**lCERs**	**AAUs**	**ERUs**	**RMUs**	**CERs**	**tCERs**	**lCERs**
Issuance pursuant to Article 3.7 and 3.8	3.82E+08											
Non-compliance cancellation							NO	NO	NO	NO		
Carry-over	NO	NO		NO								
Sub-total	3.82E+08	NO		NO			NO	NO	NO	NO		
Annual transactions												
Year 0 (2007)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 1 (2008)	4457203	NO	NO	1533397	NO	NO	16199880	NO	NO	288000	NO	NO
Year 2 (2009)	28019395	NO	NO	3627324	NO	NO	27039815	NO	NO	604981	NO	NO
Year 3 (2010)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 4 (2011)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 5 (2012)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 6 (2013)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 7 (2014)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year 8 (2015)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Sub-total	32476598	NO	NO	5160721	NO	NO	43239695	NO	NO	892981	NO	NO
Total	4.14E+08	NO	NO	5160721	NO	NO	43239695	NO	NO	892981	NO	NO

Table 5 (b). Summary information on replacement

	Requirement for replacement		Replacement					
	Unit type		Unit type					
	tCERs	**lCERs**	**AAUs**	**ERUs**	**RMUs**	**CERs**	**tCERs**	**lCERs**
Previous CPs			NO	NO	NO	NO	NO	NO
Year 1 (2008)		NO	NO	NO	NO	NO	NO	NO
Year 2 (2009)		NO	NO	NO	NO	NO	NO	NO
Year 3 (2010)		NO	NO	NO	NO	NO	NO	NO
Year 4 (2011)		NO	NO	NO	NO	NO	NO	NO
Year 5 (2012)	NO	NO	NO	NO	NO	NO	NO	NO
Year 6 (2013)	NO	NO	NO	NO	NO	NO	NO	NO
Year 7 (2014)	NO	NO	NO	NO	NO	NO	NO	NO
Year 8 (2015)	NO	NO	NO	NO	NO	NO	NO	NO
Total	NO	NO	NO	NO	NO	NO	NO	NO

Table 5 (c). Summary information on retirement

	Retirement					
	Unit type					
Year	**AAUs**	**ERUs**	**RMUs**	**CERs**	**tCERs**	**lCERs**
Year 1 (2008)	NO	NO	NO	NO	NO	NO
Year 2 (2009)	27923069	NO	NO	1985373	NO	NO
Year 3 (2010)	NO	NO	NO	NO	NO	NO
Year 4 (2011)	NO	NO	NO	NO	NO	NO
Year 5 (2012)	NO	NO	NO	NO	NO	NO
Year 6 (2013)	NO	NO	NO	NO	NO	NO
Year 7 (2014)	NO	NO	NO	NO	NO	NO
Year 8 (2015)	NO	NO	NO	NO	NO	NO
Total	27923069	NO	NO	1985373	NO	NO

Table 6 (a). Memo item: Corrective transactions relating to additions and subtractions

	Additions						Subtractions					
	Unit type						Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
NO TRANSACTION												

Table 6 (b). Memo item: Corrective transactions relating to replacement

	Requirement for replacement		Replacement					
	Unit type		Unit type					
	tCERs	lCERs	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
NO TRANSACTION								

Table 6 (c). Memo item: Corrective transactions relating to retirement

	Retirement					
	Unit type					
	AAUs	ERUs	RMUs	CERs	tCERs	lCERs
NO TRANSACTION						

6 CHANGES IN NATIONAL SYSTEM

These chapter concerns information on changes in the national system.

There have been no changes in the National System since the last submission and the initial report. Information on the NS is included in the Introduction section of the NIR.

7 CHANGES IN NATIONAL REGISTRY

7.1 Contact names

The contact names have not changed.

7.2 Cooperation arrangement

The Portuguese registry is operated independently. i.e. in a non-consolidated way.

7.3 Changes to the National Registry

No changes in the database infrastructure have been performed. The current database capacity has proved to be sufficient so far and in the near future.

The Portuguese registry is in full operation with CR software since 8th October 2007 (at that date linked with CITL). In 2009, the only major change made in the Portuguese registry occurred on 15th July, when the registry software was updated to CR v3.2. This new version makes use of a new generic webservice to connect to CITL through ITL (AccountManagementService). This change has been preceded with intense testing, some internal and others coordinated by the EU COM and the UNFCCC secretariat. The formal ETS test was performed on 7th July and its results are presented in section 7.7 together with the final internal tests results.

In addition to this major software update, minor bugs have been detected and corrected and some functionality has been added to the registry software. All changes have been preceded with intense testing and have passed to the production environment in the following dates:

- 9th September;
- 12h October;
- 11th December.

The communication infra-structure has been improved by establishing an independent second link from the secondary datacenter to the ITL. As previously reported, in February 2009 Portugal improved its communication infrastructure to better manage emergency situations and reduce the risk of long non operating periods. An independent PIX has been installed in the secondary datacenter to implement a quasi independent second link to ITL. The connection to the secondary datacenter is still routed to a common firewall infrastructure (with two redundant nodes) linked to the backbone of the Portugal Telecom network. No changes have occurred in the way the registry conforms to the technical standards for data exchange.

7.4 Procedures to minimize discrepancies

No changes have occurred in the way the registry minimizes discrepancies. It should be stressed that during the three and a half years period of operation of the registry no discrepancies have been found between the registry, the ITL and the CITL. No complaint has also been reported by the registry users regarding a hypothetical discrepancy in their accounts.

7.5 Security measures

No changes have occurred in the way the registry deals with security issues. No security breaches have occurred.

7.6 Disaster management

No changes have occurred in the way the registry ensures the integrity of data storage and possibility of recovering from data losses. No incidents have occurred which may have put in danger the integrity of data storage. A major disaster recovery exercise planned for late 2009, was postponed and is now scheduled for February 2010, depending on ITL availability.

7.7 Test results on registry software upgrade to CR v3.2

7.7.1 Internal Tests

Summary

Environment: ITL DEV

Tester: Joana Simões

Dates: April-July 2009

Test	Description	Date	Result	Comment
Account creation	Creation of government account PT-100	15th April 2009	OK	Usernames are First_nameLast_name now New column with account status
Account update	Update of the city of primary authorized representative	15th April 2009	+/-	Incorrect body text in email sent
Add people	Add an additional representative of the government account	15th April 2009	NOK	Error stating role is mandatory, but I have chosen that role!
Account creation	OHA creation PT-120		OK	New field in the form: Permit nr (repeated) Possibility of getting account holder info from permit New field: Permit entry date – MANDATORY When the new installation is created the Permit Mgt is automatically updated with the permit id and start and expiry dates
Add people	Add an additional representative of the OHA		NOK	Error stating role is mandatory, but I have chosen that role! ???pt.form.field.account.role=Role??? É obrigatório Corrected in 29th April
Replace people	Replaced the primary authorized representative of OHA	15th April 2009	OK	
Reconciliation	ITL started reconciliation PT10010827	16th April 2009	+/-	Validated status
Project creation	Creation of a project	16th April 2009		
Conversion	Conversion of 25 AAU to ERU (project ID PT13390)	16th April 2009	OK	
Account blocking (DB) – is_frozen='Y'	Internal transfer to that account was successful Logged in as PAR – everything worked fine	16th April 2009	NOK	Blocking accounts in the database continues not to have any effects
Account Blocking (DB) Article27_blocked_flag='Y'	The account gets a key lock (cadeado), but everything is possible also. Manual intervention does not change anything	16th April 2009	NOK	No effects. Needs to happen automatically when the date is due
Password change as a user	Rules for password change: 8 alphanumeric characters	16th April 2009	OK	Displays a red rectangle with errors and I haven't clicked anything
Emission of RMU	Emission of 1500 RMU to government account	16th April 2009	OK	
Allowance allocation	Allocation for 2010 to inst 1 and 2	16th April 2009	OK	The operation has destination account blank
Verified emission insertion	Manual insertion of verified emissions	16th April 2009	NOK	Error. Permit must be from the previous year (entry into force date)
Allowance conversion	Error	16th April 2009	NOK	Error. After surrendering it works, but the national account are PT-100-50 and PT-100-600. They do not exist in DEV.
Retirement	New combobox Retirement Type with 3 options Kyoto Protocol Retirement Surrendered allowances retirement Unallocated allowances retirement	16th April 2009	+/-	Field is mandatory
Allowance surrender	Surrendered EUA	16th April 2009	+/-	If default_surrender_account is not defined it doesn't display the allowance surrender. There is an error. After defining that account, it works just fine.

Log off button	Page goes blue and login and other options disappear	16th April 2009	NOK	CORRECTED
User block	Unable to block an user without changing password	16th April 2009	NOK	
Message Sent to ITL	Message was sent to the ITL and they received it	16th April 2009	OK	
Type 9 notifications	Type 9 notification sent by ITL automatically completed in CR	29th April 2009	OK	Date is correctly changed
Type 5 notifications	Type 5 notification sent by ITL (lCERs for project PW35)			
Remove people	Remove additional representative	29th April 2009	OK	
Type 4 notification	Project id KP34	29th April 2009	OK	
Allowance conversion	Error	5th May 2009	OK	After correction, tested. Only works after 30th June 2013. Changed the clock. Worked
Type 1 notifications	Type 1 notifications sent to ITL	6th May 2009	OK	
Account closure	No units	6th May 2009	OK	Closed accounts disappear from accounts search
Account closure	With units	6th May 2009	OK	Not possible. Error stating there are still units in that account
Account closure	For installation: no units	6th May 2009	NOK	Not possible. Error. Should be possible without submitting VE for 2008. Since it belongs to NAP, it makes sense not allowing
Account creation	Longitude and Latitude not mandatory fields Permit 2004	6th May 2009	OK	
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from PartyHA to OHA		12th May 2009	OK	
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from OHA to OHA		12th May 2009	OK	
Surrendering (check 7367)		12th May 2009	OK	It works as it is supposed. I tried to surrender 5001 CER (total CER and ERU surrender: 5000) and it gave me error 7367. I then surrendered 250 CER and 25 ERU. Transactions completed. Then I tried to surrender 5000 CER: error 7367. Finally, I surrendered 4725 CER and the transaction was submitted and completed. Last test: surrender 1 ERU or 1 CER. Error 7367. Surrender CER and ERU for different year: error 7367. The check is working fine.
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from		12th May 2009	OK	

PartyHA to PHA				
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from PHA to OHA		12th May 2009	OK	
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from PHA to PHA		12th May 2009	OK	
Internal transfer of lCER, tCER, ERU, CER, RMU to operator holding account, EUA, AAU from OHA to PHA		12th May 2009	OK	
ETS testing 2009		15th May 2009 18th May 2009	+/-	Problems in NAP update uploads and allowance conversion
PAR functionalities		21st May 2009	OK	PAR can transfer units and check operations from and to his account. He can also submit VE but cannot approve them
SAR functionalities		21st May 2009	OK	SAR can transfer units and check operations from and to his account. He can also submit VE but cannot approve them
AAR functionalities		21st May 2009	+/-	AAR cannot transfer units. He cannot check notifications (error: Occorreu um erro durante a execução do pedido). He can only check operations and compliance
Verifier		21st May 2009	OK	Verifier can only check compliance and submit and approve VE

7.7.2 ETS Testing

Summary

Environment: ITL REG

Tester: Joana Simões

Date: 7th July 2009

Subject	Test case	Name	Description	Result
Account creation	2-1	Party holding accounts creation	creation of accounts 100, 230 (CP1), 300 (CP1), 300 (CP2)	OK
	2-2	Operator and party holding accounts creation	creation of 3 OHA accounts, 2 PHA accounts	OK
NAP upload	3-1	NAP upload for CP1	upload NAP for inst 1 (4*15000+50000) and 2 (5*10000); reserve 105000	OK
	4-1	Amended NAP upload	add installation 3 (4*20000); reserve 25000	OK
	4-2	Amended NAP upload	Inst 3 has amended allocation for 2012; reserve 15000	OK
Issuance	5-1	AAU issuance	issue 500000 AAU	OK
	5-2	EUA issuance	issue 265000 EUA	OK
Allowance allocation	5-3	Allowance allocation	2008: inst 1 - 15000; inst 2 - 10000	OK
	5-4	Allowance allocation	2009: inst 1 - 15000; inst 2 - 10000	OK
Internal transfer	6-1	Allowance Internal transfer (Party -> OHA)	From Party holding account to OHA (inst 1) 25000 EUA	OK
	6-2	Allowance internal transfer (OHA -> OHA)	From OHA (inst 1) to OHA (inst 2) 10000 EUA	OK
	6-3	Allowance internal transfer (OHA -> PHA)	From OHA (inst 2) to PHA 10000 EUA	OK
	6-4	Allowance internal transfer (PHA -> Party)	From PHA to Party holding account 10000 EUA	OK
	6-5	Allowance internal transfer (Party-> OHA)	From Party holding account to OHA (inst 2) 10000 EUA	OK
	6-6	EUA and AAU internal transfer (Party -> OHA)	From Party holding account to OHA (inst 2) 5000 EUA and 10000 AAU	OK
	6-7	EUA and AAU internal transfer (OHA -> PHA)	From OHA (inst 2) to PHA 5000 EUA and 10000 AAU	OK
	6-8	EUA and AAU internal transfer (PHA -> Party)	From PHA to Party holding account 5000 EUA and 10000 AAU	OK
External transfer	7-1	Allowance external transfer (Party -> YY)	From party holding account to registry YY: 10000 EUA	OK
	7-2	EUA and AAU external transfer (Party - > YY)	From party holding account to registry YY: 8000 EUA and 10000 AAU	skipped
	7-3	EUA and AAU external transfer (YY -> Party)	From registry YY to party holding account: 8000 EUA and 10000AAU	OK
Cancellation	8-1	Allowance cancellation	Cancel voluntarily 15000 allowances (inst 1)	OK
Account Management	9-1	Update OHA	The PAR is now SAR and vice-versa	OK
	9-2	Update OHA (SAR phone number and visibility)	Inst 2 - phone number changed; address and phone information not visible	OK
	9-3	Update OHA (Sar phone number and visibility)	Inst 2 - phone number changed; address and phone information visible again	OK
	9-4	Update permit number (inst 2)		

NAP upload	10-1	NAP upload for CP1	Inst 3: Delete; reserve: 105000	OK
Account closure	10-2	Account Closure		OK
Compliance	11-1	Update verified emissions (inst 1 and 2)	For inst 1 - 9500; inst 2 - 10000	OK
	11-2	Surrendering	For inst 1 - 8500	OK
	11-4	Update verified emissions (inst 1 and 2)	For inst 1 - 9500; inst 2 - 9000	OK
	11-5	Upload compliance		OK
Acount creation	12-1	Operator holding accounts creation	Inst 4	OK
NAP upload	12-2	NAP upload for CP1	Add installation 4: 4*15000; reserve: 45000	OK
Allowance allocation	12-4	Allowance allocation	Inst 4, 2009	OK
Retirement	13-1	Conversion of surrendered EUA to AAU	17500 surrendered allowances	OK
	13-2	EUA Retirement	17500 AAU	OK
	13-3	Conversion of none allocated allowances into AAUs	150000 allowances	skipped
	13-4	Retirement of AAUs	15000 AAU	skipped
	13-5	Retirement AAUs	6000 AAU	OK
Reconciliation	14-1	Positive reconciliation		OK
	14-2	Negative reconciliation		OK
	14-3	Manual intervention	Remove unit block from inst 2 to inst 1	OK
	14-4	Positive reconciliation		OK
NAP upload	15-1	Upload amended NAP	Reserve 225000	skipped
	15-2	Upload NAP	Reserve: 140000; inst 1 for 2010: 30000; for 2011 30000; for 2012 15000; inst 2 for 2009 until 2012: 25000	skipped
	15-3	NAP upload	Reserve: 125000	skipped

8 MINIMIZATION OF ADVERSE IMPACTS

This chapter concerns information on minimization of adverse impacts in accordance with Article 3, paragraph 14

Portugal's contribution to the minimisation of the adverse effects of climate change in other Parties, particularly developing countries, is carried out through a strong commitment to implementing the Convention and the Kyoto Protocol.

As such, the policies and measures implemented, adopted or foreseen in PNAC, targeting the six GHG of the Kyoto Protocol through its broad portfolio of instruments and wide-ranging coverage of all sectors of the economy, make up a significant effort by the Portuguese Government to address climate change, including the minimization of adverse effects of such policies.

In some cases, such as measures pertaining to the diversification of primary energy sources (namely shifting to natural gas), there can simultaneously be positive effects on Portugal's emissions reduction and in the economy of some fossil fuel exporting countries.

9 List of Acronyms

ABS	Acrylonitrile Butadiene Styrene	Acrilo Nitrilo Butadieno Estireno
AC	Air Conditioning	Ar condicionado
ACAP	Portuguese Association of Automobile Business	Associação do Comércio Automóvel de Portugal
AG	Aviation Gasoline	Gasolina de Aviação
AN	Ammonium Nitrate	Nitrato de Amónio
ANA	Airports and Air Navigation	Aeroportos e Navegação Aérea
ANAM	Madeira Island Airports and Air Navigation	Aeroportos e Navegação Aérea da Madeira
ANECRA	National Association of Companies of Automobile Business and Reparation	Associação Nacional das Empresas do Comércio e da Reparação Automóvel
APED	Portuguese Association of Distribution Companies	Associação Portuguesa de Empresas de Distribuição
APIRAC	National Association of Industry of Refrigeration and Air Conditioning	Associação Portuguesa dos Industriais da Refrigeração e Ar Condicionado
APORBET	Portuguese Association of Betuminous Mixes Producers	Associação Portuguesa de Fabricantes de Misturas Betuminosas
AS	Ammonium Sulphate	Sulfato de Amónia
ASN	Ammonium Sulphate Nitrate	Sulfonitrato de Amónia
BAT	Best Available Technologies	-
BOD	Biochemical Oxygen Demand	Carência Bioquímica de Oxigénio
BOF	Basic Oxygen Furnace	-
CAFE	Clean Air For Europe	-
CAN	Calcium Ammonium Nitrate	Nitrato de Cálcio-amônio
CCDR-LVT	Lisbon and Tagus Valley Coordination and Regional Development Comission	Comissão de Coordenação e Desenvolvimento Regional de Lisboa e Vale do Tejo
CELPA	Portuguese Paper Industry Association	Associação da Indústria Papeleira
CFC	Clorofluorcarbons	Clorofluorcarbonetos
CH4	Methane	Metano
CITEPA	Interprofessional Technical Center of Studies of Atmospheric Pollution	Centre Interprofessionnel Technique d'Études de la Pollution Atmosphérique
CKD	Cement Kiln Dust	-
CMN	Calcium Magnesium Nitrate	-
CN	Calcium Nitrate	Nitrato de Cálcio
CO	Carbon Monoxide	Monóxido de Carbono
CO2	Carbon Dioxide	Dióxido de Carbono ou anidrido carbónico
COD	Chemical Oxygen Demand	Carência Química de Oxigénio
CONCAWE	-	-
Concelho	Portuguese territorial unit under the responsibility of a municipal authority	-
CORINAIR	Core Inventory Air Emissions	Inventário de Emissões Atmosféricas
CRF	Common Reporting Format	-
CTCV	Technological Centre for Ceramics and Glass	Centro Tecnológico da Cerâmica e do Vidro
DAP	Di-ammonium phosphate	-
DBH	Diameter at Breast Height	Diâmetro à Altura do Peito (DAP)
DC	Degradable Organic Component	Fracção Orgânica Degradável
DGA	General Directorate of Environment	Direcção Geral do Ambiente
DGF	General Directorate of Forests	Direcção-Geral das Florestas

DGEG (ex DGGE)	General Directorate for Energy and Geology	Direcção Geral de Energia e Geologia
DGAE (ex DGE)	Economic Activities General Directorate	Direcção Geral das Actividades Económicas
DGRF	General Directorate for Forestry Resources	Direcção Geral dos Recursos Florestais
DGTT	General Directorate of Terrestrial Transportation	Direcção Geral dos Transportes Terrestres
Distrito	Portuguese territorial unit comprehending several concelhos but not coincident with a region which is NUT II.	-
DOC	Degradable Organic Carbon	Carbono Orgânico Degradável
DOCF	Degradable Organic Carbon Dissimilated	-
DRAOT	Regional Directorate of Environment and Land Use Planning	Direcção Regional do Ambiente e Ordenamento do Território
EAF	Electric Arc Furnace	Forno Arco Eléctrico
EAPA	European Asphalt Pavement Association	-
EF	Emission Factors	Factores de Emissão
EMEP	Cooperative Programme for Monitoring and Evaluation of the Longrange Transmission of Air Pollutants in Europe	-
EPER	European Pollutant Emission Register	Registo Europeu de Emissões Poluentes
E-PRTR	European Pollutant Release and Transfer Register	-
FAEED	Federal Aviation Administration Aircraft Engine Emission Database	-
FAM	Animal Manure Nitrogen Applied to Soils	-
FAO	Food and Agriculture Organization of the United Nations	-
FCC	Fluidized-bed Catalytic Cracking	Cracking catalítico de leito fluidizado
FCR	Fixation in Crop Residues	-
FCT-UNL	Faculty of Science and Technology of New University of Lisbon	Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
FGR	Annual amount of nitrogen in animal excreta (faeces and urine) deposited directly in soil during grazing in pasture and adjusted to account for the amount that volatilises as NH3	-
FOD	First Order Decay	Decaimento de Primeira Ordem
FSN	Nitrogen in Synthetic Fertilizers	-
GASA	Analysis Group of Ambiental Systems	Grupo de Análises de Sistemas Ambientais
GCV	Gross Calorific Value	-
GHG	Green House Gases	Gases Com Efeito de Estufa
GHV	Gross Heating Value	Poder Calorífico Superior
GIC	Large Combustion Plants (LCP)	Grandes Instalações de Combustão
GPG	Good Practice Guidance	-
GWP	Global Warming Potential	-
H2S	Hydrogen Sulfide	Sulfureto de Hidrogénio
HCFC	Hydroclorofluorcarbons	-
HDPE	High Density Poly Ethylene	-
HDV	Heavy Duty Vehicles	Veículos Pesados de Mercadorias
HFC	Hydrofluorcarbons	-
APA	Portuguese Environmental Agency	Agência Portuguesa do Ambiente
IAIT	Annual Survey to Manufacturing Industry	Inquérito Anual à Indústria Transformadora
IAPI	Annual Survey to Industrial Production	Inquérito Anual à Produção Industrial
ICAO	International Civil Aviation Organization	
IEF	Implied Emission Factors	Factores de Emissão Implícitos

