

## **Air Emissions Accounts. Series 1990, 1995-2010.**

The fight against **climate change** constitutes one of the most significant challenges facing humankind, in order to reach a level of concentration in the atmosphere of greenhouse gases (GEG) that does not cause unnatural changes in the earth's climate.

In order to adopt measures that reduce this type of emissions, it has been necessary to have access to reliable statistical information regarding polluting substances generated by the different economic sectors. In this sense, the “European Environmental Account Strategy” identifies the Air Emissions Accounts as a core module that should be produced on a regular basis to serve as a support for adopting policies in this scope.

**Atmospheric Emissions Accounts** form part of the Environmental Accounts developed by the INE using available international methodologies. In this publication, the results are published for the new base change, with the series 1990, 1995-2010.

The new Regulation (UE) No 691/2011 on European environmental economic accounts set up in 2011 contains a section about this account.

The Air Emissions Accounts present data on atmosphere emissions, with the National Accounts System, broken down by branches of economic activity and household sector. The methodology used in estimates is to be found in the “Manual for Air Emissions Accounts. 2009 edition” published by EUROSTAT.

The information on air emissions presents polluting agents with a direct effect on warming of the atmosphere (greenhouse effect), acid rain, the forerunners of the ozone layer, and on photochemical contamination.

The estimates of the Emissions Accounts are made from Atmospheric Emission National Inventories, which the Ministry of Agriculture, Food and Environment is responsible for compiling (<http://www.magrama.gob.es/en/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/volumen2.aspx>). In the inventories, the EMEP/CORINAIR methodology carried out by the European Environment Agency is used, with SNAP nomenclature (Selected Nomenclature for Air Pollution) which groups emissions functionally by process. The Emission Accounts are compiled by adapting data to the classification based on the NACE (plus the household sector). The majority of categories in the inventories correspond to one economic activity registered in a NACE branch, but in certain cases, emissions should be divided into several branches (combustion plants, transport and others).

Since atmospheric emissions are distributed by branch of economic activity in accordance with the rules of the National Accounts system, those resulting from secondary and auxiliary activities are grouped with those of the main activity of economic units. In the household sector, direct emissions corresponding to private transport, heating and others of a secondary nature are considered.

**Overall coverage of the Emission Accounts and the Inventories** differs due to the framework used in the former, the National Accounts system, which only considers national economic activities (principle of residence), whereas the inventories present emissions from all sources within Spain. In addition, in the Emission Accounts, emissions from non-economic agents (nature) are not shown, nor is absorption of gases by nature (absorption of CO<sub>2</sub>). Thus, in the Air Emissions Accounts, emissions covered are those generated by national economic activities (resident units), and emissions from these units abroad, tourists and international transport companies, which must be included in the corresponding branch of activity or in households, whereas emissions from non-resident units are excluded within national borders.

## **Results of the base change, (series 1990, 1995-2010). Analysis of the GHG evolution.**

In the new publication, the results are published for the base change, with the series 1990, 1995-2010. The detail in the tables may be found in INEBase, with the distribution of emissions from each of the gases and pollutants (greenhouse effect, acid rain, forerunners of the ozone layer, and photochemical contamination) by branch of activity and household sector.

The evolution of emissions of greenhouse gases (CO<sub>2</sub>: carbon dioxide, CH<sub>4</sub>: methane, N<sub>2</sub>O: nitrous oxide, HFC: hydrogenfluorocarbon composites, PFC: polyfluorocarbon composites, SF<sub>6</sub>: sulphur hexafluoride), is shown below. In order to be able to compare the amounts emitted into the atmosphere of the different agents, greenhouse effect gases other than carbon dioxide are converted into their equivalent carbon dioxide value (CO<sub>2</sub>eq) by multiplying the mass of gas in question by their global warming potential. In this way it is possible to compare emissions of all GHGs.

The results obtained for the total emissions of GHGs measured in thousands of equivalent tonnes of CO<sub>2</sub> are presented in the following table\*:

TOTAL GHG emission (Equivalent kilotonnes (Gg) of CO<sub>2</sub>)

	1990	1995	2000	2005	2006	2007	2008	2009	2010
<b>ECONOMIC ACTIVITY</b>									
Agriculture, livestock, hunting, forestry and fishing	41,537	41,135	47,181	45,375	46,031	47,001	44,577	44,356	45,077
Extractive industries	3,012	2,882	3,073	2,810	2,581	2,501	2,318	2,635	1,809
Manufacturing industry	83,332	92,213	102,141	116,892	115,039	114,880	107,538	92,246	97,662
Production and distribution of electrical energy, gas and water supply	64,829	72,252	90,294	110,631	102,006	108,056	91,144	75,507	59,149
Construction	4,254	3,401	4,179	5,359	5,568	5,798	5,443	4,764	4,292
Transport, storage and communications	20,419	22,730	28,739	36,146	36,799	38,984	37,177	30,965	29,577
Other Service activities	13,538