IEP	Portuguese Road Institute	Instituto de Estradas de Portugal
IFADAP	Institute for Financing and Support of Development of Agriculture and Fisheries	Instituto de Financiamento e Apoio ao Desenvolvimento da Agricultura e das Pescas
IMTT (ex. DGV)	Institute for Mobility and Terrestrial Transportation	Instituto da Mobilidade e dos Transportes Terrestres
INAG	National Water Institute	Instituto da Água
INE	National Statistics Institute	Instituto Nacional de Estatística
INR	National Wastes Institute	Instituto Nacional de Resíduos
INRA	National Institute for Agronomic Investigation (France)	Institut National de la Recherche Agronomique (França)
IPCC	Intergovernmental Panel on Climate Change	-
ISP	Portuguese Insurance Institute	Instituto de Seguros de Portugal
IST-UTL	Technical Superior Institute - Lisbon Technical University	Instituto Superior Técnico - Universidade Técnica de Lisboa
JP	Jet Fuel	-
LCP	Large Combustion Plants (the same as GIC)	o mesmo que GIC
LDPE	Low Density Poly Ethylene	Polietileno de Baixa Densidade (PEBD)
LDV	Light Duty Vehicles	Veículos Ligeiros de Mercadorias
LNG	Liquified Natural Gas	Gás Natural Liquefeito
LOSP	Light Organic Solvent-based Preservatives	-
LPS	Large Point Sources (Corinair definition)	Grandes Fontes Poluidoras
LRTAP	Long-range Transboundary Air Pollution	Poluição Atmosférica Transfronteiras a Longa Distância
LTO	Landing and Take-off	Aterragens e Descolagens
LUCF	Land-use Change and Forestry	Alteração do Uso do Solo e Florestas
LULUCF	Land Use, Land-use Change and Forestry	Uso do Solo, Alteração do Uso do Solo e Florestas
MAC	Mobile Air-conditioning systems	-
MADRP	Ministry of Agriculture, Rural Development and Fisheries	Ministério da Agricultura, Desenvolvimento Rural e Pescas
MAOT	Ministry of Environment and Land Use Planning	Ministério do Ambiente e Ordenamento do Território
MCF	Methane Conversion Factor	Factor de Conversão de Metano
MCOTA	Ministry of Urban Affairs, Land Use Planning and Environment	Ministério das Cidades, Ordenamento do Território e Ambiente
MDI	Metered Dose Inhalers	-
MEET	Methodologies For Estimating Air Pollutant Emissions From Transport	-
MMS	Manure Management Systems	Sistema de Gestão de Estrumes
MSW	Municipal Solid Wastes	Resíduos Sólidos Municipais
MTBE	Methyl Tertiary Butyl Ether	Metil-Ter-Butil-Éter
Na2S	Sodium Sulphide	Sulfureto de Sódio
NaOH	Sodium Hydroxide	Hidróxido de Sódio
NATO	North Atlantic Treaty Organisation	Organização do Tratado do Atlântico Norte
NAV	National Entity responsible for air traffic	Navegação Aérea
NCV	Net Calorific Value	-
NFI	National Forestry Inventories	Inventário Florestal Nacional
NFR	New Format Reporting	-
NH3	Ammoniac	Amoníaco
NMVOC	Non Methane Volatile Organic Compounds	Compostos Orgânicos Voláteis Não Metânicos (COVNM)
NOx	Nitrogen Oxides (NO + NO2)	Óxidos de Azoto (NO+NO2)
NPK	Nitrogen, Phosphorus and Potassium	Nitrogénio, Fósforo e Potássio

NSS	Normal Super Phosphates	Superfosfatos simples
NUTS (0..III)	Nomenclature of Territorial Units for Statistics	Nomenclatura de Unidades Territoriais para fins estatísticos
OD	Origin - Destiny	Origem - Destino
ODS	Ozone Depleting Substances	-
OECD	Organization for Economic Co-operation and Development	Organização para a Cooperação e Desenvolvimento Económico (OCDE)
OX	Oxidation Factor	Factor de Oxidação
PAF	Florestal Action Program	Programa de Acção Florestal
PAH	Polycyclic Aromatic Hydrocarbons	Hidrocarbonetos Aromáticos Policíclicos
PCI	Low Heating Value (LHV)	Poder Calorífico Inferior
PEN	National Energetic Program	Plano Energético Nacional
PER	Perchloro-ethylene	Percloroetileno
PERSU	Strategic Plan on Municipal Solid Wastes	Plano Estratégico dos Resíduos Sólidos Urbanos
PETROGAL	Portuguese Petroleum Company	Empresa de Petróleos de Portugal
PFC	Perfluorinated Hidrocarbons	-
PM1	Particles with Aerodynamic Diameter smaller than 1 micrometer	Partículas cujo diâmetro aerodinâmico é inferior a 1 micrómetro
PM10	Particles with Aerodynamic Diameter smaller than 10 micrometers	Partículas cujo diâmetro aerodinâmico é inferior a 10 micrómetros
PM2.5	Particles with Aerodynamic Diameter smaller than 2.5 micrometers	Partículas cujo diâmetro aerodinâmico é inferior a 2.5 micrómetros
PNAC	National Climate Change Program	Programa Nacional para as Alterações Climáticas
PNPA	National Plan for Environmental Policy	Plano Nacional da Política de Ambiente
PP	Poly Propylene	Polipropileno
PS	Poly Styrene	Poliestireno
PTEN	National Emission Ceilings Program	Programa para os Tectos de Emissão Nacional
PVC	Poly Vinyl Chloride	Cloreto de Polivinil
RA	Agricultural Region	Região Agrária
REN	National Electric System	Rede Eléctrica Nacional
RVP	Reid Vapour Pressure	Pressão de Vapor de Reid
SF6	Sulphur Hexafluoride	Hexafluoreto de Enxofre
SNIERPA	National System of Inventories of Emissions and Remotions of Atmospheric Pollutants	Sistema Nacional de Inventários de Emissões e Remoções de Poluentes Atmosféricos
SOx	Sulphur Oxides	Óxidos de Enxofre
SW	Solid Wastes	Resíduos Sólidos
SWDS	Solid Waste Disposal Sites	Locais para Deposição de Resíduos Sólidos
TANKS	Software designed to estimate air emissions from organic liquids in storage tanks (USEPA, September 27, 2001)	Software criado para a estimativa de emissões atmosféricas a partir de líquidos orgânicos em tanques de armazenamento (USEPA, 27 de Setembro de 2001)
TNT	Trinitrotoluene	Trinitrotolueno
TOE	Tons of oil equivalent	Toneladas Equivalentes de Petróleo (TEP)
TOW	Total Organic Waste	Resíduo Orgânico Total
TRANSGÁS	Portuguese Company of Natural Gas	Sociedade Portuguesa de Gás Natural (Empresa)
TSP	Total Suspended Particles	Partículas Totais em Suspensão
TSS	Triple Super Phosphates	Superfosfatos Triplos
UNECE	United Nations Economic Commission for Europe	-
UNFCCC	United Nations Framework Convention on Climate Change	Convenção Quadro das Nações Unidas para as Alterações Climáticas
USEPA	United States Environmental Protection	Agência de Protecção Ambiental dos Estados

	Agency	Unidos da América
VCM	Vinyl Chloride Monomer	Monómero de Cloreto de Vinilo
VOC	Volatile Organic Compounds	Compostos Orgânicos Voláteis
VRF	Vacuum Residual Fuel Oil	Resíduo de Alto Vácuo
WWH	Wastewater Handling	Tratamento de Águas Resíduais
ZA	Agricultural Zone	Zona Agrária

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ANNEX A: Key Category Analysis

A.1 Introduction

This chapter provides an analysis of key categories following recommendations of the IPCC Good Practice Guidance (IPCC 2000) and IPCC Good Practice Guidance for LULUCF (IPCC 2003). A key category (source or sink) "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, the trend in emissions, or both." The aim of defining key categories is the improvement of the inventory´s accuracy. As key categories are the most important sources or removals in terms of their contribution to the absolute level of national emissions, the identification of these categories enables the prioritisation of national efforts and a more efficient use of available resources in order to reach an improvement of national estimates. Information on key categories is also important for the development of policies and measures for emissions reduction.

IPCC Good Practice Guidance (IPCC 2000) purposes several methods for performing key source analysis, which are:

- Tier 1 approach (level and trend assessments);
- Tier 2 approach (level and trend assessments with uncertainty analysis);
- Qualitative approach.

A.2 Methodology for key source identification: Portuguese inventory

Having as a basis the 2009 Portuguese inventory estimates (1990-2007), the determination of key categories was conducted using the Tier 2 including LULUCF. A qualitative approach has been used in the case of emissions of PFCs from category 2F1, as this source is largely unknown and is quantified as potential emissions.

Tier 2 - Level assessment

The level assessment is based on the quantified uncertainties presented in the introduction, according to the equation:

Level Assessment with Uncertainty= Tier 1 Level Assessment • Relative category Uncertainty

$$LU_{x,t} = L_{x,t} \bullet U_{x,t}$$

Where,

$LU_{x,t}$ = Level Assessment with Uncertainty

$L_{x,t}$ = calculated as in Tier 1 equation

$U_{x,t}$ = relative category uncertainty in the year t

Tier 2 - Trend assessment

The trend assessment is based according to the equation:

Trend Assessment with Uncertainty= Tier 1 Trend Assessment • Relative category Uncertainty

$$TU_{x,t} = T_{x,t} \bullet U_{x,t}$$

Where,

$TU_{x,t}$ = Trend Assessment with Uncertainty

$T_{x,t}$ = calculated as in Tier 1 equation

$U_{x,t}$ = relative category uncertainty in the year t

The key categories are those that add up to 90% of the total value of either $LU_{x,t}$ and $TU_{x,t}$.

A.3 Presentation of results

Key category analysis can be very influenced by the definitions of source categories (extent of the split). If a large category is broken into many subcategories, then these subcategories may not have a significant contribution to the total inventory to be considered as a key source. On the opposite, several non-key sources categories may become key source categories if aggregated into a unique source category.

In a general way, the source and removal categories have been split into (sub) categories that have been estimated using the same methodology and emission factors.

Following the recommendations from the ERT report, LULUCF and Agricultural sectors have been disaggregated according to the IPCC GPG (IPCC 2000 and 2003).

The analysis was based on the application of Tier 2 method with the LULUCF sector, and a qualitative approach, and resulted in the identification of 52 key categories.

Table A-1 presents a summary of identified key categories for 1990-2008 using Tier 2 analysis including LULUCF, and the criteria used (level, trend, qualitative) in the identification.

Three other tables are presented, Tables A-2.1 to A-2.3 for 1990 and 2008 inventory year´s level assessment and trend assessment for 1990-2008.

Table A.1 – Portuguese key categories (1990-2008) based on Tier 2 with LULUCF

IPCC CATEGORIES	ACTIVITY	GHG	Key source Categor	Criteria for Identificat	Comments on level assessment	2008 emissions estimate (kton CO2 eq.)
1A 3 b Road Transportation	All Fuels	CO2	√	Level Trend	All years	18346
1A 1a Public Electricity and Heat Production	Solid Fuels	CO2	√	Level	All years	8949
1A 1a Public Electricity and Heat Production	Gaseous Fuels	CO2	√	Level Trend	1999, 2004, 2005, 2006, 2007, 2008	5153
2 A 1Cement Production	Production Quantities	CO2	√	Level	All years	4110
1A 2 f Other	Liquid Fuels	CO2	√	Level	All years	3950
6 A Municipal SWDL	SW Disposal on Land	CH4	√	Level Trend	All years	3149
4 A ENTERIC FERMENTATION	Population size	CH4	√	Level	All years	2967
1A 2 f Other	Gaseous Fuels	CO2	√	Level Trend	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	2035
1A 1a Public Electricity and Heat Production	Liquid Fuels	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1995, 1998, 1999, 2000, 2001, 2002, 2005	1944
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	√	Level Trend	All years	1851
6 A 3 Industrial SWDL	Industrial Waste Disposal on Land	CH4	√	Level Trend	All years	1768
6 B 1Industrial Wastewater	Wastewater	CH4	√	Level	All years	1655
1A 4 b Residential	Liquid Fuels	CO2	√	Level	1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006	1412
1A 4 a Commercial / Institutional	Liquid Fuels	CO2	√	Level	1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007	1392
4 B MANURE MANAGEMENT	Animal Excretion	CH4	√	Level Trend	All years	1371
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	√	Level Trend	All years	1138
5 E 2 Land converted to Settlements	Emissions/Removals	CO2	√	Level	All years	1108
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	CO2	√	Level Trend	1990, 1991, 1993	1051
2 F 1Refrigeration and Air Conditioning Equipment	Consumption	HFC	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	981
6 B 2 Domestic and Commercial wastewater	Wastewater	CH4	√	Level Trend	All years	754
2 B 1Ammonia Production	Production Quantities	CO2	√	Level	1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005,	652
1B 2 a Oil	Liquid Fuels	CO2	√	Level Trend	1995, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	629
4 C RICE CULTIVATION	Culture Surface	CH4	√	Level	2004, 2006, 2007, 2008	386
2 A 2 Lime Production	Production Quantities	CO2	√	Level Trend	1990, 1991, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	378
1A 3 a ii Domestic	Liquid Fuels	CO2	√	Level	1990, 1991, 1992, 1994, 1995, 1996, 1997, 1998, 2005, 2006, 2007	360
5 B 2 Land converted to Cropland	Emissions/Removals	CO2	√	Level	1990, 1997, 1998, 2000, 2001, 2002, 2007	354
1A 4 b Residential	Biomass	CH4	√	Level Trend	All years	310
6 B 1Industrial Wastewater	Wastewater	N2O	√	Level Trend	All years	226
1A 2 f Other	Solid Fuels	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1995, 1996	195
2 A 7 Other	Production Quantities	CO2	√	Level Trend	2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008	181
1B 2 b Natural gas	Gaseous Fuels	CH4	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	148
1B 2 d Other (Geothermal)	Energy Production	CO2	√	Level Trend	1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005,	126
3 D OTHER	Other Use of Chemicals	CO2	√	Level	All years	102
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	N2O	√	Level Trend	All years	102
1A 4 b Residential	Biomass	N2O	√	Level Trend	All years	65
3 A PAINT APPLICATION	Paint application	CO2	√	Level Trend	1990, 1991, 1992, 1993, 1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2006	63
3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING	Chemical manufacture and processing	CO2	√	Level	All years	56
2 F 2 Foam Blowing	Consumption	HFC	√	Level Trend	2003, 2004, 2005, 2006, 2008	45
1A 1a Public Electricity and Heat Production	Solid Fuels	N2O	√	Level	All years	42
1A 1a Public Electricity and Heat Production	Gaseous Fuels	N2O	√	Level Trend	1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	40
1A 2 f Other	Biomass	N2O	√	Level	1990, 1991, 1992, 1993, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008	26
1A 1a Public Electricity and Heat Production	Biomass	N2O	√	Level Trend	2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008	20
1A 2 d Pulp, Paper and Print	Biomass	N2O	√	Level	2007, 2008	18
1A 2 f Other	Gaseous Fuels	N2O	√	Trend		16
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CH4	√	Level	2003	12
1A 1a Public Electricity and Heat Production	Other Fuels	N2O	√	Trend		11
2 F 1Refrigeration and Air Conditioning Equipment	Imports/Potential	PFC	√	Qualitative		9
1A 1a Public Electricity and Heat Production	Liquid Fuels	N2O	√	Level Trend	1992	5
2 A 6 Road Paving with Asphalt	Production Quantities	CO2	√	Level Trend	All years	4
5 B 1Cropland remaining Cropland	Emissions/Removals	CO2	√	Trend		-164
5 A 2 Land converted to Forest Land	Emissions/Removals	CO2	√	Level Trend	All years	-577
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CO2	√	Level Trend	All years	-2999
Sub-total with LULUCF		All gases				**65928**
% of total with LULUCF		All gases				86.3
TOTAL EMISSIONS WITH LULUCF		All gases				**76363**

Table A.2 – Tier 2 Level assessment with LULUCF: 1990

Tier 2 Level Assessment (1990)

IPCC SOURCE CATEGORIES	ACTIVITY	GHG	Base year Estimate (kton CO2 eq.) 1990	Current year Estimate (kton CO2 eq.) 1990	Level Assess.	Combined Uncert. %	Level * Uncert. %	Share Level * Uncert. %	Cumulative Total
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	2105	2105	0.03	500.28	16.85	0.34	0.34
6 A 3 Industrial SWDL	Industrial Waste Disposal	CH4	1599	1599	0.03	149.82	3.83	0.08	0.41
6 B 1 Industrial Wastewater	Wastewater	N2O	156	156	0.00	1000.33	2.49	0.05	0.46
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	N2O	151	151	0.00	1000.05	2.41	0.05	0.51
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	1331	1331	0.02	113.05	2.41	0.05	0.56
6 A Municipal SWDL	SWDisposal on Land	CH4	1433	1433	0.02	67.27	1.54	0.03	0.59
4 B MANUREMANAGEMENT	Animal Excretion	CH4	1379	1379	0.02	60.90	1.34	0.03	0.62
1A 4 b Residential	Biomass	N2O	73	73	0.00	1001.80	1.17	0.02	0.64
1A 3 b Road Transportation	All Fuels	CO2	9246	9246	0.15	7.07	1.05	0.02	0.66
6 B 1 Industrial Wastewater	Wastewater	CH4	1386	1386	0.02	44.16	0.98	0.02	0.68
1A 4 b Residential	Biomass	CH4	343	343	0.01	161.55	0.89	0.02	0.70
4 A ENTERIC FERMENTATION	Population size	CH4	2622	2622	0.04	20.90	0.88	0.02	0.72
3 C CHEMICAL PRODUCTS, MANUFACTUREAND	Chemical manufacture and	CO2	51	51	0.00	1000.05	0.82	0.02	0.73
6 B 2 Domestic and Commercial wastewater	Wastewater	CH4	1056	1056	0.02	48.28	0.82	0.02	0.75
3 D OTHER	Other Use of Chemicals	CO2	85	85	0.00	500.00	0.68	0.01	0.76
1A 1a Public Electricity and Heat Production	Solid Fuels	CO2	7659	7659	0.12	5.10	0.63	0.01	0.78
5 E 2 Land converted to Settlements	Emissions/Removals	CO2	1108	1108	0.02	34.61	0.61	0.01	0.79
1A 2 f Other	Liquid Fuels	CO2	3375	3375	0.05	11.18	0.60	0.01	0.80
1A 1a Public Electricity and Heat Production	Solid Fuels	N2O	36	36	0.00	1000.00	0.58	0.01	0.81
1A 1a Public Electricity and Heat Production	Liquid Fuels	CO2	6301	6301	0.10	5.10	0.51	0.01	0.82
2 A 1 Cement Production	Production Quantities	CO2	3107	3107	0.05	10.10	0.50	0.01	0.83
2 A 6 Road Paving with Asphalt	Production Quantities	CO2	3	3	0.00	10000.05	0.42	0.01	0.84
5 A 2 Land converted to Forest Land	Emissions/Removals	CO2	-577	-577	0.01	45.01	0.42	0.01	0.85
1A 3 a ii Domestic	Liquid Fuels	CO2	236	236	0.00	100.11	0.38	0.01	0.86
1A 2 f Other	Solid Fuels	CO2	2103	2103	0.03	11.18	0.38	0.01	0.86
3 A PAINT APPLICATION	Paint application	CO2	86	86	0.00	262.39	0.36	0.01	0.87
1A 2 f Other	Biomass	N2O	21	21	0.00	1001.80	0.34	0.01	0.88
5 A 1 Forest Land remaining Forest Land	Emissions/Removals	CO2	526	526	0.01	39.58	0.33	0.01	0.88
2 A 2 Lime Production	Production Quantities	CO2	178	178	0.00	105.34	0.30	0.01	0.89
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	CO2	1660	1660	0.03	11.18	0.30	0.01	0.90
5 B 2 Land converted to Cropland	Emissions/Removals	CO2	354	354	0.01	51.58	0.29	0.01	0.90
1A 4 b Residential	Liquid Fuels	CO2	1621	1621	0.03	11.18	0.29	0.01	0.91
2 B 1 Ammonia Production	Production Quantities	CO2	569	569	0.01	31.57	0.29	0.01	0.91
1A 1a Public Electricity and Heat Production	Liquid Fuels	N2O	15	15	0.00	1000.00	0.25	0.00	0.92
1A 3 d ii National navigation	Liquid Fuels	CO2	262	262	0.00	50.64	0.21	0.00	0.92
4 C RICECULTIVATION	Culture Surface	CH4	227	227	0.00	53.62	0.19	0.00	0.93
1A 2 d Pulp, Paper and Print	Biomass	N2O	11	11	0.00	1000.00	0.18	0.00	0.93
1A 4 b Residential	Liquid Fuels	N2O	11	11	0.00	1000.05	0.18	0.00	0.93
1A 2 f Other	Liquid Fuels	N2O	11	11	0.00	1000.05	0.18	0.00	0.94
1A 1b Petroleum refining	Liquid Fuels	CO2	1910	1910	0.03	5.10	0.16	0.00	0.94
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	CO2	820	820	0.01	11.18	0.15	0.00	0.94
1A 1b Petroleum refining	Liquid Fuels	N2O	9	9	0.00	1000.00	0.15	0.00	0.95
5 B 1 Cropland remaining Cropland	Emissions/Removals	CO2	-164	-164	0.00	54.83	0.14	0.00	0.95
6 B 2 Domestic and Commercial wastewater	Wastewater	N2O	286	286	0.00	30.41	0.14	0.00	0.95
1A 4 a Commercial / Institutional	Liquid Fuels	CO2	744	744	0.01	11.18	0.13	0.00	0.96
1A 2 c Chemicals	Liquid Fuels	CO2	1372	1372	0.02	5.83	0.13	0.00	0.96
2 A 7 Other	Production Quantities	CO2	64	64	0.00	113.66	0.12	0.00	0.96
1B 1a Coal Mining	Solid Fuels	CH4	66	66	0.00	100.12	0.11	0.00	0.96
2 B 5 Other	Production Quantities	CO2	65	65	0.00	100.50	0.10	0.00	0.96
1A 2 c Chemicals	Liquid Fuels	N2O	6	6	0.00	1000.00	0.10	0.00	0.97
2 B 2 Nitric Acid Production	Production Quantities	N2O	567	567	0.01	10.05	0.09	0.00	0.97
5 A 1 Forest Land remaining Forest Land	Emissions/Removals	CH4	137	137	0.00	39.58	0.09	0.00	0.97
1A 2 e Food Processing, Beverages and Tobacco	Biomass	N2O	5	5	0.00	1001.80	0.09	0.00	0.97
1B 2 a Oil	Liquid Fuels	CO2	105	105	0.00	50.16	0.08	0.00	0.97
1B 2 a Oil	Liquid Fuels	CH4	51	51	0.00	100.08	0.08	0.00	0.98
1A 2 f Other	Solid Fuels	N2O	5	5	0.00	1000.05	0.07	0.00	0.98
1A 2 d Pulp, Paper and Print	Liquid Fuels	CO2	743	743	0.01	5.83	0.07	0.00	0.98
1A 3 b Road Transportation	All Fuels	N2O	81	81	0.00	50.25	0.07	0.00	0.98
1A 3 b Road Transportation	All Fuels	CH4	100	100	0.00	40.31	0.06	0.00	0.98
2 A 3 Limestone and Dolomite Use	Production Quantities	CO2	33	33	0.00	105.02	0.06	0.00	0.98
4 B MANUREMANAGEMENT	Animal Excretion	N2O	536	536	0.01	6.05	0.05	0.00	0.98
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	CH4	30	30	0.00	101.98	0.05	0.00	0.98
5 D 2 Land converted to Wetlands	Emissions/Removals	CO2	105	105	0.00	28.08	0.05	0.00	0.98
1A 2 d Pulp, Paper and Print	Biomass	CH4	19	19	0.00	150.03	0.05	0.00	0.99
1A 2 a Iron and Steel	Solid Fuels	CO2	466	466	0.01	5.83	0.04	0.00	0.99
1B 2 c Venting and flaring	Liquid Fuels	CO2	49	49	0.00	50.09	0.04	0.00	0.99
1A 4 a Commercial / Institutional	Liquid Fuels	N2O	2	2	0.00	1000.05	0.04	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	N2O	2	2	0.00	1000.05	0.04	0.00	0.99
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	N2O	22	22	0.00	101.98	0.04	0.00	0.99
5 C 2 Land converted to Grassland	Emissions/Removals	CO2	-25	-25	0.00	88.47	0.04	0.00	0.99
1A 3 d ii National navigation	Liquid Fuels	N2O	2	2	0.00	1001.27	0.03	0.00	0.99
1A 3 a ii Domestic	Liquid Fuels	N2O	2	2	0.00	1004.99	0.03	0.00	0.99
1B 2 d Other (Geothermal)	Energy Production	CO2	2	2	0.00	1000.05	0.03	0.00	0.99
1A 2 d Pulp, Paper and Print	Liquid Fuels	N2O	2	2	0.00	1000.00	0.03	0.00	0.99
5 F 2 Land converted to Other Land	Emissions/Removals	CO2	32	32	0.00	46.46	0.02	0.00	0.99
1A 2 c Chemicals	Biomass	N2O	1	1	0.00	1000.00	0.02	0.00	0.99
5 B 2 Land converted to Cropland	Emissions/Removals	N2O	24	24	0.00	51.58	0.02	0.00	0.99
1A 3 c Railways	Liquid Fuels	CO2	173	173	0.00	7.07	0.02	0.00	0.99
3 B DEGREASING AND DRY CLEANING	Degreasing and Dry	CO2	12	12	0.00	100.00	0.02	0.00	0.99
1A 5 Other	Liquid Fuels	CO2	95	95	0.00	11.18	0.02	0.00	1.00

Table A.3 – Tier 2 Level assessment with LULUCF: 2008

Tier 2 Level Assessment (2008)

IPCC SOURCE CATEGORIES	ACTIVITY	GHG	Base year Estimate (kton CO2 eq.) 1990	Current year Estimate (kton CO2 eq.) 2008	Level Assess.	Combined Uncert. %	Level * Uncert. %	Share Level * Uncert. %	Cumulative Total
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	2105	1851	0.02	500.28	11.04	0.24	0.24
6 A 3 Industrial SWDL	Industrial Waste Disposal	CH4	1599	1768	0.02	149.82	3.16	0.07	0.31
6 B 1 Industrial Wastewater	Wastewater	N2O	156	226	0.00	1000.30	2.69	0.06	0.37
6 A Municipal SWDL	SWDisposal on Land	CH4	1433	3149	0.04	67.27	2.53	0.06	0.43
1A 3 b Road Transportation	All Fuels	CO2	9246	18346	0.22	7.07	1.55	0.03	0.46
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	1331	1138	0.01	113.05	1.53	0.03	0.50
1B 2 d Other (Geothermal)	Energy Production	CO2	2	126	0.00	1000.05	1.51	0.03	0.53
5 A 1 Forest Land remaining Forest Land	Emissions/Removals	CO2	526	-2999	0.04	39.58	1.42	0.03	0.56
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	N2O	151	102	0.00	1000.05	1.22	0.03	0.59
2 F 1 Refrigeration and Air Conditioning Equipment	Consumption	HFC	0	981	0.01	99.29	1.16	0.03	0.62
4 B MANUREMANAGEMENT	Animal Excretion	CH4	1379	1371	0.02	60.90	1.00	0.02	0.64
6 B 1 Industrial Wastewater	Wastewater	CH4	1386	1655	0.02	43.88	0.87	0.02	0.66
1A 4 b Residential	Biomass	N2O	73	65	0.00	1001.80	0.78	0.02	0.67
4 A ENTERIC FERMENTATION	Population size	CH4	2622	2967	0.04	20.90	0.74	0.02	0.69
3 C CHEMICAL PRODUCTS, MANUFACTUREAND	Chemical manufacture and	CO2	51	56	0.00	1000.05	0.67	0.01	0.71
3 D OTHER	Other Use of Chemicals	CO2	85	102	0.00	500.00	0.61	0.01	0.72
1A 4 b Residential	Biomass	CH4	343	310	0.00	161.55	0.60	0.01	0.73
1A 1a Public Electricity and Heat Production	Solid Fuels	CO2	7659	8949	0.11	5.10	0.54	0.01	0.74
1A 2 f Other	Liquid Fuels	CO2	3375	3950	0.05	11.18	0.53	0.01	0.76
2 A 6 Road Paving with Asphalt	Production Quantities	CO2	3	4	0.00	10000.05	0.51	0.01	0.77
1A 1a Public Electricity and Heat Production	Solid Fuels	N2O	36	42	0.00	1000.00	0.51	0.01	0.78
2 A 1 Cement Production	Production Quantities	CO2	3107	4110	0.05	10.10	0.49	0.01	0.79
1A 1a Public Electricity and Heat Production	Gaseous Fuels	N2O	0	40	0.00	1000.00	0.48	0.01	0.80
2 A 2 Lime Production	Production Quantities	CO2	178	378	0.00	105.34	0.47	0.01	0.81
5 E 2 Land converted to Settlements	Emissions/Removals	CO2	1108	1108	0.01	34.61	0.46	0.01	0.82
6 B 2 Domestic and Commercial wastewater	Wastewater	CH4	1056	754	0.01	48.28	0.43	0.01	0.83
1B 2 a Oil	Liquid Fuels	CO2	105	629	0.01	50.16	0.38	0.01	0.84
1A 1a Public Electricity and Heat Production	Gaseous Fuels	CO2	0	5153	0.06	5.10	0.31	0.01	0.85
1A 2 f Other	Biomass	N2O	21	26	0.00	1001.80	0.31	0.01	0.85
5 A 2 Land converted to Forest Land	Emissions/Removals	CO2	-577	-577	0.01	45.01	0.31	0.01	0.86
1A 2 f Other	Gaseous Fuels	CO2	0	2035	0.02	11.18	0.27	0.01	0.87
1B 2 b Natural gas	Gaseous Fuels	CH4	0	148	0.00	150.33	0.27	0.01	0.87
4 C RICECULTIVATION	Culture Surface	CH4	227	386	0.00	53.62	0.25	0.01	0.88
2 A 7 Other	Production Quantities	CO2	64	181	0.00	113.66	0.25	0.01	0.88
2 B 1 Ammonia Production	Production Quantities	CO2	569	652	0.01	31.57	0.25	0.01	0.89
1A 1a Public Electricity and Heat Production	Biomass	N2O	0	20	0.00	1000.00	0.24	0.01	0.89
2 F 2 Foam Blowing	Consumption	HFC	0	45	0.00	435.48	0.24	0.01	0.90
1A 2 d Pulp, Paper and Print	Biomass	N2O	11	18	0.00	1000.00	0.22	0.00	0.90
5 B 2 Land converted to Cropland	Emissions/Removals	CO2	354	354	0.00	51.58	0.22	0.00	0.91
3 A PAINT APPLICATION	Paint application	CO2	86	63	0.00	262.39	0.20	0.00	0.91
1A 2 f Other	Gaseous Fuels	N2O	0	16	0.00	1000.05	0.19	0.00	0.92
1A 4 b Residential	Liquid Fuels	CO2	1621	1412	0.02	11.18	0.19	0.00	0.92
1A 4 a Commercial / Institutional	Liquid Fuels	CO2	744	1392	0.02	11.18	0.19	0.00	0.92
2 A 3 Limestone and Dolomite Use	Production Quantities	CO2	33	132	0.00	105.02	0.17	0.00	0.93
1A 1b Petroleum refining	Liquid Fuels	CO2	1910	2624	0.03	5.10	0.16	0.00	0.93
1A 3 b Road Transportation	All Fuels	N2O	81	234	0.00	50.25	0.14	0.00	0.93
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	CO2	1660	1051	0.01	11.18	0.14	0.00	0.94
1A 1b Petroleum refining	Liquid Fuels	N2O	9	11	0.00	1000.00	0.13	0.00	0.94
6 B 2 Domestic and Commercial wastewater	Wastewater	N2O	286	356	0.00	30.41	0.13	0.00	0.94
1A 3 d ii National navigation	Liquid Fuels	CO2	262	213	0.00	50.64	0.13	0.00	0.95
1A 1a Public Electricity and Heat Production	Other Fuels	N2O	0	11	0.00	1000.00	0.13	0.00	0.95
2 B 5 Other	Production Quantities	CO2	65	104	0.00	100.50	0.12	0.00	0.95
1A 2 f Other	Liquid Fuels	N2O	11	10	0.00	1000.05	0.12	0.00	0.95
1A 1a Public Electricity and Heat Production	Liquid Fuels	CO2	6301	1944	0.02	5.10	0.12	0.00	0.96
1A 4 b Residential	Liquid Fuels	N2O	11	10	0.00	1000.05	0.12	0.00	0.96
5 B 1 Cropland remaining Cropland	Emissions/Removals	CO2	-164	-164	0.00	54.83	0.11	0.00	0.96
1A 2 c Chemicals	Liquid Fuels	CO2	1372	1384	0.02	5.83	0.10	0.00	0.96
1A 2 c Chemicals	Liquid Fuels	N2O	6	8	0.00	1000.00	0.09	0.00	0.97
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	CO2	820	600	0.01	11.18	0.08	0.00	0.97
1B 2 a Oil	Liquid Fuels	CH4	51	61	0.00	100.08	0.07	0.00	0.97
1A 4 b Residential	Gaseous Fuels	CO2	0	470	0.01	11.18	0.06	0.00	0.97
1A 2 e Food Processing, Beverages and Tobacco	Biomass	N2O	5	5	0.00	1001.80	0.06	0.00	0.97
1A 4 a Commercial / Institutional	Gaseous Fuels	CO2	0	459	0.01	11.18	0.06	0.00	0.97
1A 4 a Commercial / Institutional	Liquid Fuels	N2O	2	5	0.00	1000.05	0.06	0.00	0.98
1A 1a Public Electricity and Heat Production	Liquid Fuels	N2O	15	5	0.00	1000.00	0.06	0.00	0.98
2 B 2 Nitric Acid Production	Production Quantities	N2O	567	463	0.01	10.05	0.06	0.00	0.98
1A 2 d Pulp, Paper and Print	Biomass	CH4	19	27	0.00	150.03	0.05	0.00	0.98
1A 2 d Pulp, Paper and Print	Gaseous Fuels	N2O	0	4	0.00	1000.00	0.04	0.00	0.98
1A 4 a Commercial / Institutional	Gaseous Fuels	N2O	0	4	0.00	1000.05	0.04	0.00	0.98
1A 3 a ii Domestic	Liquid Fuels	N2O	2	3	0.00	1000.00	0.04	0.00	0.98
1A 4 c Agriculture / Forestry / Fishing	Biomass	N2O	0	3	0.00	1001.80	0.04	0.00	0.98
5 D 2 Land converted to Wetlands	Emissions/Removals	CO2	105	105	0.00	28.08	0.04	0.00	0.98
1B 2 b Natural gas	Gaseous Fuels	CO2	0	19	0.00	150.33	0.03	0.00	0.98
1A 2 d Pulp, Paper and Print	Gaseous Fuels	CO2	0	483	0.01	5.83	0.03	0.00	0.98
4 B MANUREMANAGEMENT	Animal Excretion	N2O	536	463	0.01	6.05	0.03	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Gaseous Fuels	CO2	0	233	0.00	11.18	0.03	0.00	0.99
1B 2 c Venting and flaring	Liquid Fuels	CO2	49	51	0.00	50.09	0.03	0.00	0.99
1A 2 c Chemicals	Gaseous Fuels	N2O	0	3	0.00	1000.00	0.03	0.00	0.99
1A 2 d Pulp, Paper and Print	Liquid Fuels	CO2	743	384	0.00	5.83	0.03	0.00	0.99
5 C 2 Land converted to Grassland	Emissions/Removals	CO2	-25	-25	0.00	88.47	0.03	0.00	0.99
1A 2 f Other	Solid Fuels	CO2	2103	195	0.00	11.18	0.03	0.00	0.99
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	CH4	30	20	0.00	101.98	0.02	0.00	0.99
1A 2 c Chemicals	Biomass	N2O	1	2	0.00	1000.00	0.02	0.00	0.99
1A 2 c Chemicals	Gaseous Fuels	CO2	0	323	0.00	5.83	0.02	0.00	0.99
1A 3 b Road Transportation	All Fuels	CH4	100	45	0.00	40.31	0.02	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Gaseous Fuels	N2O	0	2	0.00	1000.05	0.02	0.00	0.99
1A 3 a ii Domestic	Liquid Fuels	CO2	236	360	0.00	5.00	0.02	0.00	0.99
1A 1a Public Electricity and Heat Production	Other Fuels	CO2	0	350	0.00	5.10	0.02	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	N2O	2	2	0.00	1000.05	0.02	0.00	0.99
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	N2O	22	17	0.00	101.98	0.02	0.00	0.99
1A 2 f Other	Gaseous Fuels	CH4	0	11	0.00	150.33	0.02	0.00	0.99
1A 3 d ii National navigation	Liquid Fuels	N2O	2	2	0.00	1001.27	0.02	0.00	0.99
5 F 2 Land converted to Other Land	Emissions/Removals	CO2	32	32	0.00	46.46	0.02	0.00	0.99
1A 2 f Other	Liquid Fuels	CH4	7	9	0.00	150.33	0.02	0.00	1.00

Table A.4 – Tier 2 Trend assessment with LULUCF: 1990-2008

Tier 2 Trend Assessment (1990-2008)

IPCC SOURCE CATEGORIES	ACTIVITY	GHG	Base year Estimate (kton CO2 eq.) 1990	Current year Estimate (kton CO2 eq.) 2008	Trend Assess.	Combined Uncert. %	Level * Uncert. %	Share Level * Uncert. %	Cumulative Total
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	2105	1851	0.01	500.28	4.10	0.17	0.17
4 D a AGRICULTURAL SOILS. Direct Emissions	Input to soils	N2O	2105	1851	0.01	500.28	4.10	0.17	0.34
1B 2 d Other (Geothermal)	Energy Production	CO2	2	126	0.00	1000.05	1.30	0.05	0.40
2 F 1Refrigeration and Air Conditioning Equipment	Consumption	HFC	0	981	0.01	99.29	1.02	0.04	0.44
2 F 1Refrigeration and Air Conditioning Equipment	Consumption	HFC	0	981	0.01	99.29	1.02	0.04	0.48
6 A Municipal SWDL	SW Disposal on Land	CH4	1433	3149	0.01	67.27	0.96	0.04	0.52
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	N2O	151	102	0.00	1000.05	0.90	0.04	0.56
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	1331	1138	0.01	113.05	0.62	0.03	0.59
4 D b AGRICULTURAL SOILS. Indirect Emissions	Input to soils	N2O	1331	1138	0.01	113.05	0.62	0.03	0.61
1A 3 b Road Transportation	All Fuels	CO2	9246	18346	0.07	7.07	0.50	0.02	0.63
1A 1a Public Electricity and Heat Production	Gaseous Fuels	N2O	0	40	0.00	1000.00	0.42	0.02	0.65
6 A 3 Industrial SWDL	Industrial Waste Disposal on	CH4	1599	1768	0.00	149.82	0.37	0.02	0.67
5 A 2 Land converted to Forest Land	Emissions/Removals	CO2	-577	-577	0.01	45.01	0.34	0.01	0.68
6 B 1Industrial Wastewater	Wastewater	N2O	156	226	0.00	1000.30	0.32	0.01	0.70
6 B 1Industrial Wastewater	Wastewater	N2O	156	226	0.00	1000.30	0.32	0.01	0.71
1A 1a Public Electricity and Heat Production	Liquid Fuels	CO2	6301	1944	0.06	5.10	0.32	0.01	0.72
6 B 2 Domestic and Commercial wastewater	Wastewater	CH4	1056	754	0.01	48.28	0.29	0.01	0.73
1A 2 f Other	Solid Fuels	CO2	2103	195	0.03	11.18	0.29	0.01	0.75
1A 1a Public Electricity and Heat Production	Gaseous Fuels	CO2	0	5153	0.05	5.10	0.28	0.01	0.76
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CO2	526	-2999	0.01	39.58	0.27	0.01	0.77
1A 4 b Residential	Biomass	N2O	73	65	0.00	100.80	0.27	0.01	0.78
1B 2 a Oil	Liquid Fuels	CO2	105	629	0.01	50.16	0.26	0.01	0.79
1A 2 f Other	Gaseous Fuels	CO2	0	2035	0.02	11.18	0.24	0.01	0.80
1B 2 b Natural gas	Gaseous Fuels	CH4	0	148	0.00	150.33	0.23	0.01	0.81
4 B MANURE MANAGEMENT	Animal Excretion	CH4	1379	1371	0.00	60.90	0.23	0.01	0.82
1A 1a Public Electricity and Heat Production	Biomass	N2O	0	20	0.00	1000.00	0.21	0.01	0.83
2 F 2 Foam Blowing	Consumption	HFC	0	45	0.00	435.48	0.21	0.01	0.84
2 F 2 Foam Blowing	Consumption	HFC	0	45	0.00	435.48	0.21	0.01	0.85
1A 4 b Residential	Biomass	CH4	343	310	0.00	161.55	0.20	0.01	0.86
2 A 2 Lime Production	Production Quantities	CO2	178	378	0.00	105.34	0.17	0.01	0.86
1A 2 f Other	Gaseous Fuels	N2O	0	16	0.00	1000.05	0.17	0.01	0.87
1A 1a Public Electricity and Heat Production	Liquid Fuels	N2O	15	5	0.00	1000.00	0.15	0.01	0.88
3 A PAINT APPLICATION	Paint application	CO2	86	63	0.00	262.39	0.12	0.01	0.88
2 A 7 Other	Production Quantities	CO2	64	181	0.00	113.66	0.12	0.01	0.89
1A 4 c Agriculture / Forestry / Fishing	Liquid Fuels	CO2	1660	1051	0.01	11.18	0.12	0.01	0.89
5 B 1Cropland remaining Cropland	Emissions/Removals	CO2	-164	-164	0.00	54.83	0.12	0.00	0.90
1A 1a Public Electricity and Heat Production	Other Fuels	N2O	0	11	0.00	1000.00	0.11	0.00	0.90
2 A 6 Road Paving with Asphalt	Production Quantities	CO2	3	4	0.00	10000.05	0.10	0.00	0.90
5 E 2 Land converted to Settlements	Emissions/Removals	CO2	1108	1108	0.00	34.61	0.10	0.00	0.91
2 A 3 Limestone and Dolomite Use	Production Quantities	CO2	33	132	0.00	105.02	0.10	0.00	0.91
1B 1a Coal Mining	Solid Fuels	CH4	66	0	0.00	100.12	0.09	0.00	0.92
3 C CHEMICAL PRODUCTS. MANUFACTURE AND	Chemical manufacture and	CO2	51	56	0.00	1000.05	0.08	0.00	0.92
1A 4 b Residential	Liquid Fuels	CO2	1621	1412	0.01	11.18	0.07	0.00	0.92
1A 3 b Road Transportation	All Fuels	N2O	81	234	0.00	50.25	0.07	0.00	0.93
4 A ENTERIC FERMENTATION	Population size	CH4	2622	2967	0.00	20.90	0.07	0.00	0.93
5 A 1Forest Land remaining Forest Land	Emissions/Removals	CH4	137	12	0.00	39.58	0.07	0.00	0.93
1A 3 d ii National navigation	Liquid Fuels	CO2	262	213	0.00	50.64	0.06	0.00	0.93
4 C RICE CULTIVATION	Culture Surface	CH4	227	386	0.00	53.62	0.06	0.00	0.94
1A 2 f Other	Solid Fuels	N2O	5	0	0.00	1000.05	0.06	0.00	0.94
1A 4 b Residential	Gaseous Fuels	CO2	0	470	0.00	11.18	0.06	0.00	0.94
1A 4 a Commercial / Institutional	Liquid Fuels	CO2	744	1392	0.00	11.18	0.05	0.00	0.94
1A 4 a Commercial / Institutional	Gaseous Fuels	CO2	0	459	0.00	11.18	0.05	0.00	0.95
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	CO2	820	600	0.00	11.18	0.05	0.00	0.95
5 B 2 Land converted to Cropland	Emissions/Removals	CO2	354	354	0.00	51.58	0.05	0.00	0.95
1A 4 b Residential	Liquid Fuels	N2O	11	10	0.00	1000.05	0.04	0.00	0.95
1A 2 d Pulp, Paper and Print	Biomass	N2O	11	18	0.00	1000.00	0.04	0.00	0.95
1A 2 f Other	Liquid Fuels	N2O	11	10	0.00	1000.05	0.04	0.00	0.96
1A 2 d Pulp, Paper and Print	Gaseous Fuels	N2O	0	4	0.00	1000.00	0.04	0.00	0.96
1A 4 a Commercial / Institutional	Gaseous Fuels	N2O	0	4	0.00	1000.05	0.04	0.00	0.96
6 B 1Industrial Wastewater	Wastewater	CH4	1386	1655	0.00	43.88	0.04	0.00	0.96
1A 2 a Iron and Steel	Solid Fuels	CO2	466	25	0.01	5.83	0.03	0.00	0.96
1A 1a Public Electricity and Heat Production	Solid Fuels	CO2	7659	8949	0.01	5.10	0.03	0.00	0.96
1A 3 b Road Transportation	All Fuels	CH4	100	45	0.00	40.31	0.03	0.00	0.96
1A 2 d Pulp, Paper and Print	Liquid Fuels	CO2	743	384	0.01	5.83	0.03	0.00	0.97
1A 4 c Agriculture / Forestry / Fishing	Biomass	N2O	0	3	0.00	100.80	0.03	0.00	0.97
1A 2 f Other	Liquid Fuels	CO2	3375	3950	0.00	11.18	0.03	0.00	0.97
1B 2 b Natural gas	Gaseous Fuels	CO2	0	19	0.00	150.33	0.03	0.00	0.97
1A 2 d Pulp, Paper and Print	Gaseous Fuels	CO2	0	483	0.01	5.83	0.03	0.00	0.97
1A 1a Public Electricity and Heat Production	Solid Fuels	N2O	36	42	0.00	1000.00	0.03	0.00	0.97
5 C 2 Land converted to Grassland	Emissions/Removals	CO2	-25	-25	0.00	88.47	0.03	0.00	0.97
1A 2 e Food Processing, Beverages and Tobacco	Gaseous Fuels	CO2	0	233	0.00	11.18	0.03	0.00	0.97
1A 2 c Chemicals	Gaseous Fuels	N2O	0	3	0.00	1000.00	0.03	0.00	0.98
2 B 2 Nitric Acid Production	Production Quantities	N2O	567	463	0.00	10.05	0.03	0.00	0.98
2 B 5 Other	Production Quantities	CO2	65	104	0.00	100.50	0.02	0.00	0.98
2 A 1Cement Production	Production Quantities	CO2	3107	4110	0.00	10.10	0.02	0.00	0.98
1A 4 a Commercial / Institutional	Liquid Fuels	N2O	2	5	0.00	1000.05	0.02	0.00	0.98
1A 2 c Chemicals	Liquid Fuels	CO2	1372	1384	0.00	5.83	0.02	0.00	0.98
2 B 1Ammonia Production	Production Quantities	CO2	569	652	0.00	31.57	0.02	0.00	0.98
1A 2 c Chemicals	Gaseous Fuels	CO2	0	323	0.00	5.83	0.02	0.00	0.98
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	CH4	30	20	0.00	101.98	0.02	0.00	0.98
1A 2 e Food Processing, Beverages and Tobacco	Gaseous Fuels	N2O	0	2	0.00	1000.05	0.02	0.00	0.98
1A 1a Public Electricity and Heat Production	Other Fuels	CO2	0	350	0.00	5.10	0.02	0.00	0.98
3 D OTHER	Other Use of Chemicals	CO2	85	102	0.00	500.00	0.02	0.00	0.99
1A 2 f Other	Gaseous Fuels	CH4	0	11	0.00	150.33	0.02	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Biomass	N2O	5	5	0.00	100.80	0.02	0.00	0.99
1A 2 d Pulp, Paper and Print	Liquid Fuels	N2O	2	1	0.00	1000.00	0.01	0.00	0.99
4 B MANURE MANAGEMENT	Animal Excretion	N2O	536	463	0.00	6.05	0.01	0.00	0.99
4 B MANURE MANAGEMENT	Animal Excretion	N2O	536	463	0.00	6.05	0.01	0.00	0.99
1A 1b Petroleum refining	Liquid Fuels	CO2	1910	2624	0.00	5.10	0.01	0.00	0.99
1B 1a Coal Mining	Solid Fuels	CO2	9	0	0.00	100.12	0.01	0.00	0.99
1A 2 e Food Processing, Beverages and Tobacco	Liquid Fuels	N2O	2	2	0.00	1000.05	0.01	0.00	0.99
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	N2O	22	17	0.00	101.98	0.01	0.00	0.99
4 F FIELD BURNING OF AGRICULTURAL WASTES	Residues Burning	N2O	22	17	0.00	101.98	0.01	0.00	0.99
1A 3 c Railways	Liquid Fuels	CO2	173	79	0.00	7.07	0.01	0.00	0.99
1A 2 a Iron and Steel	Solid Fuels	N2O	1	0	0.00	1000.00	0.01	0.00	0.99
1A 3 d ii National navigation	Liquid Fuels	N2O	2	2	0.00	1001.27	0.01	0.00	0.99
1A 2 a Iron and Steel	Gaseous Fuels	N2O	0	1	0.00	1000.00	0.01	0.00	0.99
1A 2 a Iron and Steel	Liquid Fuels	CO2	154	52	0.00	5.83	0.01	0.00	0.99
5 D 2 Land converted to Wetlands	Emissions/Removals	CO2	105	105	0.00	28.08	0.01	0.00	0.99
1A 2 f Other	Solid Fuels	CH4	4	1	0.00	150.33	0.01	0.00	0.99
1A 1c Manufacture of Solid fuels and Other Energy	Liquid Fuels	CO2	49	0	0.00	11.18	0.01	0.00	0.99
1A 2 a Iron and Steel	Gaseous Fuels	CO2	0	117	0.00	5.83	0.01	0.00	0.99
5 A 1Forest Land remaining Forest Land	Emissions/Removals	N2O	14	1	0.00	39.58	0.01	0.00	0.99
5 A 1Forest Land remaining Forest Land	Emissions/Removals	N2O	14	1	0.00	39.58	0.01	0.00	0.99
6 C WASTE INCINERATION	Waste Incinerated	CO2	10	1	0.00	50.25	0.01	0.00	0.99
1A 3 a ii Domestic	Liquid Fuels	N2O	2	3	0.00	1000.00	0.01	0.00	100

ANNEX B: Uncertainty Analysis Methodology

B1 Introduction

Uncertainty in the inventory of emissions and removals of GHG result from the natural variability of emission processes, incomplete knowledge of emission sources and definition, errors and gaps in data collection and statistical information, incorrect determination and choice of emission factors and parameter due to errors in original monitoring data, reference studies and expert judgement.

Uncertainty values were defined as the range of 95% confidence interval (IPCC,1997; IPCC,2000), meaning that there is a 95% probability that the actual value of the quantity (activity data, emission factor or emission) is within the interval defined by the confidence limits.

The uncertainty analysis was performed only for the direct GHG: CO_2, CH_4, N_2O, HFC and SF_6, considering all emissions in CO_2 equivalent (CO_2e). The uncertainty of all source activities was considered to overall uncertainty including the uncertainty of LULUCF category.

A tier 1 methodology was used to estimate total uncertainty for the inventory, for one individual year and also the uncertainty in trend. Basically this method of classical analysis, which is explained in more detail in IPCC(2000), attributes uncertainty values to activity data and emission factors, for each of the pollutants, and uses error propagation rules to combine uncertainty estimates for each individual source into total uncertainty. In accordance with IPCC (2000) considerations the uncertainty in Global Warming Potentials (GWP) is not included in uncertainty quantification. The uncertainty values, both for activity data and emission factors, are discussed in the detailed analysis of emission estimates for each individual source sector.

The uncertainty is estimated for individual years, from emission estimates in specific years and uncertainty values for both activity data and implied emission factors, but also for the trend of emissions for each individual category. In the last case, the sensitivity factor of the emissions is also calculated.

B2 Methodology Issues

Level of Analysis

The level at which uncertainties were estimated was determined at the level at which different uncertainty values must be attributed. Therefore the following factors were considered:

- Origin of activity data. A different level was defined whenever activity data resulted from a different origin, including different classes in Energy Balance. In the case when Large Point Source (LPS) was used to estimate part of emissions from a given source sector the uncertainty analysis had to be done independently for that fraction, because the resultant error is different, and uncertainty level was independently made for emissions from LPS and from the remaining Area sources. This separation is also very important in agriculture where different animal types have very different levels of error in activity data;

- Emission Factor. A different class is used for sub-sources whenever different emission factors were used. For example, that has caused the detailed consideration

of emissions for each product from organic chemical industry (PVC, Polypropylene, etc) because emission factors have different origins. In the same way fuels (e.g. biomass) were analyzed independently in situations where uncertainty values are different.

- For certain processes, if the emission estimate depends of different parts of the product life-time, uncertainty analysis was done at the lowest level also. That is the case of aviation, where separation is done for LTO and cruise emissions, and fluorine gas emissions from refrigeration equipment, where uncertainty analysis was performed independently for assembly, operation and disposal.

Uncertainty Values

The uncertainty values that were used were set from:

- Good Practice Guidebook (IPCC,2000);
- references to emission factors, such as AP42[6];
- comparison of several sources of information. For example, comparison to international sources such as FAO, IEA;
- inter-annual un expected variations of activity data;
- statistical variation in the determination of country-specific emission factors, for different units or different years.

The actual uncertainty values that were used for each activity source is reported in following chapters for each source.

Error propagation

Two different rules were used in error propagation (IPCC,2000):

Rule A: For the case when the quantities are to be combined by addition, the standard deviation of the sum will be the square root of the sum of the squares of the standard deviations of the quantities that are added with the standard deviations all expressed in absolute terms;

$$U_{Total} = \frac{\{\Sigma_i [U_i * x_i]^2\}^{0.5}}{\Sigma_i [x_i]}$$

Where:

[6] In this reference source quality codes are usually reported from A (good quality) to E (poor quality). The following conversion rules was used in uncertainty assessment:

A	5 %
B	10 %
C	50 %
D	100 %
E	1 000 %

U_{total} is the percentage uncertainty in the sum of the quantities expressed as a percentage;

x_i and U_i are the uncertain quantities and the percentage uncertainties associated with them, respectively;

Rule B: quantities are to be combined by multiplication, a simpler rule applies:

$$U_{Total} = [\Sigma_i U^2_i]^{0.5}$$

Where:

U_{total} is the percentage uncertainty in the product of the quantities (half the 95% confidence interval divided by the total and expressed as a percentage);

U_i are the percentage uncertainties associated with each of the quantities.

Explanation of tables[7]

A single table is presented including the most basic information used in uncertainty determination. The uncertainty was estimated in a consistent way for all years from 1990 to 2007. However, tables present only information for 2007.

All tables are equal and include the following columns:

- Sector;
- Category: second level of source category according to the IPCC;
- Individual category: the more detailed level at which uncertainties are determined;
- Fuel: type of fuel used in the category, when relevant;
- Source type: uncertainties are estimated with different uncertainty values when emissions are estimated using data from Large Point Sources (LPS) or from national statistics (AREA) ;
- IPCC code: the IPCC code defined for the individual category under calculus (Column A of table 6.1 in GP (IPCC,2000));
- Gas: GHG under consideration: CO_2 ; CH_4 ; N_2O and F G (F gases). Emissions are reported for F gases (HFC, PFC and SF6) after conversion to CO_2eq using the appropriate GWP factor. Removals and emissions of the LULUCF sector, except fires, are reported as CO2, by conversion of all carbon fluxes (Column B of table 6.1 in GP (IPCC,2000));
- Base Year emissions: Emissions and removals per category in 1990. Emissions are reported as positive values and removals as negative values[8]. All emissions,

[7] Tables provided in excel annex

[8] Note: alll calculation is done with absolute values.

irrespective of the gas, are reported as CO_2 equivalent (Column C of table 6.1 in GP (IPCC,2000));

- Current Year emissions : Emissions and removals per category in the last year of the inventory. (Column D of table 6.1 in GP (IPCC,2000));

- AD Uncertainty: uncertainty value attributed to the activity data, half the 95 per cent net confidence interval divided by the mean and expressed as percentage. Detailed presentation of the assumptions and determination os individual valures are discussed in main text (Column E of table 6.1 in GP (IPCC,2000));

- EF Uncertainty: the uncertainty value attributed to the implied emission factor, per cent. The determination of this value from basic parameters is discussed in main text. (Column F of table 6.1 in GP (IPCC,2000));

- Combined Uncertainty: derived from the uncertainties of AD and EF and using propagation rule B. (Column G of table 6.1 in GP (IPCC,2000));

- Combined uncertainty as per cent of total national emissions in current year: represents the importance of the uncertainty of each specific individual category to the overall uncertainty in the current year. The addition of the squares of all the entries in column H and after taking the square root (Rule A) is an estimate of the percentage uncertainty in total national emissions in the current year. (Column H of table 6.1 in GP (IPCC,2000));

- type A sensitivity: The per cent difference in emissions for this individual category following a 1 per cent increase in both the base year and current year, expressing the sensitivity in trend to a uncertainty systematic in nature (Column I of table 6.1 in GP (IPCC,2000));

- type B sensitivity: The per cent difference in emissions for this individual category following a 1 per cent increase in the current year only, expressing the sensitivity in trend to a uncertainty due to random error in emission estimate (i.e. error not correlated between years). (Column J of table 6.1 in GP (IPCC,2000));

- Uncertainty in trend from the uncertainty in EF: In all cases type A sensitivity (correlation) was used to estimate uncertainty in EF. (Column K of table 6.1 in GP (IPCC,2000));

- Uncertainty in trend from the uncertainty in AD: In all cases type B sensitivity (no correlation) was used to estimate uncertainty in AD. (Column L of table 6.1 in GP (IPCC,2000));

- Uncertainty into the trend in total national emissions. is an estimate of the uncertainty introduced into the trend in national emissions by the source category in question, derived from the data in columns K and L using Rule B. Total uncertainty in trend is calculated from the entries above using the error propagation equation, summing the squares of all the entries in column M and taking the square root.(Column M of table 6.1 in GP (IPCC,2000)).

Finally, because there are confidentiality issues, for some categories the activity data and combined uncertainty are reported as “C”. Nevertheless, the importance of the uncertainty for each source may still be assessed from the tables.

Table 10-1 – Tier 1 Uncertainty calculation and reporting (IPCC Good Pratice Guidance and Uncertainty Management Table 6.1)

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Public Electricity Generation	L	LPS	1A1a	CO2	6298.5	1821.3	1	5	5.1	0.1	-0.09910	0.02983	-0.495	0.211	0.539
Energy	Fuel Combustion Activities	Public Electricity Generation	S	LPS	1A1a	CO2	7659.4	8948.5	1	5	5.1	0.6	-0.01033	0.14657	-0.052	1.036	1.038
Energy	Fuel Combustion Activities	Public Electricity Generation	G	LPS	1A1a	CO2	0.0	5153.5	1	5	5.1	0.3	0.08441	0.08441	0.422	0.597	0.731
Energy	Fuel Combustion Activities	Public Electricity Generation	L	AREA	1A1a	CO2	2.1	122.7	4	5	6.4	0.0	0.00197	0.00201	0.010	0.014	0.017
Energy	Fuel Combustion Activities	Petroleum Refining	L	LPS	1A1b	CO2	1909.5	2624.0	1	5	5.1	0.2	0.00386	0.04298	0.019	0.304	0.305
Energy	Fuel Combustion Activities	Petroleum Refining	G	LPS	1A1b	CO2	0.0	20.7	1	5	5.1	0.0	0.00034	0.00034	0.002	0.002	0.003
Energy	Fuel Combustion Activities	Manufacture Of Solid Fuels	S	LPS	1A1c	CO2	25.4	0.0	1	5	5.1	0.0	-0.00052	0.00000	-0.003	0.000	0.003
Energy	Fuel Combustion Activities	Other Energy Industries	L	AREA	1A1cii	CO2	49.5	0.0	4	5	6.4	0.0	-0.00101	0.00000	-0.005	0.000	0.005
Energy	Fuel Combustion Activities	Iron And Steel	L	LPS	1A2a	CO2	134.0	41.5	3	5	5.8	0.0	-0.00207	0.00068	-0.010	0.005	0.011
Energy	Fuel Combustion Activities	Iron And Steel	S	LPS	1A2a	CO2	466.0	0.0	3	5	5.8	0.0	-0.00955	0.00000	-0.048	0.000	0.048
Energy	Fuel Combustion Activities	Iron And Steel	O	LPS	1A2a	CO2	3.1	0.8	3	5	5.8	0.0	-0.00005	0.00001	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	L	AREA	1A2a	CO2	20.1	10.8	5	5	7.1	0.0	-0.00024	0.00018	-0.001	0.001	0.002
Energy	Fuel Combustion Activities	Iron And Steel	S	AREA	1A2a	CO2	0.0	24.9	5	5	7.1	0.0	0.00041	0.00041	0.002	0.003	0.004
Energy	Fuel Combustion Activities	Iron And Steel	G	AREA	1A2a	CO2	0.0	116.8	5	5	7.1	0.0	0.00191	0.00191	0.010	0.014	0.017
Energy	Fuel Combustion Activities	Chemicals	L	LPS	1A2c	CO2	808.0	827.6	3	5	5.8	0.1	-0.00300	0.01355	-0.015	0.096	0.097
Energy	Fuel Combustion Activities	Chemicals	L	AREA	1A2c	CO2	563.7	556.3	5	5	7.1	0.1	-0.00244	0.00911	-0.012	0.064	0.066
Energy	Fuel Combustion Activities	Chemicals	S	AREA	1A2c	CO2	44.2	61.2	5	5	7.1	0.0	0.00010	0.00100	0.000	0.007	0.007
Energy	Fuel Combustion Activities	Chemicals	G	AREA	1A2c	CO2	0.0	322.6	5	5	7.1	0.0	0.00528	0.00528	0.026	0.037	0.046
Energy	Fuel Combustion Activities	Chemicals	O	AREA	1A2c	CO2	62.7	64.0	5	5	7.1	0.0	-0.00024	0.00105	-0.001	0.007	0.008

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	LPS	1A2d	CO2	432.3	228.0	3	5	5.8	0.0	-0.00512	0.00373	-0.026	0.026	0.037
Energy	Fuel Combustion Activities	Pulp, Paper And Print	G	LPS	1A2d	CO2	0.0	33.9	3	5	5.8	0.0	0.00055	0.00055	0.003	0.004	0.005
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	AREA	1A2d	CO2	311.1	156.2	5	5	7.1	0.0	-0.00381	0.00256	-0.019	0.018	0.026
Energy	Fuel Combustion Activities	Pulp, Paper And Print	G	AREA	1A2d	CO2	0.0	448.7	5	5	7.1	0.0	0.00735	0.00735	0.037	0.052	0.064
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	L	AREA	1A2e	CO2	820.4	600.4	10	5	11.2	0.1	-0.00697	0.00983	-0.035	0.070	0.078
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	S	AREA	1A2e	CO2	1.2	0.0	10	5	11.2	0.0	-0.00002	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	G	AREA	1A2e	CO2	0.0	233.2	10	5	11.2	0.0	0.00382	0.00382	0.019	0.027	0.033
Energy	Fuel Combustion Activities	Textile	L	AREA	1A2fi	CO2	814.0	356.3	10	5	11.2	0.1	-0.01084	0.00584	-0.054	0.041	0.068
Energy	Fuel Combustion Activities	Textile	G	AREA	1A2fi	CO2	0.0	306.5	10	5	11.2	0.0	0.00502	0.00502	0.025	0.035	0.043
Energy	Fuel Combustion Activities	Ceramic	L	AREA	1A2fii	CO2	659.9	108.7	5	5	7.1	0.0	-0.01174	0.00178	-0.059	0.013	0.060
Energy	Fuel Combustion Activities	Ceramic	S	AREA	1A2fii	CO2	0.6	0.0	5	5	7.1	0.0	-0.00001	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Ceramic	G	AREA	1A2fii	CO2	0.0	772.9	5	5	7.1	0.1	0.01266	0.01266	0.063	0.090	0.110
Energy	Fuel Combustion Activities	Glass	L	AREA	1A2fiii	CO2	413.9	34.7	5	5	7.1	0.0	-0.00791	0.00057	-0.040	0.004	0.040
Energy	Fuel Combustion Activities	Glass	G	AREA	1A2fiii	CO2	0.0	496.6	5	5	7.1	0.0	0.00813	0.00813	0.041	0.058	0.070
Energy	Fuel Combustion Activities	Cement	L	LPS	1A2fiv	CO2	109.8	2333.7	3	5	5.8	0.2	0.03597	0.03822	0.180	0.270	0.325
Energy	Fuel Combustion Activities	Cement	S	LPS	1A2fiv	CO2	2051.8	195.3	3	5	5.8	0.0	-0.03882	0.00320	-0.194	0.023	0.195
Energy	Fuel Combustion Activities	Cement	O	LPS	1A2fiv	CO2	16.8	51.8	3	5	5.8	0.0	0.00050	0.00085	0.003	0.006	0.007
Energy	Fuel Combustion Activities	Cement	L	AREA	1A2fiv	CO2	73.6	70.0	3	5	5.8	0.0	-0.00036	0.00115	-0.002	0.008	0.008
Energy	Fuel Combustion Activities	Cement	G	AREA	1A2fiv	CO2	0.0	58.3	3	5	5.8	0.0	0.00095	0.00095	0.005	0.007	0.008

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Cloth	L	AREA	1A2fv	CO2	66.4	33.5	10	5	11.2	0.0	-0.00081	0.00055	-0.004	0.004	0.006
Energy	Fuel Combustion Activities	Cloth	G	AREA	1A2fv	CO2	0.0	32.3	10	5	11.2	0.0	0.00053	0.00053	0.003	0.004	0.005
Energy	Fuel Combustion Activities	Wood	L	AREA	1A2fvi	CO2	145.2	155.8	10	5	11.2	0.0	-0.00042	0.00255	-0.002	0.018	0.018
Energy	Fuel Combustion Activities	Wood	G	AREA	1A2fvi	CO2	0.0	25.0	10	5	11.2	0.0	0.00041	0.00041	0.002	0.003	0.004
Energy	Fuel Combustion Activities	Rubber	L	AREA	1A2fvii	CO2	46.3	2.2	10	5	11.2	0.0	-0.00091	0.00004	-0.005	0.000	0.005
Energy	Fuel Combustion Activities	Rubber	G	AREA	1A2fvii	CO2	0.0	7.3	10	5	11.2	0.0	0.00012	0.00012	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Metal Equipment And Machines	L	AREA	1A2fviii	CO2	311.6	108.1	10	5	11.2	0.0	-0.00461	0.00177	-0.023	0.013	0.026
Energy	Fuel Combustion Activities	Metal Equipment And Machines	S	AREA	1A2fviii	CO2	50.6	0.0	10	5	11.2	0.0	-0.00104	0.00000	-0.005	0.000	0.005
Energy	Fuel Combustion Activities	Metal Equipment And Machines	G	AREA	1A2fviii	CO2	0.0	165.2	10	5	11.2	0.0	0.00271	0.00271	0.014	0.019	0.023
Energy	Fuel Combustion Activities	Other Transformation Industries	L	AREA	1A2fc	CO2	145.7	14.5	10	5	11.2	0.0	-0.00275	0.00024	-0.014	0.002	0.014
Energy	Fuel Combustion Activities	Other Transformation Industries	S	AREA	1A2fc	CO2	0.0	0.0	10	5	11.2	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	G	AREA	1A2fc	CO2	0.0	20.7	10	5	11.2	0.0	0.00034	0.00034	0.002	0.002	0.003
Energy	Fuel Combustion Activities	Extractive Industry	L	AREA	1A2fix	CO2	83.3	170.6	10	5	11.2	0.0	0.00109	0.00279	0.005	0.020	0.020
Energy	Fuel Combustion Activities	Extractive Industry	S	AREA	1A2fix	CO2	0.2	0.0	10	5	11.2	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Extractive Industry	G	AREA	1A2fix	CO2	0.0	11.6	10	5	11.2	0.0	0.00019	0.00019	0.001	0.001	0.002
Energy	Fuel Combustion Activities	Cop	L	AREA	1A2fx	CO2	505.6	562.1	10	5	11.2	0.1	-0.00115	0.00921	-0.006	0.065	0.065
Energy	Fuel Combustion Activities	Cop	G	AREA	1A2fx	CO2	0.0	139.0	10	5	11.2	0.0	0.00228	0.00228	0.011	0.016	0.020
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3ai	CO2	4.0	4.8	0	5	5.0	0.0	0.00000	0.00008	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Lto	L JeK	AREA	1A3ai	CO2	126.4	293.8	0	5	5.0	0.0	0.00222	0.00481	0.011	0.034	0.036

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3ai	CO2	1322.3	2291.1	0	5	5.0	0.2	0.01043	0.03753	0.052	0.265	0.270
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3aii	CO2	1.8	2.2	0	5	5.0	0.0	0.00000	0.00004	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Lto	L JeK	AREA	1A3aii	CO2	75.1	122.2	0	5	5.0	0.0	0.00046	0.00200	0.002	0.014	0.014
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3aii	CO2	159.4	235.7	0	5	5.0	0.0	0.00059	0.00386	0.003	0.027	0.027
Energy	Fuel Combustion Activities	Cars	L Gas	AREA	1A3bi	CO2	3586.5	3995.3	5	5	7.1	0.4	-0.00803	0.06544	-0.040	0.463	0.464
Energy	Fuel Combustion Activities	Cars	L DiesO	AREA	1A3bi	CO2	436.0	4778.1	5	5	7.1	0.4	0.06932	0.07826	0.347	0.553	0.653
Energy	Fuel Combustion Activities	Cars	L LPG	AREA	1A3bi	CO2	0.1	71.1	5	5	7.1	0.0	0.00116	0.00116	0.006	0.008	0.010
Energy	Fuel Combustion Activities	Light Duty Trucks	L DiesO	AREA	1A3bii	CO2	1911.5	2029.9	5	5	7.1	0.2	-0.00591	0.03325	-0.030	0.235	0.237
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L Gas	AREA	1A3biii	CO2	0.5	1.0	5	5	7.1	0.0	0.00001	0.00002	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L DiesO	AREA	1A3biii	CO2	2708.0	6934.4	5	5	7.1	0.6	0.05808	0.11358	0.290	0.803	0.854
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	G CNG	AREA	1A3biii	CO2	0.0	18.8	5	5	7.1	0.0	0.00031	0.00031	0.002	0.002	0.003
Energy	Fuel Combustion Activities	Motorcycles	L Gas	AREA	1A3biv	CO2	603.2	517.8	5	5	7.1	0.0	-0.00387	0.00848	-0.019	0.060	0.063
Energy	Fuel Combustion Activities	Railways	S	AREA	1A3c	CO2	0.1	0.0	5	5	7.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Railways	L	AREA	1A3c	CO2	173.0	78.7	5	5	7.1	0.0	-0.00225	0.00129	-0.011	0.009	0.014
Energy	Fuel Combustion Activities	International Marine (C)	L ResO	AREA	1A3di	CO2	1060.3	1654.2	50.39	5	50.6	1.1	0.00537	0.02709	0.027	0.192	0.193
Energy	Fuel Combustion Activities	International Marine (C)	L GasD	AREA	1A3di	CO2	322.7	297.8	50.39	5	50.6	0.2	-0.00173	0.00488	-0.009	0.034	0.036
Energy	Fuel Combustion Activities	National Navigation	L ResO	AREA	1A3dii	CO2	188.4	153.0	50.39	5	50.6	0.1	-0.00135	0.00251	-0.007	0.018	0.019
Energy	Fuel Combustion Activities	National Navigation	L GasD	AREA	1A3dii	CO2	73.5	59.6	50.39	5	50.6	0.0	-0.00053	0.00098	-0.003	0.007	0.007
Energy	Fuel Combustion Activities	Commercial / Institutional	L	AREA	1A4a	CO2	743.7	1392.3	10	5	11.2	0.2	0.00757	0.02280	0.038	0.161	0.166
Energy	Fuel Combustion Activities	Commercial / Institutional	G	AREA	1A4a	CO2	0.0	459.4	10	5	11.2	0.1	0.00752	0.00752	0.038	0.053	0.065
Energy	Fuel Combustion	Commercial /	B	AREA	1A4a	CO2	0.0	9.0	60	5	60.2	0.0	0.00015	0.00015	0.001	0.001	0.001

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Activities	Institutional															
Energy	Fuel Combustion Activities	Residential	L	AREA	1A4b	CO2	1621.3	1412.1	10	5	11.2	0.2	-0.01008	0.02313	-0.050	0.164	0.171
Energy	Fuel Combustion Activities	Residential	G	AREA	1A4b	CO2	0.0	470.1	10	5	11.2	0.1	0.00770	0.00770	0.039	0.054	0.067
Energy	Fuel Combustion Activities	Agriculture/ Forestry	L	AREA	1A4ci	CO2	88.1	49.4	10	5	11.2	0.0	-0.00099	0.00081	-0.005	0.006	0.008
Energy	Fuel Combustion Activities	Agriculture/ Forestry	G	AREA	1A4ci	CO2	0.0	12.9	10	5	11.2	0.0	0.00021	0.00021	0.001	0.001	0.002
Energy	Fuel Combustion Activities	Agriculture/ Forestry	B	AREA	1A4ci	CO2	0.0	0.7	60	5	60.2	0.0	0.00001	0.00001	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Off-Road Vehicles And Other Machinery	L	AREA	1A4cii	CO2	1169.2	798.1	81.4	5	81.5	0.9	-0.01088	0.01307	-0.054	0.092	0.107
Energy	Fuel Combustion Activities	Stationary	L	AREA	1A4ciii	CO2	1.0	28.4	10	5	11.2	0.0	0.00044	0.00047	0.002	0.003	0.004
Energy	Fuel Combustion Activities	Stationary	G	AREA	1A4ciii	CO2	0.0	0.1	10	5	11.2	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Mobile	L	AREA	1A4ciii	CO2	401.9	175.0	10	5	11.2	0.0	-0.00537	0.00287	-0.027	0.020	0.034
Energy	Fuel Combustion Activities	Stationary	S	AREA	1A5	CO2	8.1	0.0	10	5	11.2	0.0	-0.00017	0.00000	-0.001	0.000	0.001
Energy	Fuel Combustion Activities	Mobile	L JeK	AREA	1A5b	CO2	95.1	84.9	5	5	7.1	0.0	-0.00056	0.00139	-0.003	0.010	0.010
Energy	Fugitive Emissions From Fuels	Underground Mines	0	LPS	1B1ai	CO2	8.5	0.0	5	100	100.1	0.0	-0.00017	0.00000	-0.017	0.000	0.017
Energy	Fugitive Emissions From Fuels	Surface Mines	0	LPS	1B1aii	CO2	0.1	0.0	5	200	200.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fugitive Emissions From Fuels	Exploration	0	AREA	1B2ai	CO2	5.9	7.4	4	50	50.2	0.0	0.00000	0.00012	0.000	0.009	0.009
Energy	Fugitive Emissions From Fuels	Transport	0	LPS	1B2aiii	CO2	11.5	13.4	3	50	50.1	0.0	-0.00002	0.00022	-0.001	0.015	0.015
Energy	Fugitive Emissions From Fuels	Refining/ Storage	0	LPS	1B2aiv	CO2	42.7	570.4	3	50	50.1	0.4	0.00847	0.00934	0.423	0.661	0.785
Energy	Fugitive Emissions From Fuels	Distribution Of Oil Products	0	AREA	1B2av	CO2	44.6	38.3	10	50	51.0	0.0	-0.00029	0.00063	-0.014	0.044	0.047
Energy	Fugitive Emissions From Fuels	Transmission/ Distribution	G	AREA	1B2bii	CO2	0.0	19.4	10	150	150.3	0.0	0.00032	0.00032	0.048	0.067	0.083
Energy	Fugitive Emissions From Fuels	Oil	0	LPS	1B2ci	CO2	48.5	50.6	3	50	50.1	0.0	-0.00017	0.00083	-0.008	0.059	0.059

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fugitive Emissions From Fuels	Other (Geothermal)	O	AREA	1B2d	CO2	2.0	126.4	10	1000	1000.0	1.7	0.00203	0.00207	2.029	2.928	3.562
Industrial Processes	Mineral Products	Cement Production	0	LPS	2A1	CO2	3106.5	4109.6	2	9.8995	10.1	0.5	0.00367	0.06731	0.036	0.942	0.943
Industrial Processes	Mineral Products	Lime Production	0	AREA	2A2	CO2	168.0	377.6	105	8.5	105.3	0.5	0.00274	0.00619	0.023	0.074	0.078
Industrial Processes	Mineral Products	Lime Production	0	LPS	2A2	CO2	9.7	0.0	105	8.5	105.3	0.0	-0.00020	0.00000	-0.002	0.000	0.002
Industrial Processes	Mineral Products	Limestone And Dolomite Use	0	AREA	2A3	CO2	33.3	132.0	105	2	105.0	0.2	0.00148	0.00216	0.003	0.006	0.007
Industrial Processes	Mineral Products	Road Paving With Asphalt	0	AREA	2A6	CO2	2.6	4.3	30.92	10000	10000.0	0.6	0.00002	0.00007	0.161	0.986	0.999
Industrial Processes	Mineral Products	Other (Glass)	0	AREA	2A7	CO2	64.3	181.5	100	54.028	113.7	0.3	0.00166	0.00297	0.089	0.227	0.244
Industrial Processes	Chemical Industry	Ammonia Production	0	LPS	2B1	CO2	569.2	652.3	31.17	5	31.6	0.3	-0.00098	0.01068	-0.005	0.076	0.076
Industrial Processes	Chemical Industry	* Ethylene	0	LPS	2B5bi	CO2	0.5	0.5	10	100	100.5	0.0	0.00000	0.00001	0.000	0.001	0.001
Industrial Processes	Chemical Industry	* Butadiene	0	LPS	2B5bii	CO2	0.0	0.0	10	100	100.5	0.0	0.00000	0.00000	0.000	0.000	0.000
Industrial Processes	Chemical Industry	* Polyethilene High Density	0	LPS	2B5bv	CO2	0.7	1.3	10	100	100.5	0.0	0.00001	0.00002	0.001	0.003	0.003
Industrial Processes	Chemical Industry	* Polyethilene Low Density	0	LPS	2B5bvi	CO2	5.5	6.2	10	100	100.5	0.0	-0.00001	0.00010	-0.001	0.014	0.014
Industrial Processes	Chemical Industry	* Polypropilene	0	LPS	2B5bvii	CO2	0.4	0.0	10	100	100.5	0.0	-0.00001	0.00000	-0.001	0.000	0.001
Industrial Processes	Chemical Industry	* Carbon Black	0	LPS	2B5bx	CO2	50.6	84.5	10	100	100.5	0.1	0.00035	0.00138	0.035	0.196	0.199
Industrial Processes	Chemical Industry	* Ammonium Sulphate	0	LPS	2B5aii	CO2	0.1	0.0	10	100	100.5	0.0	0.00000	0.00000	0.000	0.000	0.000
Industrial Processes	Chemical Industry	* Vinylchloride (Except 04.05.05)	0	AREA	2B5biv	CO2	0.1	0.1	100	1000	1005.0	0.0	0.00000	0.00000	0.000	0.003	0.003
Industrial Processes	Chemical Industry	* Polyethylene Low Density	0	AREA	2B5bvi	CO2	0.0	4.6	100	1000	1005.0	0.1	0.00007	0.00008	0.075	0.107	0.131
Industrial Processes	Chemical Industry	* Polyvinylchloride	0	AREA	2B5bviii	CO2	0.9	2.3	100	1000	1005.0	0.0	0.00002	0.00004	0.019	0.053	0.056
Industrial Processes	Chemical Industry	* Polypropylene	0	AREA	2B5bvii	CO2	1.6	0.0	100	1000	1005.0	0.0	-0.00003	0.00000	-0.033	0.001	0.033
Industrial Processes	Chemical Industry	* Polystyrene	0	AREA	2B5bix	CO2	0.0	0.0	100	1000	1005.0	0.0	0.00000	0.00000	0.001	0.001	0.001
Industrial	Chemical Industry	* Formaldehyde	0	AREA	2B5biii	CO2	1.0	1.0	100	1000	1005.0	0.0	0.00000	0.00002	-0.003	0.023	0.023

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Processes																	
Industrial Processes	Chemical Industry	* Phthalic Anhydride	0	LPS	2B5bxi	CO2	3.6	3.6	10	100	100.5	0.0	-0.00001	0.00006	-0.001	0.008	0.009
Industrial Processes	Metal Production	Iron And Steel	0	LPS	2C11	CO2	11.6	13.4	10	30	31.6	0.0	-0.00002	0.00022	-0.001	0.009	0.009
Industrial Processes	Metal Production	Coke Production	0	LPS	2C14	CO2	1.7	0.0	10	30	31.6	0.0	-0.00004	0.00000	-0.001	0.000	0.001
Industrial Processes	Metal Production	Ferroalloys Production	0	AREA	2C2	CO2	2.7	2.7	100	260	278.6	0.0	-0.00001	0.00004	-0.003	0.016	0.016
Industrial Processes	Other Production	General	0	AREA	2D2	CO2	0.4	0.4	100	0	100.0	0.0	0.00000	0.00001	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Public Electricity Generation	L	LPS	1A1a	CH4	1.4	0.9	1	150	150.0	0.0	-0.00001	0.00001	-0.002	0.003	0.004
Energy	Fuel Combustion Activities	Public Electricity Generation	S	LPS	1A1a	CH4	1.3	1.4	1	150	150.0	0.0	0.00000	0.00002	0.000	0.005	0.005
Energy	Fuel Combustion Activities	Public Electricity Generation	G	LPS	1A1a	CH4	0.0	1.8	1	150	150.0	0.0	0.00003	0.00003	0.004	0.006	0.008
Energy	Fuel Combustion Activities	Public Electricity Generation	B	LPS	1A1a	CH4	0.0	0.3	1	150	150.0	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Public Electricity Generation	L	AREA	1A1a	CH4	0.0	0.1	4	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Petroleum Refining	L	LPS	1A1b	CH4	1.6	2.2	1	150	150.0	0.0	0.00000	0.00004	0.000	0.008	0.008
Energy	Fuel Combustion Activities	Petroleum Refining	G	LPS	1A1b	CH4	0.0	0.0	1	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Manufacture Of Solid Fuels	S	LPS	1A1c	CH4	0.0	0.0	1	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Energy Industries	L	AREA	1A1cii	CH4	0.0	0.0	4	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	L	LPS	1A2a	CH4	0.1	0.0	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	S	LPS	1A2a	CH4	0.1	0.0	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	O	LPS	1A2a	CH4	0.0	0.0	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	L	AREA	1A2a	CH4	0.0	0.0	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	S	AREA	1A2a	CH4	0.0	0.0	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	G	AREA	1A2a	CH4	0.0	0.1	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Iron And Steel	B	AREA	1A2a	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Chemicals	L	LPS	1A2c	CH4	0.9	1.2	3	150	150.0	0.0	0.00000	0.00002	0.000	0.004	0.004
Energy	Fuel Combustion Activities	Chemicals	L	AREA	1A2c	CH4	0.5	0.3	5	150	150.1	0.0	0.00000	0.00001	-0.001	0.001	0.001
Energy	Fuel Combustion Activities	Chemicals	S	AREA	1A2c	CH4	0.0	0.0	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Chemicals	G	AREA	1A2c	CH4	0.0	0.2	5	150	150.1	0.0	0.00000	0.00000	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Chemicals	B	AREA	1A2c	CH4	0.3	0.5	60	150	161.6	0.0	0.00000	0.00001	0.000	0.002	0.002
Energy	Fuel Combustion Activities	Chemicals	O	AREA	1A2c	CH4	0.0	0.0	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	LPS	1A2d	CH4	1.4	1.7	3	150	150.0	0.0	0.00000	0.00003	0.000	0.006	0.006
Energy	Fuel Combustion Activities	Pulp, Paper And Print	G	LPS	1A2d	CH4	0.2	0.4	3	150	150.0	0.0	0.00000	0.00001	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Pulp, Paper And Print	B	LPS	1A2d	CH4	18.9	27.0	3	150	150.0	0.1	0.00005	0.00044	0.008	0.094	0.094
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	AREA	1A2d	CH4	0.3	0.1	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.001
Energy	Fuel Combustion Activities	Pulp, Paper And Print	G	AREA	1A2d	CH4	0.0	0.2	5	150	150.1	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Pulp, Paper And Print	B	AREA	1A2d	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	L	AREA	1A2e	CH4	0.7	0.5	10	150	150.3	0.0	-0.00001	0.00001	-0.001	0.002	0.002
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	S	AREA	1A2e	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	G	AREA	1A2e	CH4	0.0	0.1	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.001
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	B	AREA	1A2e	CH4	1.3	1.2	60	150	161.6	0.0	-0.00001	0.00002	-0.001	0.004	0.004
Energy	Fuel Combustion Activities	Textile	L	AREA	1A2fi	CH4	0.6	0.3	10	150	150.3	0.0	-0.00001	0.00000	-0.001	0.001	0.002
Energy	Fuel Combustion	Textile	G	AREA	1A2fi	CH4	0.0	0.2	10	150	150.3	0.0	0.00000	0.00000	0.000	0.001	0.001

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Activities																
Energy	Fuel Combustion Activities	Textile	B	AREA	1A2fi	CH4	0.4	0.7	60	150	161.6	0.0	0.00000	0.00001	0.001	0.003	0.003
Energy	Fuel Combustion Activities	Ceramic	L	AREA	1A2fii	CH4	0.2	0.1	5	150	150.1	0.0	0.00000	0.00000	0.000	0.000	0.001
Energy	Fuel Combustion Activities	Ceramic	G	AREA	1A2fii	CH4	0.0	0.5	5	150	150.1	0.0	0.00001	0.00001	0.001	0.002	0.002
Energy	Fuel Combustion Activities	Ceramic	B	AREA	1A2fii	CH4	1.5	4.0	60	150	161.6	0.0	0.00004	0.00007	0.005	0.014	0.015
Energy	Fuel Combustion Activities	Glass	L	AREA	1A2fiii	CH4	3.5	0.5	5	150	150.1	0.0	-0.00006	0.00001	-0.010	0.002	0.010
Energy	Fuel Combustion Activities	Glass	G	AREA	1A2fiii	CH4	0.0	10.1	5	150	150.1	0.0	0.00017	0.00017	0.025	0.035	0.043
Energy	Fuel Combustion Activities	Glass	B	AREA	1A2fiii	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cement	L	LPS	1A2fiv	CH4	0.3	6.0	3	150	150.0	0.0	0.00009	0.00010	0.014	0.021	0.025
Energy	Fuel Combustion Activities	Cement	S	LPS	1A2fiv	CH4	4.1	0.5	3	150	150.0	0.0	-0.00008	0.00001	-0.011	0.002	0.012
Energy	Fuel Combustion Activities	Cement	O	LPS	1A2fiv	CH4	0.0	0.2	3	150	150.0	0.0	0.00000	0.00000	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Cement	L	AREA	1A2fiv	CH4	0.1	0.1	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cement	G	AREA	1A2fiv	CH4	0.0	0.0	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cement	B	AREA	1A2fiv	CH4	0.1	0.1	3	150	150.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cloth	L	AREA	1A2fv	CH4	0.1	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cloth	G	AREA	1A2fv	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cloth	B	AREA	1A2fv	CH4	0.1	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Wood	L	AREA	1A2fvi	CH4	0.1	0.1	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Wood	G	AREA	1A2fvi	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Wood	B	AREA	1A2fvi	CH4	0.4	0.5	60	150	161.6	0.0	0.00000	0.00001	0.000	0.002	0.002
Energy	Fuel Combustion Activities	Rubber	L	AREA	1A2fvii	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Rubber	G	AREA	1A2fvii	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Rubber	B	AREA	1A2fvii	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Metal Equipment And Machines	L	AREA	1A2fviii	CH4	0.2	0.1	10	150	150.3	0.0	0.00000	0.00000	-0.001	0.000	0.001
Energy	Fuel Combustion Activities	Metal Equipment And Machines	S	AREA	1A2fviii	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Metal Equipment And Machines	G	AREA	1A2fviii	CH4	0.0	0.1	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Metal Equipment And Machines	B	AREA	1A2fviii	CH4	0.1	0.1	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	L	AREA	1A2fc	CH4	0.1	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	S	AREA	1A2fc	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	G	AREA	1A2fc	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	B	AREA	1A2fc	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Extractive Industry	L	AREA	1A2fix	CH4	0.6	1.3	10	150	150.3	0.0	0.00001	0.00002	0.001	0.005	0.005
Energy	Fuel Combustion Activities	Extractive Industry	S	AREA	1A2fix	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Extractive Industry	G	AREA	1A2fix	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Extractive Industry	B	AREA	1A2fix	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cop	L	AREA	1A2fx	CH4	0.7	0.7	10	150	150.3	0.0	0.00000	0.00001	0.000	0.002	0.002
Energy	Fuel Combustion Activities	Cop	G	AREA	1A2fx	CH4	0.0	0.5	10	150	150.3	0.0	0.00001	0.00001	0.001	0.002	0.002
Energy	Fuel Combustion Activities	Cop	B	AREA	1A2fx	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3ai	CH4	0.0	0.1	0	100	100.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion	Lto	L JeK	AREA	1A3ai	CH4	1.9	0.8	0	100	100.0	0.0	-0.00003	0.00001	-0.003	0.002	0.003

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Activities																
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3ai	CH4	0.7	0.7	0	100	100.0	0.0	0.00000	0.00001	0.000	0.002	0.002
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3aii	CH4	0.0	0.0	0	100	100.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Lto	L JeK	AREA	1A3aii	CH4	0.7	0.3	0	100	100.0	0.0	-0.00001	0.00000	-0.001	0.001	0.001
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3aii	CH4	0.1	0.0	0	100	100.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cars	L Gas	AREA	1A3bi	CH4	58.9	18.9	5	40	40.3	0.0	-0.00090	0.00031	-0.036	0.017	0.040
Energy	Fuel Combustion Activities	Cars	L DiesO	AREA	1A3bi	CH4	1.1	1.4	5	40	40.3	0.0	0.00000	0.00002	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Cars	L LPG	AREA	1A3bi	CH4	0.0	0.5	5	40	40.3	0.0	0.00001	0.00001	0.000	0.000	0.001
Energy	Fuel Combustion Activities	Cars	B DiesO	AREA	1A3bi	CH4	0.0	0.0	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Light Duty Trucks	L DiesO	AREA	1A3bii	CH4	3.2	0.8	5	40	40.3	0.0	-0.00005	0.00001	-0.002	0.001	0.002
Energy	Fuel Combustion Activities	Light Duty Trucks	B DiesO	AREA	1A3bii	CH4	0.0	0.0	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L Gas	AREA	1A3biii	CH4	0.0	0.0	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L DiesO	AREA	1A3biii	CH4	5.3	11.0	5	40	40.3	0.0	0.00007	0.00018	0.003	0.010	0.011
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	G CNG	AREA	1A3biii	CH4	0.0	0.5	5	40	40.3	0.0	0.00001	0.00001	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	B DiesO	AREA	1A3biii	CH4	0.0	0.3	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Motorcycles	L Gas	AREA	1A3biv	CH4	31.0	11.6	5	40	40.3	0.0	-0.00045	0.00019	-0.018	0.011	0.021
Energy	Fuel Combustion Activities	Railways	S	AREA	1A3c	CH4	0.0	0.0	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Railways	L	AREA	1A3c	CH4	0.2	0.1	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	International Marine (C)	L ResO	AREA	1A3di	CH4	0.4	0.6	50.39	100	112.0	0.0	0.00000	0.00001	0.000	0.001	0.001
Energy	Fuel Combustion Activities	International Marine (C)	L GasD	AREA	1A3di	CH4	0.1	0.1	50.39	100	112.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	National Navigation	L ResO	AREA	1A3dii	CH4	0.1	0.1	50.39	100	112.0	0.0	0.00000	0.00000	0.000	0.000	0.000

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	National Navigation	L GasD	AREA	1A3dii	CH4	0.0	0.0	50.39	100	112.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Commercial / Institutional	L	AREA	1A4a	CH4	0.9	1.5	10	150	150.3	0.0	0.00001	0.00003	0.001	0.005	0.005
Energy	Fuel Combustion Activities	Commercial / Institutional	G	AREA	1A4a	CH4	0.0	0.2	10	150	150.3	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Commercial / Institutional	B	AREA	1A4a	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Residential	L	AREA	1A4b	CH4	0.9	0.7	10	150	150.3	0.0	-0.00001	0.00001	-0.001	0.003	0.003
Energy	Fuel Combustion Activities	Residential	G	AREA	1A4b	CH4	0.0	0.4	10	150	150.3	0.0	0.00001	0.00001	0.001	0.002	0.002
Energy	Fuel Combustion Activities	Residential	B	AREA	1A4b	CH4	343.5	309.5	60	150	161.6	0.7	-0.00197	0.00507	-0.295	1.075	1.115
Energy	Fuel Combustion Activities	Agriculture/ Forestry	L	AREA	1A4ci	CH4	0.1	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Agriculture/ Forestry	G	AREA	1A4ci	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Agriculture/ Forestry	B	AREA	1A4ci	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Off-Road Vehicles And Other Machinery	L	AREA	1A4cii	CH4	2.4	1.6	81.4	40	90.7	0.0	-0.00002	0.00003	-0.001	0.002	0.002
Energy	Fuel Combustion Activities	Off-Road Vehicles And Other Machinery	B	AREA	1A4cii	CH4	0.0	0.0	81.4	40	90.7	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	L	AREA	1A4ciii	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	G	AREA	1A4ciii	CH4	0.0	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	B	AREA	1A4ciii	CH4	0.0	0.0	60	150	161.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Mobile	L	AREA	1A4ciii	CH4	0.6	0.3	10	100	100.5	0.0	-0.00001	0.00000	-0.001	0.001	0.001
Energy	Fuel Combustion Activities	Mobile	B	AREA	1A4ciii	CH4	0.0	0.0	60	100	116.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	S	AREA	1A5	CH4	0.2	0.0	10	150	150.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Mobile	L JeK	AREA	1A5b	CH4	0.0	0.0	5	40	40.3	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fugitive Emissions	Underground	0	LPS	1B1ai	CH4	65.2	0.0	5	100	100.1	0.0	-0.00133	0.00000	-0.133	0.000	0.133

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	From Fuels	Mines															
Energy	Fugitive Emissions From Fuels	Surface Mines	0	LPS	1B1aii	CH4	0.9	0.0	5	200	200.1	0.0	-0.00002	0.00000	-0.004	0.000	0.004
Energy	Fugitive Emissions From Fuels	Exploration	0	AREA	1B2ai	CH4	16.0	20.4	4	100	100.1	0.0	0.00001	0.00033	0.001	0.047	0.047
Energy	Fugitive Emissions From Fuels	Transport	0	LPS	1B2aiii	CH4	13.2	15.3	3	100	100.0	0.0	-0.00002	0.00025	-0.002	0.035	0.035
Energy	Fugitive Emissions From Fuels	Refining/ Storage	0	LPS	1B2aiv	CH4	22.0	25.5	3	100	100.0	0.0	-0.00003	0.00042	-0.003	0.059	0.059
Energy	Fugitive Emissions From Fuels	Transmission/ Distribution	G	AREA	1B2bii	CH4	0.0	148.3	10	150	150.3	0.3	0.00243	0.00243	0.364	0.515	0.631
Energy	Fugitive Emissions From Fuels	Oil	0	LPS	1B2ci	CH4	0.0	0.0	3	100	100.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Industrial Processes	Mineral Products	Road Paving With Asphalt	0	AREA	2A6	CH4	0.8	1.8	30.92	0	30.9	0.0	0.00001	0.00003	0.000	0.000	0.000
Industrial Processes	Chemical Industry	* Ethylene	0	LPS	2B5bi	CH4	4.9	4.1	10	100	100.5	0.0	-0.00003	0.00007	-0.003	0.010	0.010
Industrial Processes	Chemical Industry	* Carbon Black	0	LPS	2B5bx	CH4	3.4	5.6	10	100	100.5	0.0	0.00002	0.00009	0.002	0.013	0.013
Agriculture	Enteric Fermentation	Dairy	0	AREA	4A1a	CH4	786.2	783.2	6.053	20	20.9	0.2	-0.00328	0.01283	-0.066	0.363	0.369
Agriculture	Enteric Fermentation	Non-Dairy	0	AREA	4A1b	CH4	1028.2	1358.1	6.492	20	21.0	0.4	0.00118	0.02224	0.024	0.629	0.630
Agriculture	Enteric Fermentation	Ewes	0	AREA	4A3a	CH4	411.4	436.8	19.1	20	27.7	0.2	-0.00127	0.00715	-0.025	0.202	0.204
Agriculture	Enteric Fermentation	Other Sheep	0	AREA	4A3b	CH4	148.3	188.5	19.1	20	27.7	0.1	0.00005	0.00309	0.001	0.087	0.087
Agriculture	Enteric Fermentation	Females	0	AREA	4A4a	CH4	104.9	73.6	19.1	20	27.7	0.0	-0.00094	0.00121	-0.019	0.034	0.039
Agriculture	Enteric Fermentation	Other Sheep	0	AREA	4A4b	CH4	10.6	7.5	19.1	20	27.7	0.0	-0.00010	0.00012	-0.002	0.003	0.004
Agriculture	Enteric Fermentation	Horses	0	AREA	4A6	CH4	12.4	17.4	71.21	50	87.0	0.0	0.00003	0.00028	0.002	0.020	0.020
Agriculture	Enteric Fermentation	Mules And Asses	0	AREA	4A7	CH4	24.8	6.1	271.8	50	276.3	0.0	-0.00041	0.00010	-0.020	0.007	0.022
Agriculture	Enteric Fermentation	Sows	0	AREA	4A8a	CH4	17.7	16.0	10.96	20	22.8	0.0	-0.00010	0.00026	-0.002	0.007	0.008
Agriculture	Enteric Fermentation	Other Swine	0	AREA	4A8b	CH4	56.5	51.9	10.96	20	22.8	0.0	-0.00031	0.00085	-0.006	0.024	0.025
Agriculture	Enteric Fermentation	Rabbits	0	AREA	4A10e	CH4	20.9	27.6	770.6	20	770.9	0.3	0.00003	0.00045	0.001	0.013	0.013

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Agriculture	Manure Management	Dairy	0	AREA	4B1a	CH4	19.2	41.4	6.053	60.603	60.9	0.0	0.00028	0.00068	0.017	0.058	0.061
Agriculture	Manure Management	Non-Dairy	0	AREA	4B1b	CH4	27.4	34.4	6.492	46.214	46.7	0.0	0.00000	0.00056	0.000	0.037	0.037
Agriculture	Manure Management	Ewes	0	AREA	4B3a	CH4	17.8	107.8	19.1	59.341	62.3	0.1	0.00140	0.00177	0.083	0.148	0.170
Agriculture	Manure Management	Females	0	AREA	4B4a	CH4	3.7	16.9	19.1	58.399	61.4	0.0	0.00020	0.00028	0.012	0.023	0.026
Agriculture	Manure Management	Horses	0	AREA	4B6	CH4	1.3	1.7	71.21	60.996	93.8	0.0	0.00000	0.00003	0.000	0.002	0.002
Agriculture	Manure Management	Mules And Asses	0	AREA	4B7	CH4	2.3	0.5	271.8	60.996	278.5	0.0	-0.00004	0.00001	-0.002	0.001	0.002
Agriculture	Manure Management	Sows	0	AREA	4B8a	CH4	1290.4	1151.3	10.96	91.019	91.7	1.4	-0.00758	0.01886	-0.690	2.427	2.523
Agriculture	Manure Management	Broilers	0	AREA	4B9a	CH4	14.3	12.8	41.14	65.958	77.7	0.0	-0.00008	0.00021	-0.006	0.020	0.020
Agriculture	Manure Management	Rabbits	0	AREA	4B9e	CH4	2.7	3.6	770.6	66.002	773.5	0.0	0.00000	0.00006	0.000	0.006	0.006
Agriculture	Rice Cultivation	Continuously Flooded	0	AREA	4C1	CH4	226.8	386.0	35.7	40	53.6	0.3	0.00168	0.00632	0.067	0.358	0.364
Agriculture	Field Burning Of Agricultural Wastes	Cereals	0	AREA	4F1	CH4	14.2	5.1	100	20	102.0	0.0	-0.00021	0.00008	-0.004	0.002	0.005
Agriculture	Field Burning Of Agricultural Wastes	Other	0	AREA	4F5	CH4	16.3	15.2	100	20	102.0	0.0	-0.00008	0.00025	-0.002	0.007	0.007
Waste	Solid Waste Disposal On Land	Managed	0	AREA	6A3a	CH4	431.3	1263.3	136.2	62.45	149.8	2.5	0.01185	0.02069	0.740	1.827	1.972
Waste	Solid Waste Disposal On Land	Unmanaged	0	AREA	6A3b	CH4	1168.0	504.3	136.2	86.023	161.1	1.1	-0.01566	0.00826	-1.348	1.005	1.681
Waste	Wastewater Handling	Industrial Wastewater	0	AREA	6B1	CH4	1385.8	1654.9	24.69	36.275	43.9	1.0	-0.00128	0.02711	-0.047	1.391	1.391
Waste	Wastewater Handling	Domestic And Commercial Wastewater	0	AREA	6B2	CH4	1056.4	753.9	30.41	37.5	48.3	0.5	-0.00929	0.01235	-0.348	0.655	0.742
Energy	Fuel Combustion Activities	Public Electricity Generation	L	LPS	1A1a	N2O	15.3	4.4	1	1000	1000.0	0.1	-0.00024	0.00007	-0.241	0.103	0.262
Energy	Fuel Combustion Activities	Public Electricity Generation	S	LPS	1A1a	N2O	36.2	42.4	1	1000	1000.0	0.6	-0.00005	0.00070	-0.046	0.983	0.984
Energy	Fuel Combustion Activities	Public Electricity Generation	G	LPS	1A1a	N2O	0.0	40.1	1	1000	1000.0	0.5	0.00066	0.00066	0.656	0.928	1.137

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Public Electricity Generation	B	LPS	1A1a	N2O	0.0	1.2	1	1000	1000.0	0.0	0.00002	0.00002	0.020	0.028	0.034
Energy	Fuel Combustion Activities	Public Electricity Generation	L	AREA	1A1a	N2O	0.0	0.3	4	1000	1000.0	0.0	0.00000	0.00000	0.004	0.007	0.008
Energy	Fuel Combustion Activities	Petroleum Refining	L	LPS	1A1b	N2O	9.1	11.0	1	1000	1000.0	0.1	-0.00001	0.00018	-0.007	0.255	0.255
Energy	Fuel Combustion Activities	Petroleum Refining	G	LPS	1A1b	N2O	0.0	0.2	1	1000	1000.0	0.0	0.00000	0.00000	0.003	0.004	0.005
Energy	Fuel Combustion Activities	Manufacture Of Solid Fuels	S	LPS	1A1c	N2O	0.3	0.0	1	1000	1000.0	0.0	-0.00001	0.00000	-0.006	0.000	0.006
Energy	Fuel Combustion Activities	Other Energy Industries	L	AREA	1A1cii	N2O	0.1	0.0	4	1000	1000.0	0.0	0.00000	0.00000	-0.002	0.000	0.002
Energy	Fuel Combustion Activities	Iron And Steel	L	LPS	1A2a	N2O	0.4	0.2	3	1000	1000.0	0.0	-0.00001	0.00000	-0.005	0.004	0.006
Energy	Fuel Combustion Activities	Iron And Steel	S	LPS	1A2a	N2O	0.8	0.0	3	1000	1000.0	0.0	-0.00002	0.00000	-0.017	0.000	0.017
Energy	Fuel Combustion Activities	Iron And Steel	O	LPS	1A2a	N2O	0.0	0.0	3	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Iron And Steel	L	AREA	1A2a	N2O	0.1	0.0	5	1000	1000.0	0.0	0.00000	0.00000	-0.002	0.001	0.002
Energy	Fuel Combustion Activities	Iron And Steel	S	AREA	1A2a	N2O	0.0	0.1	5	1000	1000.0	0.0	0.00000	0.00000	0.001	0.001	0.002
Energy	Fuel Combustion Activities	Iron And Steel	G	AREA	1A2a	N2O	0.0	0.9	5	1000	1000.0	0.0	0.00001	0.00001	0.015	0.021	0.026
Energy	Fuel Combustion Activities	Iron And Steel	B	AREA	1A2a	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Chemicals	L	LPS	1A2c	N2O	5.0	4.8	3	1000	1000.0	0.1	-0.00002	0.00008	-0.025	0.111	0.114
Energy	Fuel Combustion Activities	Chemicals	L	AREA	1A2c	N2O	1.4	3.0	5	1000	1000.0	0.0	0.00002	0.00005	0.020	0.070	0.072
Energy	Fuel Combustion Activities	Chemicals	S	AREA	1A2c	N2O	0.1	0.1	5	1000	1000.0	0.0	0.00000	0.00000	0.000	0.003	0.003
Energy	Fuel Combustion Activities	Chemicals	G	AREA	1A2c	N2O	0.0	2.5	5	1000	1000.0	0.0	0.00004	0.00004	0.041	0.058	0.071
Energy	Fuel Combustion Activities	Chemicals	B	AREA	1A2c	N2O	1.4	2.0	60	1000	1001.8	0.0	0.00000	0.00003	0.005	0.047	0.048
Energy	Fuel Combustion Activities	Chemicals	O	AREA	1A2c	N2O	0.4	0.4	5	1000	1000.0	0.0	0.00000	0.00001	-0.002	0.010	0.010
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	LPS	1A2d	N2O	1.0	0.6	3	1000	1000.0	0.0	-0.00001	0.00001	-0.012	0.013	0.018
Energy	Fuel Combustion	Pulp, Paper And	G	LPS	1A2d	N2O	0.0	0.3	3	1000	1000.0	0.0	0.00000	0.00000	0.004	0.006	0.007

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Activities	Print															
Energy	Fuel Combustion Activities	Pulp, Paper And Print	B	LPS	1A2d	N2O	11.4	18.2	3	1000	1000.0	0.2	0.00007	0.00030	0.066	0.423	0.428
Energy	Fuel Combustion Activities	Pulp, Paper And Print	L	AREA	1A2d	N2O	0.8	0.4	5	1000	1000.0	0.0	-0.00001	0.00001	-0.010	0.009	0.013
Energy	Fuel Combustion Activities	Pulp, Paper And Print	G	AREA	1A2d	N2O	0.0	3.5	5	1000	1000.0	0.0	0.00006	0.00006	0.057	0.081	0.099
Energy	Fuel Combustion Activities	Pulp, Paper And Print	B	AREA	1A2d	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.000	0.000	0.001
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	L	AREA	1A2e	N2O	2.3	1.8	10	1000	1000.0	0.0	-0.00002	0.00003	-0.017	0.041	0.044
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	S	AREA	1A2e	N2O	0.0	0.0	10	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	G	AREA	1A2e	N2O	0.0	1.8	10	1000	1000.0	0.0	0.00003	0.00003	0.030	0.042	0.051
Energy	Fuel Combustion Activities	Food Processing, Beverages And Tobacco	B	AREA	1A2e	N2O	5.3	5.2	60	1000	1001.8	0.1	-0.00002	0.00008	-0.024	0.120	0.122
Energy	Fuel Combustion Activities	Textile	L	AREA	1A2fi	N2O	2.0	0.9	10	1000	1000.0	0.0	-0.00003	0.00001	-0.027	0.021	0.034
Energy	Fuel Combustion Activities	Textile	G	AREA	1A2fi	N2O	0.0	2.4	10	1000	1000.0	0.0	0.00004	0.00004	0.039	0.055	0.068
Energy	Fuel Combustion Activities	Textile	B	AREA	1A2fi	N2O	1.5	3.1	60	1000	1001.8	0.0	0.00002	0.00005	0.020	0.072	0.075
Energy	Fuel Combustion Activities	Ceramic	L	AREA	1A2fii	N2O	3.3	0.4	5	1000	1000.0	0.0	-0.00006	0.00001	-0.062	0.008	0.063
Energy	Fuel Combustion Activities	Ceramic	S	AREA	1A2fii	N2O	0.0	0.0	5	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Ceramic	G	AREA	1A2fii	N2O	0.0	6.0	5	1000	1000.0	0.1	0.00010	0.00010	0.098	0.139	0.170
Energy	Fuel Combustion Activities	Ceramic	B	AREA	1A2fii	N2O	16.6	20.0	60	1000	1001.8	0.3	-0.00001	0.00033	-0.013	0.463	0.464
Energy	Fuel Combustion Activities	Glass	L	AREA	1A2fiii	N2O	1.3	0.1	5	1000	1000.0	0.0	-0.00003	0.00000	-0.026	0.002	0.026
Energy	Fuel Combustion Activities	Glass	G	AREA	1A2fiii	N2O	0.0	3.9	5	1000	1000.0	0.1	0.00006	0.00006	0.063	0.089	0.110
Energy	Fuel Combustion Activities	Glass	B	AREA	1A2fiii	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.000	0.000	0.000

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Cement	L	LPS	1A2fiv	N2O	0.3	5.1	3	1000	1000.0	0.1	0.00008	0.00008	0.078	0.118	0.141
Energy	Fuel Combustion Activities	Cement	S	LPS	1A2fiv	N2O	4.5	0.4	3	1000	1000.0	0.0	-0.00008	0.00001	-0.085	0.010	0.086
Energy	Fuel Combustion Activities	Cement	O	LPS	1A2fiv	N2O	0.0	0.1	3	1000	1000.0	0.0	0.00000	0.00000	0.001	0.003	0.003
Energy	Fuel Combustion Activities	Cement	L	AREA	1A2fiv	N2O	0.2	0.2	3	1000	1000.0	0.0	0.00000	0.00000	-0.001	0.004	0.005
Energy	Fuel Combustion Activities	Cement	G	AREA	1A2fiv	N2O	0.0	0.5	3	1000	1000.0	0.0	0.00001	0.00001	0.007	0.010	0.013
Energy	Fuel Combustion Activities	Cement	B	AREA	1A2fiv	N2O	0.3	0.3	3	1000	1000.0	0.0	0.00000	0.00001	-0.001	0.008	0.008
Energy	Fuel Combustion Activities	Cloth	L	AREA	1A2fv	N2O	0.2	0.1	10	1000	1000.0	0.0	0.00000	0.00000	-0.001	0.003	0.003
Energy	Fuel Combustion Activities	Cloth	G	AREA	1A2fv	N2O	0.0	0.3	10	1000	1000.0	0.0	0.00000	0.00000	0.004	0.006	0.007
Energy	Fuel Combustion Activities	Cloth	B	AREA	1A2fv	N2O	0.4	0.0	60	1000	1001.8	0.0	-0.00001	0.00000	-0.008	0.000	0.008
Energy	Fuel Combustion Activities	Wood	L	AREA	1A2fvi	N2O	0.4	0.4	10	1000	1000.0	0.0	0.00000	0.00001	-0.001	0.009	0.009
Energy	Fuel Combustion Activities	Wood	G	AREA	1A2fvi	N2O	0.0	0.2	10	1000	1000.0	0.0	0.00000	0.00000	0.003	0.005	0.006
Energy	Fuel Combustion Activities	Wood	B	AREA	1A2fvi	N2O	1.7	2.3	60	1000	1001.8	0.0	0.00000	0.00004	0.002	0.053	0.053
Energy	Fuel Combustion Activities	Rubber	L	AREA	1A2fvii	N2O	0.1	0.0	10	1000	1000.0	0.0	0.00000	0.00000	-0.002	0.000	0.002
Energy	Fuel Combustion Activities	Rubber	G	AREA	1A2fvii	N2O	0.0	0.1	10	1000	1000.0	0.0	0.00000	0.00000	0.001	0.001	0.002
Energy	Fuel Combustion Activities	Rubber	B	AREA	1A2fvii	N2O	0.1	0.0	60	1000	1001.8	0.0	0.00000	0.00000	-0.001	0.000	0.001
Energy	Fuel Combustion Activities	Metal Equipment And Machines	L	AREA	1A2fviii	N2O	1.3	0.6	10	1000	1000.0	0.0	-0.00002	0.00001	-0.017	0.014	0.022
Energy	Fuel Combustion Activities	Metal Equipment And Machines	S	AREA	1A2fviii	N2O	0.1	0.0	10	1000	1000.0	0.0	0.00000	0.00000	-0.002	0.000	0.002
Energy	Fuel Combustion Activities	Metal Equipment And Machines	G	AREA	1A2fviii	N2O	0.0	1.3	10	1000	1000.0	0.0	0.00002	0.00002	0.021	0.030	0.036
Energy	Fuel Combustion Activities	Metal Equipment And Machines	B	AREA	1A2fviii	N2O	0.2	0.3	60	1000	1001.8	0.0	0.00000	0.00001	0.001	0.008	0.008
Energy	Fuel Combustion Activities	Other Transformation Industries	L	AREA	1A2fc	N2O	0.4	0.1	10	1000	1000.0	0.0	-0.00001	0.00000	-0.007	0.002	0.007

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Other Transformation Industries	S	AREA	1A2fc	N2O	0.0	0.0	10	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Other Transformation Industries	G	AREA	1A2fc	N2O	0.0	0.2	10	1000	1000.0	0.0	0.00000	0.00000	0.003	0.004	0.005
Energy	Fuel Combustion Activities	Other Transformation Industries	B	AREA	1A2fc	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Extractive Industry	L	AREA	1A2fix	N2O	0.2	0.5	10	1000	1000.0	0.0	0.00000	0.00001	0.004	0.013	0.013
Energy	Fuel Combustion Activities	Extractive Industry	S	AREA	1A2fix	N2O	0.0	0.0	10	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Extractive Industry	G	AREA	1A2fix	N2O	0.0	0.1	10	1000	1000.0	0.0	0.00000	0.00000	0.001	0.002	0.003
Energy	Fuel Combustion Activities	Extractive Industry	B	AREA	1A2fix	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Cop	L	AREA	1A2fx	N2O	1.3	1.6	10	1000	1000.0	0.0	0.00000	0.00003	-0.002	0.036	0.036
Energy	Fuel Combustion Activities	Cop	G	AREA	1A2fx	N2O	0.0	1.1	10	1000	1000.0	0.0	0.00002	0.00002	0.018	0.025	0.031
Energy	Fuel Combustion Activities	Cop	B	AREA	1A2fx	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3ai	N2O	0.0	0.0	0	1000	1000.0	0.0	0.00000	0.00000	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Lto	L JeK	AREA	1A3ai	N2O	1.1	2.6	0	1000	1000.0	0.0	0.00002	0.00004	0.020	0.060	0.063
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3ai	N2O	11.6	20.1	0	1000	1000.0	0.3	0.00009	0.00033	0.092	0.466	0.475
Energy	Fuel Combustion Activities	Lto	L AvG	AREA	1A3aii	N2O	0.0	0.0	0	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Lto	L JeK	AREA	1A3aii	N2O	0.7	1.1	0	1000	1000.0	0.0	0.00000	0.00002	0.004	0.025	0.025
Energy	Fuel Combustion Activities	Cruise	L JeK	AREA	1A3aii	N2O	1.4	2.1	0	1000	1000.0	0.0	0.00001	0.00003	0.005	0.048	0.048
Energy	Fuel Combustion Activities	Cars	L Gas	AREA	1A3bi	N2O	59.1	83.0	5	50	50.2	0.1	0.00015	0.00136	0.007	0.096	0.096
Energy	Fuel Combustion Activities	Cars	L DiesO	AREA	1A3bi	N2O	0.0	68.7	5	50	50.2	0.0	0.00113	0.00113	0.056	0.080	0.097
Energy	Fuel Combustion Activities	Cars	L LPG	AREA	1A3bi	N2O	0.0	2.3	5	50	50.2	0.0	0.00004	0.00004	0.002	0.003	0.003

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Energy	Fuel Combustion Activities	Cars	B DiesO	AREA	1A3bi	N2O	0.0	1.7	5	50	50.2	0.0	0.00003	0.00003	0.001	0.002	0.002
Energy	Fuel Combustion Activities	Light Duty Trucks	L DiesO	AREA	1A3bii	N2O	0.0	18.8	5	50	50.2	0.0	0.00031	0.00031	0.015	0.022	0.027
Energy	Fuel Combustion Activities	Light Duty Trucks	B DiesO	AREA	1A3bii	N2O	0.0	0.5	5	50	50.2	0.0	0.00001	0.00001	0.000	0.001	0.001
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L Gas	AREA	1A3biii	N2O	0.0	0.0	5	50	50.2	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	L DiesO	AREA	1A3biii	N2O	19.7	55.0	5	50	50.2	0.0	0.00050	0.00090	0.025	0.064	0.068
Energy	Fuel Combustion Activities	Heavy Duty Trucks And Buses	B DiesO	AREA	1A3biii	N2O	0.0	1.4	5	50	50.2	0.0	0.00002	0.00002	0.001	0.002	0.002
Energy	Fuel Combustion Activities	Motorcycles	L Gas	AREA	1A3biv	N2O	2.6	2.9	5	50	50.2	0.0	-0.00001	0.00005	0.000	0.003	0.003
Energy	Fuel Combustion Activities	Railways	S	AREA	1A3c	N2O	0.0	0.0	5	50	50.2	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Railways	L	AREA	1A3c	N2O	11.3	5.1	5	50	50.2	0.0	-0.00015	0.00008	-0.007	0.006	0.009
Energy	Fuel Combustion Activities	International Marine (C)	L ResO	AREA	1A3di	N2O	8.5	13.3	50.39	1000	1001.3	0.2	0.00004	0.00022	0.043	0.309	0.312
Energy	Fuel Combustion Activities	International Marine (C)	L GasD	AREA	1A3di	N2O	2.5	2.3	50.39	1000	1001.3	0.0	-0.00001	0.00004	-0.014	0.054	0.056
Energy	Fuel Combustion Activities	National Navigation	L ResO	AREA	1A3dii	N2O	1.5	1.2	50.39	1000	1001.3	0.0	-0.00001	0.00002	-0.011	0.029	0.031
Energy	Fuel Combustion Activities	National Navigation	L GasD	AREA	1A3dii	N2O	0.6	0.5	50.39	1000	1001.3	0.0	0.00000	0.00001	-0.004	0.011	0.012
Energy	Fuel Combustion Activities	Commercial / Institutional	L	AREA	1A4a	N2O	2.3	4.9	10	1000	1000.0	0.1	0.00003	0.00008	0.032	0.113	0.117
Energy	Fuel Combustion Activities	Commercial / Institutional	G	AREA	1A4a	N2O	0.0	3.6	10	1000	1000.0	0.0	0.00006	0.00006	0.059	0.083	0.101
Energy	Fuel Combustion Activities	Commercial / Institutional	B	AREA	1A4a	N2O	0.0	0.1	60	1000	1001.8	0.0	0.00000	0.00000	0.002	0.003	0.004
Energy	Fuel Combustion Activities	Residential	L	AREA	1A4b	N2O	11.2	9.8	10	1000	1000.0	0.1	-0.00007	0.00016	-0.070	0.226	0.237
Energy	Fuel Combustion Activities	Residential	B	AREA	1A4b	N2O	72.7	65.5	60	1000	1001.8	0.9	-0.00042	0.00107	-0.416	1.517	1.573
Energy	Fuel Combustion Activities	Agriculture/ Forestry	L	AREA	1A4ci	N2O	0.3	0.2	10	1000	1000.0	0.0	0.00000	0.00000	-0.003	0.005	0.006
Energy	Fuel Combustion Activities	Agriculture/ Forestry	G	AREA	1A4ci	N2O	0.0	0.0	10	1000	1000.0	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion	Agriculture/	B	AREA	1A4ci	N2O	0.0	0.1	60	1000	1001.8	0.0	0.00000	0.00000	0.001	0.002	0.002

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Activities	Forestry															
Energy	Fuel Combustion Activities	Off-Road Vehicles And Other Machinery	L	AREA	1A4cii	N2O	147.2	100.5	81.4	50	95.5	0.1	-0.00137	0.00165	-0.069	0.116	0.135
Energy	Fuel Combustion Activities	Off-Road Vehicles And Other Machinery	B	AREA	1A4cii	N2O	0.0	3.0	81.4	50	95.5	0.0	0.00005	0.00005	0.002	0.003	0.004
Energy	Fuel Combustion Activities	Stationary	L	AREA	1A4ciii	N2O	0.0	0.1	10	50	51.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	G	AREA	1A4ciii	N2O	0.0	0.0	10	50	51.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Stationary	B	AREA	1A4ciii	N2O	0.0	0.0	60	50	78.1	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Mobile	L	AREA	1A4ciii	N2O	3.1	1.4	10	1000	1000.0	0.0	-0.00004	0.00002	-0.042	0.032	0.053
Energy	Fuel Combustion Activities	Mobile	B	AREA	1A4ciii	N2O	0.0	0.0	60	1000	1001.8	0.0	0.00000	0.00000	0.001	0.001	0.001
Energy	Fuel Combustion Activities	Stationary	S	AREA	1A5	N2O	0.0	0.0	10	1000	1000.0	0.0	0.00000	0.00000	0.000	0.000	0.000
Energy	Fuel Combustion Activities	Mobile	L JeK	AREA	1A5b	N2O	0.8	0.7	5	50	50.2	0.0	0.00000	0.00001	0.000	0.001	0.001
Industrial Processes	Chemical Industry	Nitric Acid Production	0	LPS	2B2	N2O	566.6	463.5	1	10	10.0	0.1	-0.00402	0.00759	-0.040	0.107	0.115
Industrial Processes	Chemical Industry	* Carbon Black	0	LPS	2B5bx	N2O	0.0	0.1	10	100	100.5	0.0	0.00000	0.00000	0.000	0.000	0.000
Agriculture	Manure Management	Direct Emissions	0	AREA	4B10	N2O	9.6	11.5	37.52	100	106.8	0.0	-0.00001	0.00019	-0.001	0.027	0.027
Agriculture	Manure Management	Direct Emissions	0	AREA	4B11	N2O	7.6	9.7	37.51	100	106.8	0.0	0.00000	0.00016	0.000	0.023	0.023
Agriculture	Manure Management	Direct Emissions	0	AREA	4B12	N2O	519.2	442.1	38.98	100	107.3	0.6	-0.00339	0.00724	-0.339	1.024	1.079
Agriculture	Agricultural Soils	Synthetic Fertilizers. Direct Emissions	0	AREA	4D1a	N2O	912.5	519.0	16.77	500	500.3	3.4	-0.01019	0.00850	-5.096	6.011	7.880
Agriculture	Agricultural Soils	Synthetic Fertilizers. Indirect Emissions. Volatilization	0	AREA	4D1b	N2O	44.3	25.2	52.74	100	113.1	0.0	-0.00049	0.00041	-0.049	0.058	0.076
Agriculture	Agricultural Soils	Synthetic Fertilizers. Indirect Emissions.	0	AREA	4D1c	N2O	580.7	330.3	52.74	100	113.1	0.5	-0.00649	0.00541	-0.649	0.765	1.003

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
		Leaching And Runoff															
Agriculture	Agricultural Soils	Animal Wastes Applied To Soil. Direct Emissions	0	AREA	4D2a	N2O	338.4	332.9	107.3	500	511.4	2.2	-0.00148	0.00545	-0.739	3.856	3.926
Agriculture	Agricultural Soils	Animal Wastes Applied To Soil. Indirect Emissions. Volatilization	0	AREA	4D2b	N2O	62.5	62.7	118.4	100	155.0	0.1	-0.00025	0.00103	-0.025	0.145	0.147
Agriculture	Agricultural Soils	Animal Wastes Applied To Soil. Indirect Emissions. Leaching And Runoff	0	AREA	4D2c	N2O	249.9	246.8	118.4	100	155.0	0.5	-0.00108	0.00404	-0.108	0.572	0.582
Agriculture	Agricultural Soils	N-Fixing Crops	0	AREA	4D3a	N2O	30.6	16.4	25	509.9	510.5	0.1	-0.00036	0.00027	-0.183	0.193	0.267
Agriculture	Agricultural Soils	Crop Residues	0	AREA	4D3b	N2O	161.8	152.7	25	509.9	510.5	1.0	-0.00081	0.00250	-0.415	1.803	1.851
Agriculture	Agricultural Soils	Pasture Range And Paddock. Direct Emissions	0	AREA	4D4a	N2O	661.5	829.6	38.98	500	501.5	5.4	0.00004	0.01359	0.019	9.608	9.608
Agriculture	Agricultural Soils	Pasture Range And Paddock. Indirect Emissions. Volatilization	0	AREA	4D4b	N2O	22.2	28.9	63.4	100	118.4	0.0	0.00002	0.00047	0.002	0.067	0.067
Agriculture	Agricultural Soils	Pasture Range And Paddock. Indirect Emissions. Leaching And Runoff	0	AREA	4D4c	N2O	248.0	311.1	63.4	100	118.4	0.5	0.00001	0.00510	0.001	0.721	0.721
Agriculture	Agricultural Soils	Manure Management. Volatilization	0	AREA	4D5a	N2O	83.5	85.4	63.4	100	118.4	0.1	-0.00031	0.00140	-0.031	0.198	0.200
Agriculture	Agricultural Soils	Manure Management. Lexiviation	0	AREA	4D5b	N2O	37.6	45.9	63.4	100	118.4	0.1	-0.00002	0.00075	-0.002	0.106	0.106
Agriculture	Field Burning Of Agricultural Wastes	Cereals	0	AREA	4F1	N2O	5.6	2.0	100	20	102.0	0.0	-0.00008	0.00003	-0.002	0.001	0.002
Agriculture	Field Burning Of Agricultural Wastes	Other	0	AREA	4F5	N2O	16.2	15.2	100	20	102.0	0.0	-0.00008	0.00025	-0.002	0.007	0.007

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-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Waste	Wastewater Handling	Industrial Wastewater	0	AREA	6B1	N2O	155.7	225.7	24.69	1000	1000.3	3.0	0.00051	0.00370	0.506	5.227	5.251
Waste	Wastewater Handling	Domestic And Commercial Wastewater	0	AREA	6B2	N2O	285.9	356.5	30.41	0	30.4	0.1	-0.00002	0.00584	0.000	0.000	0.000
LULUCF	Forest Land	FF-LIVE Biomass		AREA	5A1.1	CO2	-214.6	-3068.8	0.72	40	39.6	1.6	-0.04587	-0.05026	-1.815	-2.813	3.348
LULUCF	Forest Land	FF-LIVE Biomass		AREA	5A1.2	CO2	-0.2	-0.2	12.95	27	30.0	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Forest Land	CF-LIVE Biomass		AREA	5A2.1	CO2	-231.5	-231.5	15.10	42	45.0	0.1	0.00095	-0.00379	0.040	-0.227	0.231
LULUCF	Forest Land	GF-LIVE Biomass		AREA	5A2.2	CO2	-59.2	-59.2	12.91	86	87.1	0.1	0.00024	-0.00097	0.021	-0.118	0.120
LULUCF	Forest Land	SF-LIVE Biomass		AREA	5A2.4	CO2	-2.7	-2.7	20.41	23	31.1	0.0	0.00001	-0.00004	0.000	-0.001	0.001
LULUCF	Forest Land	OF-LIVE Biomass		AREA	5A2.5	CO2	-158.0	-158.0	12.67	45	47.0	0.1	0.00065	-0.00259	0.029	-0.166	0.168
LULUCF	Cropland	CC-LIVE Biomass		AREA	5B1.1	CO2	-180.8	-180.8	13.94	53	54.8	0.1	0.00074	-0.00296	0.039	-0.222	0.226
LULUCF	Cropland	FC-LIVE Biomass		AREA	5B2.1	CO2	120.7	120.7	30.20	42	51.6	0.1	-0.00050	0.00198	-0.021	0.117	0.119
LULUCF	Cropland	GC-LIVE Biomass		AREA	5B2.2	CO2	-19.0	-19.0	13.43	92	92.8	0.0	0.00008	-0.00031	0.007	-0.040	0.041
LULUCF	Cropland	WC-LIVE Biomass		AREA	5B2.3	CO2	-0.4	-0.4	36.60	38	52.6	0.0	0.00000	-0.00001	0.000	0.000	0.000
LULUCF	Cropland	SC-LIVE Biomass		AREA	5B2.4	CO2	0.0	0.0	53.36	40	66.4	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Cropland	OC-LIVE Biomass		AREA	5B2.5	CO2	13.4	13.4	16.01	55	57.6	0.0	-0.00005	0.00022	-0.003	0.017	0.017
LULUCF	Grazing Land	FG-LIVE Biomass		AREA	5C2.1	CO2	1.8	1.8	21.29	86	88.5	0.0	-0.00001	0.00003	-0.001	0.004	0.004
LULUCF	Grazing Land	CG-LIVE Biomass		AREA	5C2.2	CO2	5.8	5.8	13.38	92	92.8	0.0	-0.00002	0.00010	-0.002	0.012	0.013
LULUCF	Grazing Land	WG-LIVE Biomass		AREA	5C2.3	CO2	-0.6	-0.6	13.79	84	85.1	0.0	0.00000	-0.00001	0.000	-0.001	0.001
LULUCF	Grazing Land	SG-LIVE Biomass		AREA	5C2.4	CO2	0.0	0.0	21.22	85	87.4	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Grazing Land	OG-LIVE Biomass		AREA	5C2.5	CO2	1.6	1.6	18.45	93	95.0	0.0	-0.00001	0.00003	-0.001	0.003	0.003
LULUCF	Wetland	FW-LIVE Biomass		AREA	5D2.1	CO2	11.6	11.6	20.51	19	28.1	0.0	-0.00005	0.00019	-0.001	0.005	0.005
LULUCF	Wetland	CW-LIVE Biomass		AREA	5D2.2	CO2	9.0	9.0	16.24	38	41.2	0.0	-0.00004	0.00015	-0.001	0.008	0.008
LULUCF	Wetland	GW-LIVE Biomass		AREA	5D2.3	CO2	0.3	0.3	16.82	84	85.7	0.0	0.00000	0.00001	0.000	0.001	0.001
LULUCF	Wetland	OW-LIVE Biomass		AREA	5D2.5	CO2	3.9	3.9	19.08	41	45.2	0.0	-0.00002	0.00006	-0.001	0.004	0.004
LULUCF	Settlements	SS-LIVE Biomass		AREA	5E1.1	CO2	1.5	1.5	14.89	18	23.1	0.0	-0.00001	0.00003	0.000	0.001	0.001

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-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
LULUCF	Settlements	FS-LIVE Biomass		AREA	5E2.1	CO2	229.9	229.9	26.43	22	34.6	0.1	-0.00094	0.00377	-0.021	0.119	0.121
LULUCF	Settlements	CS-LIVE Biomass		AREA	5E2.2	CO2	107.1	107.1	26.97	40	47.9	0.1	-0.00044	0.00175	-0.017	0.098	0.100
LULUCF	Settlements	GS-LIVE Biomass		AREA	5E2.3	CO2	1.9	1.9	14.18	85	86.0	0.0	-0.00001	0.00003	-0.001	0.004	0.004
LULUCF	Settlements	WS-LIVE Biomass		AREA	5E2.4	CO2	0.0	0.0	35.86	13	38.3	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Settlements	OS-LIVE Biomass		AREA	5E2.5	CO2	12.2	12.2	21.13	43	47.5	0.0	-0.00005	0.00020	-0.002	0.012	0.012
LULUCF	Otherland	OO-LIVE Biomass		AREA	5F1.1	CO2	-0.1	-0.1	20.34	58	61.1	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	FO-LIVE Biomass		AREA	5F2.1	CO2	70.9	70.9	12.59	45	46.5	0.0	-0.00029	0.00116	-0.013	0.073	0.075
LULUCF	Otherland	CO-LIVE Biomass		AREA	5F2.2	CO2	-17.0	-17.0	14.36	55	57.2	0.0	0.00007	-0.00028	0.004	-0.022	0.022
LULUCF	Otherland	GO-LIVE Biomass		AREA	5F2.3	CO2	-0.9	-0.9	15.72	93	94.5	0.0	0.00000	-0.00001	0.000	-0.002	0.002
LULUCF	Otherland	WO-LIVE Biomass		AREA	5F2.4	CO2	-0.1	-0.1	32.00	41	52.0	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	SO-LIVE Biomass		AREA	5F2.5	CO2	-0.9	-0.9	12.50	43	44.4	0.0	0.00000	-0.00001	0.000	-0.001	0.001
LULUCF	Forest Land	FF-DOM (Dead Organic Matter)		AREA	5A1.2	CO2	7.9	7.9	12.95	29	31.3	0.0	-0.00003	0.00013	-0.001	0.005	0.005
LULUCF	Forest Land	CF-DOM (Dead Organic Matter)		AREA	5A2.1	CO2	4.7	4.7	15.10	26	29.7	0.0	-0.00002	0.00008	0.000	0.003	0.003
LULUCF	Forest Land	OF-DOM (Dead Organic Matter)		AREA	5A2.5	CO2	28.1	28.1	12.67	36	38.3	0.0	-0.00012	0.00046	-0.004	0.023	0.024
LULUCF	Cropland	CC-DOM (Dead Organic Matter)		AREA	5B1.1	CO2	2.8	2.8	13.94	0	13.9	0.0	-0.00001	0.00005	0.000	0.000	0.000
LULUCF	Cropland	FC-DOM (Dead Organic Matter)		AREA	5B2.1	CO2	19.8	19.8	30.20	13	32.8	0.0	-0.00008	0.00032	-0.001	0.006	0.006
LULUCF	Cropland	OC-DOM (Dead Organic Matter)		AREA	5B2.5	CO2	3.3	3.3	16.01	26	30.1	0.0	-0.00001	0.00005	0.000	0.002	0.002
LULUCF	Grazing Land	FG-DOM (Dead Organic Matter)		AREA	5C2.1	CO2	0.2	0.2	21.29	13	24.8	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Grazing Land	CG-DOM (Dead Organic Matter)		AREA	5C2.2	CO2	0.3	0.3	13.38	0	13.4	0.0	0.00000	0.00001	0.000	0.000	0.000
LULUCF	Grazing Land	OG-DOM (Dead Organic Matter)		AREA	5C2.5	CO2	0.2	0.2	18.45	26	31.5	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Wetland	FW-DOM (Dead Organic Matter)		AREA	5D2.1	CO2	1.1	1.1	20.51	13	24.2	0.0	0.00000	0.00002	0.000	0.000	0.000
LULUCF	Wetland	CW-DOM (Dead Organic Matter)		AREA	5D2.2	CO2	0.3	0.3	16.24	0	16.2	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Wetland	OW-DOM (Dead Organic Matter)		AREA	5D2.5	CO2	0.3	0.3	19.08	26	31.9	0.0	0.00000	0.00001	0.000	0.000	0.000

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
LULUCF	Settlements	FS-DOM (Dead Organic Matter)		AREA	5E2.1	CO2	22.1	22.1	26.43	13	29.4	0.0	-0.00009	0.00036	-0.001	0.007	0.007
LULUCF	Settlements	CS-DOM (Dead Organic Matter)		AREA	5E2.2	CO2	2.3	2.3	26.97	0	27.0	0.0	-0.00001	0.00004	0.000	0.000	0.000
LULUCF	Settlements	OS-DOM (Dead Organic Matter)		AREA	5E2.5	CO2	1.0	1.0	21.13	26	33.1	0.0	0.00000	0.00002	0.000	0.001	0.001
LULUCF	Otherland	OO-DOM (Dead Organic Matter)		AREA	5F1.1	CO2	0.0	0.0	20.34	36	41.4	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	FO-DOM (Dead Organic Matter)		AREA	5F2.1	CO2	7.7	7.7	12.59	29	31.2	0.0	-0.00003	0.00013	-0.001	0.005	0.005
LULUCF	Otherland	CO-DOM (Dead Organic Matter)		AREA	5F2.2	CO2	-2.0	-2.0	14.36	26	29.3	0.0	0.00001	-0.00003	0.000	-0.001	0.001
LULUCF	Otherland	GO-DOM (Dead Organic Matter)		AREA	5F2.3	CO2	-0.1	-0.1	15.72	26	30.0	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	WO-DOM (Dead Organic Matter)		AREA	5F2.4	CO2	0.0	0.0	32.00	26	40.9	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	SO-DOM (Dead Organic Matter)		AREA	5F2.5	CO2	-0.1	-0.1	12.50	26	28.4	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Forest Land	FF-SOC (Soil Organic Carbon)		AREA	5A1.2	CO2	-4.6	-4.6	12.95	95	95.9	0.0	0.00002	-0.00007	0.002	-0.010	0.010
LULUCF	Forest Land	CF-SOC (Soil Organic Carbon)		AREA	5A2.1	CO2	-149.8	-149.8	15.10	95	96.2	0.2	0.00062	-0.00245	0.058	-0.330	0.335
LULUCF	Forest Land	GF-SOC (Soil Organic Carbon)		AREA	5A2.2	CO2	-2.0	-2.0	12.91	95	95.9	0.0	0.00001	-0.00003	0.001	-0.004	0.005
LULUCF	Forest Land	SF-SOC (Soil Organic Carbon)		AREA	5A2.4	CO2	-6.4	-6.4	20.41	95	97.2	0.0	0.00003	-0.00010	0.002	-0.014	0.014
LULUCF	Forest Land	OF-SOC (Soil Organic Carbon)		AREA	5A2.5	CO2	0.1	0.1	12.67	95	95.8	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Cropland	CC-SOC (Soil Organic Carbon)		AREA	5B1.1	CO2	14.3	14.3	13.94	95	96.0	0.0	-0.00006	0.00023	-0.006	0.031	0.032
LULUCF	Cropland	FC-SOC (Soil Organic Carbon)		AREA	5B2.1	CO2	76.7	76.7	30.20	95	99.7	0.1	-0.00031	0.00126	-0.030	0.169	0.171
LULUCF	Cropland	GC-SOC (Soil Organic Carbon)		AREA	5B2.2	CO2	118.3	118.3	13.43	95	95.9	0.1	-0.00049	0.00194	-0.046	0.260	0.264
LULUCF	Cropland	WC-SOC (Soil Organic Carbon)		AREA	5B2.3	CO2	-1.9	-1.9	36.60	95	101.8	0.0	0.00001	-0.00003	0.001	-0.004	0.004
LULUCF	Cropland	SC-SOC (Soil Organic Carbon)		AREA	5B2.4	CO2	-0.3	-0.3	53.36	95	109.0	0.0	0.00000	-0.00001	0.000	-0.001	0.001
LULUCF	Cropland	OC-SOC (Soil Organic Carbon)		AREA	5B2.5	CO2	23.6	23.6	16.01	95	96.3	0.0	-0.00010	0.00039	-0.009	0.052	0.053
LULUCF	Grazing Land	FG-SOC (Soil		AREA	5C2.1	CO2	-0.5	-0.5	21.29	95	97.4	0.0	0.00000	-0.00001	0.000	-0.001	0.001

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
		Organic Carbon)															
LULUCF	Grazing Land	CG-SOC (Soil Organic Carbon)		AREA	5C2.2	CO2	-25.1	-25.1	13.38	95	95.9	0.0	0.00010	-0.00041	0.010	-0.055	0.056
LULUCF	Grazing Land	WG-SOC (Soil Organic Carbon)		AREA	5C2.3	CO2	-7.6	-7.6	13.79	95	96.0	0.0	0.00003	-0.00013	0.003	-0.017	0.017
LULUCF	Grazing Land	SG-SOC (Soil Organic Carbon)		AREA	5C2.4	CO2	-0.6	-0.6	21.22	95	97.3	0.0	0.00000	-0.00001	0.000	-0.001	0.001
LULUCF	Grazing Land	OG-SOC (Soil Organic Carbon)		AREA	5C2.5	CO2	-0.1	-0.1	18.45	95	96.8	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Wetland	FW-SOC (Soil Organic Carbon)		AREA	5D2.1	CO2	25.2	25.2	20.51	95	97.2	0.0	-0.00010	0.00041	-0.010	0.056	0.056
LULUCF	Wetland	CW-SOC (Soil Organic Carbon)		AREA	5D2.2	CO2	39.5	39.5	16.24	95	96.4	0.0	-0.00016	0.00065	-0.015	0.087	0.088
LULUCF	Wetland	GW-SOC (Soil Organic Carbon)		AREA	5D2.3	CO2	4.6	4.6	16.82	95	96.5	0.0	-0.00002	0.00008	-0.002	0.010	0.010
LULUCF	Wetland	OW-SOC (Soil Organic Carbon)		AREA	5D2.5	CO2	9.0	9.0	19.08	95	96.9	0.0	-0.00004	0.00015	-0.004	0.020	0.020
LULUCF	Settlements	SS-SOC (Soil Organic Carbon)		AREA	5E1.1	CO2	3.8	3.8	14.89	95	96.2	0.0	-0.00002	0.00006	-0.001	0.008	0.009
LULUCF	Settlements	FS-SOC (Soil Organic Carbon)		AREA	5E2.1	CO2	385.6	385.6	26.43	95	98.6	0.5	-0.00158	0.00632	-0.150	0.849	0.862
LULUCF	Settlements	CS-SOC (Soil Organic Carbon)		AREA	5E2.2	CO2	294.1	294.1	26.97	95	98.8	0.4	-0.00121	0.00482	-0.115	0.647	0.657
LULUCF	Settlements	GS-SOC (Soil Organic Carbon)		AREA	5E2.3	CO2	26.2	26.2	14.18	95	96.1	0.0	-0.00011	0.00043	-0.010	0.058	0.059
LULUCF	Settlements	WS-SOC (Soil Organic Carbon)		AREA	5E2.4	CO2	-0.5	-0.5	35.86	95	101.5	0.0	0.00000	-0.00001	0.000	-0.001	0.001
LULUCF	Settlements	OS-SOC (Soil Organic Carbon)		AREA	5E2.5	CO2	26.4	26.4	21.13	95	97.3	0.0	-0.00011	0.00043	-0.010	0.058	0.059
LULUCF	Otherland	OO-SOC (Soil Organic Carbon)		AREA	5F1.1	CO2	-0.2	-0.2	20.34	95	97.2	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	FO-SOC (Soil Organic Carbon)		AREA	5F2.1	CO2	-0.1	-0.1	12.59	95	95.8	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	CO-SOC (Soil Organic Carbon)		AREA	5F2.2	CO2	-21.3	-21.3	14.36	95	96.1	0.0	0.00009	-0.00035	0.008	-0.047	0.047
LULUCF	Otherland	GO-SOC (Soil Organic Carbon)		AREA	5F2.3	CO2	0.0	0.0	15.72	95	96.3	0.0	0.00000	0.00000	0.000	0.000	0.000
LULUCF	Otherland	WO-SOC (Soil Organic Carbon)		AREA	5F2.4	CO2	-0.8	-0.8	32.00	95	100.2	0.0	0.00000	-0.00001	0.000	-0.002	0.002
LULUCF	Otherland	SO-SOC (Soil Organic Carbon)		AREA	5F2.4	CO2	-3.2	-3.2	12.50	95	95.8	0.0	0.00001	-0.00005	0.001	-0.007	0.007

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
LULUCF	Forest Land	FIRES-Forest Fires		AREA	5A1.3	CO2	737.8	66.6	30.00	93	97.4	0.1	-0.01402	0.00109	-1.299	0.143	1.307
LULUCF	Forest Land	FIRES-Forest Fires		AREA	5A1.3	CH4	137.1	11.6	30.00	70	76.2	0.0	-0.00262	0.00019	-0.183	0.019	0.184
LULUCF	Forest Land	FIRES-Forest Fires		AREA	5A1.3	N2O	13.9	1.2	30.00	70	76.2	0.0	-0.00027	0.00002	-0.019	0.002	0.019
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * domestic refrigeration assembly		AREA	2F1	F G	0.2	0.5	10	99	99.3	0.0	0.00000	0.00001	0.000	0.001	0.001
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * commercial refrigeration assembly		AREA	2F1	F G	0.0	2.7	10	214	214.2	0.0	0.00004	0.00004	0.009	0.013	0.016
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * stationary AC assembly		AREA	2F1	F G	3.0	17.2	20	108	110.0	0.0	0.00022	0.00028	0.024	0.043	0.049
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * domestic refrigeration operation		AREA	2F1	F G	0.2	1.8	10	99	99.9	0.0	0.00003	0.00003	0.003	0.004	0.005
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * commercial refrigeration operation		AREA	2F1	F G	0.4	95.4	15.85	333	333.3	0.4	0.00155	0.00156	0.518	0.736	0.900
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * stationary AC operation		AREA	2F1	F G	40.9	536.7	20	110	111.6	0.8	0.00795	0.00879	0.873	1.365	1.620
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * domestic refrigeration disposal		AREA	2F1	F G	0.0	63.9	25	74	78.1	0.1	0.00105	0.00105	0.077	0.109	0.134
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * commercial refrigeration disposal		AREA	2F1	F G	0.0	0.9	39.63	204	207.5	0.0	0.00002	0.00002	0.003	0.004	0.005
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * stationary AC disposal		AREA	2F1	F G	0.0	0.4	50	87	100.7	0.0	0.00001	0.00001	0.001	0.001	0.001

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * MAC assembly		AREA	2F1	F G	0.2	0.7	20	24	31.1	0.0	0.00001	0.00001	0.000	0.000	0.000
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * MAC operation		AREA	2F1	F G	4.9	167.9	40	44	59.2	0.1	0.00265	0.00275	0.115	0.169	0.205
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * MAC disposal		AREA	2F1	F G	0.0	13.1	100	52	112.7	0.0	0.00021	0.00021	0.011	0.016	0.019
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * Transport Refrigeration assembly		AREA	2F1	F G	0.0	0.1	10	119	119.6	0.0	0.00000	0.00000	0.000	0.000	0.000
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * Transport Refrigeration operation		AREA	2F1	F G	0.0	75.9	20	114	115.7	0.1	0.00124	0.00124	0.142	0.200	0.245
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	1 * Transport Refrigeration disposal		AREA	2F1	F G	0.0	4.2	50	101	112.3	0.0	0.00007	0.00007	0.007	0.010	0.012
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	2 Blowing		AREA	2F2	F G	0.0	7.8	50	433	435.5	0.0	0.00013	0.00013	0.055	0.078	0.096
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	2 Leakage		AREA	2F2	F G	0.9	37.5	100	94	137.2	0.1	0.00060	0.00061	0.056	0.082	0.099
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	3 Operation		AREA	2F3	F G	0.0	5.7	20	60	63.5	0.0	0.00009	0.00009	0.006	0.008	0.010
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride	4 *MDI		AREA	2F4	F G	3.0	0.9	40	0	40.0	0.0	-0.00005	0.00002	0.000	0.000	0.000
Industrial Processes	Consumption Of Halocarbons And			AREA	2F7	F G	5.5	8.1	20	15	25.0	0.0	0.00002	0.00013	0.000	0.003	0.003

Sector	Category	Individual Category	Fuel	Source Type	IPCC Source Category	Gas	Base Year Emissions (Gg CO2e)	Current Year Emissions (Gg CO2e)	AD Unc. (%)	EF Unc. (%)	Combined Unc. (%)	Combined Unc. as % of total emissions in year t (%)	Type A sensitivity	Type B sensitivity	Uncertainty in trend in total emissions introduced by EF unc.	Uncertainty in trend in total emissions introduced by AD unc.	Uncertainty introduced into the trend in total national emissions
-	-	-	-	-	A	B	C	D	E	F	G	H	I	J	K	L	M
	Sulphur Hexafluoride																
Industrial Processes	Consumption Of Halocarbons And Sulphur Hexafluoride			AREA	2F1	F G	0.0	9.0	176.1	1000	1015.4	0.1	0.00015	0.00015	0.148	0.209	0.256

ANNEX C: Energy Balance Sheet for 2008

BALANÇO ENERGÉTICO (Estimativa) tep 2008		Hulha e Antracite Estrangeira	Antracite Nacional	Coque	Total de Carvão	Petróleo Bruto	Refugos e Produtos Intermédios	GPL	Gasolinas	Petróleos	Jets	Gasóleo (a)	Fuelóleo	Nafta	Coque de Petróleo	Total de Petróleo Energético	Lubrificantes	Asfaltos	Parafinas	Solventes	Propileno	Total de Petróleo Não Energético	Total de Petróleo
		1	2	3	4 = 1a 3	5	6	7	8	9	10	11	12	13	14	15 = 5 a 14	16	17	18	19	20	21= 16 a 20	22= 15 +21
IMPORTAÇÕES	1.	2 324 506		2 713	**2 327 219**	12 225 495	676 280	626 705	123 845	944	256 500	1 028 591	548 916	185 126	623 539	**16 295 941**	66 605	239 816	3 617	732		**310 770**	**16 606 711**
PRODUÇÃO DOMÉSTICA	2.																						
VARIAÇÃO DE "STOCKS"	3.	- 223 765		162	**- 223 603**	16 321	51 907	9 771	11 688	370	- 10 310	113 713	45 841	- 24 160	86 476	**301 617**	20 357	- 7 990	2 716	68	- 1 095	**14 056**	**315 673**
SAÍDAS	4.	*24 949*			***24 949***			*92 642*	*805 858*		*641 740*	*208 726*	*1 318 803*	*288 358*		***3 356 127***	*127 319*	*118 293*	*5 822*	*15 789*	*57 311*	***324 534***	***3 680 661***
Exportações	*4.1*	*24 949*			*24 949*			*92 642*	*805 835*		*14 561*	*166 964*	*871 585*	*288 358*		*2 239 945*	*126 584*	*118 293*	*5 822*	*15 789*	*57 311*	*323 799*	*2 563 744*
Transportes Marítimos Internacionais	*4.2*											*41 762*	*447 218*			*488 980*	*735*					*735*	*489 715*
Aviação Internacional	*4.3*								*23*		*627 179*					*627 202*							*627 202*
CONSUMO DE ENERGIA PRIMÁRIA	5.	2 523 322		2 551	**2 525 873**	12 209 174	624 373	524 292	- 693 701	574	- 374 930	706 152	- 815 728	- 79 072	537 063	**12 638 197**	- 81 071	129 513	- 4 921	- 15 125	- 56 216	**- 27 820**	**12 610 377**
PARA NOVAS FORMAS DE ENERGIA	6.	2 444 703			**2 444 703**	12 188 085	306 740	- 422 904	-2 252 347	- 1 265	- 767 426	-4 756 333	-1 476 065	-1 174 938		**1 643 547**	- 163 140	- 283 474	- 15 904	- 21 714	- 81 985	**- 566 217**	**1 077 330**
Briquetes	*6.1*																						
Coque	*6.2*																						
Produtos de Petróleo	*6.3*					*12 188 085*	*219 844*	*- 422 904*	*-2 252 347*	*- 1 265*	*- 767 426*	*-4 776 745*	*-2 678 848*	*-1 199 317*		*309 077*	*- 163 140*	*- 283 474*	*- 15 904*	*- 21 714*	*- 81 985*	*- 566 217*	*- 257 140*
Gás de Cidade	*6.4*																						
Petroquímica	*6.5*													*24 379*		*24 379*							*24 379*
Electricidade	*6.6*	*2 444 703*			*2 444 703*							*20 049*	*455 522*			*475 571*							*475 571*
Cogeração	*6.7*						*86 896*					*363*	*747 261*			*834 520*							*834 520*
Produção de Electricidade	*6.7.1*												*108 923*			*108 923*							*108 923*
(Central do Barreiro)	*6.7.11*												*70 694*			*70 694*							*70 694*
Refinação de Petróleo	*6.7.2*						*86 896*						*246 464*			*333 360*							*333 360*
Gás de Cidade	*6.7.3*																						
Agricultura	*6.7.4*												*3 561*			*3 561*							*3 561*
Alimentação e Bebidas	*6.7.5*												*53 345*			*53 345*							*53 345*
Textéis	*6.7.6*											*249*	*94 017*			*94 266*							*94 266*
Papel e Artigos de Papel	*6.7.7*												*69 518*			*69 518*							*69 518*
Químicas e Plásticos	*6.7.8*												*103 064*			*103 064*							*103 064*
Cerâmicas	*6.7.9*												*13 730*			*13 730*							*13 730*
Vidro e Artigos de Vidro	*6.7.10*												*1 102*			*1 102*							*1 102*
Cimento	*6.7.11*																						
Metalurgicas	*6.7.12*																						
Siderurgia	*6.7.13*																						
Vestuário, Calçado e Curtumes	*6.7.14*												*4 423*			*4 423*							*4 423*
Madeira e Artigos de Madeira	*6.7.15*												*38 241*			*38 241*							*38 241*
Borracha	*6.7.16*											*114*				*114*							*114*
Metalo-Electro-Mecânicas	*6.7.17*																						
Outras	*6.7.18*																						
Indústrias Extractiva	*6.7.19*																						
Serviços	*6.7.20*												*10 873*			*10 873*							*10 873*
CONSUMO DO SECTOR ENERGÉTICO	7.					21 089	317 633	12 165	10	42	417	6 163	113 392	- 199		**470 712**	6 253	2 993	183	166	60	**9 655**	**480 367**
Consumo Próprio da Refinação	*7.1*						*269 548*	*8 407*	*10*	*6*		*3 251*	*104 968*			*386 190*	*13*	*3 451*				*3 464*	*389 654*
Perdas da Refinação	*7.2*					*21 089*	*48 085*	*3 521*		*36*	*417*	*2 338*	*7 450*	*- 199*		*82 737*	*1 140*	*- 458*	*183*	*166*	*60*	*1 091*	*83 828*
Coquerie	*7.3*																						
Centrais Eléctricas	*7.4*							*55*								*55*	*5 100*					*5 100*	*5 155*
Bombagem Hidroeléctrica	*7.5*																						
Gás de Cidade	*7.6*																						
Extracção de Carvão, Petróleo e GN	*7.7*							*8*				*18*				*26*							*26*
Perdas de Transporte e Distribuição	*7.8*							*174*				*556*	*974*			*1 704*							*1 704*
CONSUMO COMO MATÉRIA PRIMA													*179 762*	*1 096 060*		*1 275 842*							*1 275 842*
DISPONÍVEL PARA CONSUMO FINAL	8.	78 619		2 551	**81 170**			935 031	1 558 636	1 797	392 079	5 456 322	367 163	5	537 063	**9 348 096**	75 816	409 994	10 800	6 423	25 709	**528 742**	**9 776 838**
ACERTOS	9.	9 852		- 1	9 851			- 3 453	- 7 611	109	- 4 922	- 16 790	- 10 390	5	2 347	- 40 705	304	- 4 588	38	47	6	- 4 193	- 44 898
CONSUMO FINAL	10.	68 767		2 552	**71 319**			938 484	1 566 247	1 688	397 001	5 473 112	377 553		534 716	**9 288 801**	75 512	414 582	10 762	6 376	25 703	**532 935**	**9 821 736**
AGRICULTURA E PESCAS	10.1							8 803	995	930		333 302	2 375			**346 405**	379					**379**	**346 784**
Agricultura	*10.1.1*							*8 665*	*862*	*930*		*266 788*	*1 225*			*278 470*	*60*					*60*	*278 530*
Pescas	*10.1.2*							*138*	*133*			*66 514*	*1 150*			*67 935*	*319*					*319*	*68 254*
INDÚSTRIAS EXTRACTIVAS	10.2							3 760	413			48 823	1 092			**54 088**	1 394	11 027				**12 421**	**66 509**
INDÚSTRIAS TRANSFORMADORAS	10.3	68 767		2 552	**71 319**			223 237	1 487	39		78 755	188 978		534 716	**1 027 212**	16 907	6 396	10 692	6 196	25 703	**65 894**	**1 093 106**
Alimentação e Bebidas	*10.3.1*							*24 423*	*647*	*1*		*25 933*	*89 208*			*140 212*	*238*		*3*			*241*	*140 453*
Textéis	*10.3.2*							*3 635*	*63*	*1*		*2 381*	*11 494*			*17 774*	*811*					*811*	*18 585*
Papel e Artigos de Papel	*10.3.3*							*1 441*	*4*	*3*		*3 717*	*44 252*			*49 417*	*346*		*8*			*354*	*49 771*
Químicas e Plásticos	*10.3.4*	*12 817*		*2 552*	*15 369*			*140 989*	*7*	*21*		*1 344*	*22 960*			*165 321*	*5 004*	*5 775*	*7 365*	*5 759*	*25 703*	*49 606*	*214 927*
Cerâmicas	*10.3.5*							*8 765*		*5*		*3 949*	*2 815*		*7 626*	*23 160*	*144*		*1*			*145*	*23 305*
Vidro e Artigos de Vidro	*10.3.6*							*528*				*1 251*	*8 123*			*9 902*	*114*					*114*	*10 016*
Cimento	*10.3.7*	*49 637*			*49 637*			*1 399*		*1*		*22 177*	*3 348*		*527 090*	*554 015*	*213*	*1*				*214*	*554 229*
Metalurgicas	*10.3.8*							*6 210*				*1 167*	*375*			*7 752*	*66*	*158*				*224*	*7 976*
Siderurgia	*10.3.9*	*6 313*			*6 313*			*1 722*				*1 051*	*970*			*3 743*	*168*					*168*	*3 911*
Vestuário, Calçado e Curtumes	*10.3.10*							*4 826*				*228*	*1 865*			*6 919*	*11*		*4*			*15*	*6 934*
Madeira e Artigos de Madeira	*10.3.11*							*2 140*		*1*		*8 084*	*1 051*			*11 276*	*424*		*2 289*			*2 713*	*13 989*
Borracha	*10.3.12*							*146*				*36*	*428*			*610*	*6 813*		*589*			*7 402*	*8 012*
Metalo-Electro-Mecânicas	*10.3.13*							*23 855*	*766*	*2*		*7 337*	*99*			*32 059*	*2 063*	*461*	*2*	*86*		*2 612*	*34 671*
Outras	*10.3.14*							*2 958*		*4*		*100*	*1 990*			*5 052*	*492*	*1*	*431*	*351*		*1 275*	*6 327*
CONSTRUÇÃO E OBRAS PÚBLICAS	10.4							12 333	2 195	4		145 725	27 211			**187 468**	2 467	390 884	29	180		**393 560**	**581 028**
TRANSPORTES	10.5							26 942	1 560 457	8	368 343	4 556 298	116 706			**6 628 754**	50 437	7				**50 444**	**6 679 198**
Aviação Nacionais	*10.5.1*								*2 373*		*368 343*					*370 716*	*17*					*17*	*370 733*
Transportes Marítimos Nacionais	*10.5.2*								*2*			*74 737*	*116 706*			*191 445*	*632*					*632*	*192 077*
Caminho de Ferro	*10.5.3*											*26 638*				*26 638*	*6*					*6*	*26 644*
Rodoviários	*10.5.5*							*26 942*	*1 558 082*	*8*		*4 454 923*				*6 039 955*	*49 782*	*7*				*49 789*	*6 089 744*
SECTOR DOMÉSTICO	10.6							541 839		685		7 952				**550 476**							**550 476**
SERVIÇOS	10.7							121 570	700	22	28 658	302 257	41 191			**494 398**	3 928	6 268	41			**10 237**	**504 635**

BALANÇO ENERGÉTICO (Estimativa) tep 2008		Gás Natural	Gás de Cidade	Gás de Coque	Gás de Alto Forno	Alcatrão	Gases Inconde. de Petroquímica	Hidrogénio	Gases o Outros Derivados	Hidroelectricidade	Eólica e Geotérmica e Fot	Termoelectricidade	Total de Electricidade	Calor	Resíduos Industriais	Lenhas e Resíduos Vegetais	Resíduos Sólidos Urbanos	Licores Sulfitivos	Outros	Biogás	Biodiesel	Renováveis Sem Hídrica	TOTAL GERAL
		23	24	25	26	27	28	29	30 = 24 a 29	31	32	33	34= 31a 33	35	36	37	38	39	40	41	42	43=37 a 42	44=4+22+23+30+34+35+36+42
IMPORTAÇÕES	1.	**4 162 951**											**923 984**										24 020 865
PRODUÇÃO DOMÉSTICA	2.									627 456	514 882		**1 142 338**		2 523	1 985 559	182 765	789 311		22 799	149 003	**3 129 437**	**4 274 298**
VARIAÇÃO DE "STOCKS"	3.	**19 376**																			- 837	**- 837**	**110 609**
SAÍDAS	4.												**112 918**								17 634	**17 634**	**3 836 162**
Exportações	4.1												*112 918*								*17 634*	*17 634*	*2 719 245*
Transportes Marítimos Internacionais	4.2																						*489 715*
Aviação Internacional	4.3																						*627 202*
CONSUMO DE ENERGIA PRIMÁRIA	5.	**4 143 575**								627 456	514 882		**1 953 404**		2 523	1 985 559	182 765	789 311		22 799	132 206	**3 112 640**	**24 348 392**
PARA NOVAS FORMAS DE ENERGIA	6.	**2 859 766**								627 456	514 882	-2 810 996	**-2 810 996**	**-1 464 776**	2 523	244 090	182 765	789 311		22 799	128 426	**1 367 391**	**3 475 941**
Briquetes	6.1																						
Coque	6.2																						
Produtos de Petróleo	6.3																				*128 426*	*128 426*	*- 128 714*
Gás de Cidade	6.4																						
Petroquímica	6.5						*- 24 379*		*- 24 379*														
Electricidade	6.6	*2 261 580*								*627 456*	*514 882*	*-2 325 570*	*-2 325 570*			*61 957*	*182 765*			*19 729*		*264 451*	*3 120 735*
Cogeração	6.7	*598 186*					*24 379*		*24 379*			*- 485 426*	*- 485 426*	*-1 464 776*	*2 523*	*182 133*		*789 311*		*3 070*		*974 514*	*483 920*
Produção de Electricidade	6.7.1											*- 24 704*	*- 24 704*	*- 53 171*									*31 048*
(Central do Barreiro)	6.7.11											*- 8 293*	*- 8 293*	*- 52 661*									*9 740*
Refinação de Petróleo	6.7.2											*- 41 329*	*- 41 329*	*- 270 736*									*21 295*
Gás de Cidade	6.7.3																						
Agricultura	6.7.4	*3 957*										*- 3 156*	*- 3 156*	*- 2 366*						*329*		*329*	*2 325*
Alimentação e Bebidas	6.7.5	*80 866*										*- 33 383*	*- 33 383*	*- 70 540*									*30 288*
Texteis	6.7.6	*95 985*										*- 72 232*	*- 72 232*	*- 50 203*									*67 816*
Papel e Artigos de Papel	6.7.7	*174 524*										*- 191 056*	*- 191 056*	*- 775 898*		*164 763*		*789 311*		*1 328*		*955 402*	*232 490*
Químicas e Plásticos	6.7.8	*113 492*					*24 379*		*24 379*			*- 44 741*	*- 44 741*	*- 164 984*									*31 210*
Cerâmicas	6.7.9	*32 986*										*- 16 530*	*- 16 530*	*- 19 743*									*10 443*
Vidro e Artigos de Vidro	6.7.10											*- 429*	*- 429*	*- 31*									*642*
Cimento	6.7.11																						
Metalurgicas	6.7.12																						
Siderurgia	6.7.13																						
Vestuário, Calçado e Curtumes	6.7.14	*1 982*										*- 2 075*	*- 2 075*	*- 1 815*									*2 515*
Madeira e Artigos de Madeira	6.7.15											*- 17 105*	*- 17 105*	*- 16 677*		*17 370*						*17 370*	*21 829*
Borracha	6.7.16											*- 791*	*- 791*	*- 1 231*	*2 523*								*615*
Metalo-Electro-Mecânicas	6.7.17																						
Outras	6.7.18																						
Indústrias Extractiva	6.7.19	*60 201*										*- 21 470*	*- 21 470*	*- 30 844*									*7 887*
Serviços	6.7.20	*34 193*										*- 16 425*	*- 16 425*	*- 6 537*						*1 413*		*1 413*	*23 517*
CONSUMO DO SECTOR ENERGÉTICO	7.	**7 784**											**607 870**	**270 736**							3	**3**	**1 366 760**
Consumo Próprio da Refinação	7.1												*50 535*	*270 736*									*710 925*
Perdas da Refinação	7.2																						*83 828*
Coqueríe	7.3																						
Centrais Eléctricas	7.4												*139 005*										*144 160*
Bombagem Hidroeléctrica	7.5												*54 954*										*54 954*
Gás de Cidade	7.6																						
Extracção de Carvão, Petróleo e GN	7.7												*809*										*826*
Perdas de Transporte e Distribuição	7.8	*7 784*											*362 576*								*3*	*3*	*372 057*
CONSUMO COMO MATÉRIA PRIMA																							*1 275 842*
DISPONÍVEL PARA CONSUMO FINAL	8.	**1 276 025**											**4 156 539**	**1 194 040**		1 741 469					3 777	**1 745 246**	**18 229 849**
ACERTOS	9.	- 1 362											10								271	271	- 36 128
CONSUMO FINAL	10.	**1 277 387**											**4 156 520**	**1 194 040**		1 741 469					3 505	**1 744 975**	**18 265 977**
AGRICULTURA E PESCAS	10.1	2 223											**87 218**	**2 366**							**21**	**21**	**438 612**
Agricultura	10.1.1	*2 170*											*87 218*	*2 366*							*21*	*21*	*370 305*
Pescas	10.1.2	*53*																					*68 307*
INDÚSTRIAS EXTRACTIVAS	10.2	**5 474**											**49 882**	**30 844**							4	**4**	**152 713**
INDÚSTRIAS TRANSFORMADORAS	10.3	**850 855**											**1 344 124**	**1 154 293**		580 456					**254**	**580 710**	**5 094 407**
Alimentação e Bebidas	10.3.1	*29 630*											*152 856*	*70 540*		*92 809*					*89*	*92 898*	*486 377*
Texteis	10.3.2	*49 205*											*103 010*	*50 203*		*55 662*					*1*	*55 663*	*276 666*
Papel e Artigos de Papel	10.3.3	*54 497*											*222 110*	*775 898*									*1 102 276*
Químicas e Plásticos	10.3.4	*39 353*											*200 188*	*217 645*		*36 718*					*56*	*36 774*	*724 256*
Cerâmicas	10.3.5	*292 710*											*55 790*	*19 743*		*358 693*						*358 693*	*750 241*
Vidro e Artigos de Vidro	10.3.6	*206 688*											*40 275*	*31*									*257 010*
Cimento	10.3.7	*27 620*											*92 949*			*6 190*						*6 190*	*730 625*
Metalurgicas	10.3.8	*18 680*											*2 995*			*5 733*					*1*	*5 734*	*35 385*
Siderurgia	10.3.9	*48 605*											*128 495*								*6*	*6*	*187 330*
Vestuário, Calçado e Curtumes	10.3.10	*11 704*											*29 259*	*1 815*							*8*	*8*	*49 720*
Madeira e Artigos de Madeira	10.3.11	*10 399*											*57 567*	*16 677*		*23 409*					*63*	*23 472*	*122 104*
Borracha	10.3.12	*3 048*											*15 869*	*1 231*									*28 160*
Metalo-Electro-Mecânicas	10.3.13	*50 091*											*194 894*			*406*					*6*	*412*	*280 068*
Outras	10.3.14	*8 625*											*47 867*	*510*		*836*					*24*	*860*	*64 189*
CONSTRUÇÃO E OBRAS PÚBLICAS	10.4	**5 642**											**50 490**								195	**195**	**637 355**
TRANSPORTES	10.5	**7 010**											**42 236**								1 309	**1 309**	**6 729 753**
Aviação Nacionais	10.5.1																						*370 733*
Transportes Marítimos Nacionais	10.5.2																						*192 077*
Caminho de Ferro	10.5.3												*42 236*										*68 880*
Rodoviários	10.5.5	*7 010*																			*1 309*	*1 309*	*6 098 063*
SECTOR DOMÉSTICO	10.6	**222 728**											**1 156 143**			*1 161 013*					11	**1 161 024**	**3 090 371**
SERVIÇOS	10.7	**183 455**											**1 426 427**	**6 537**							1 712	**1 712**	**2 122 766**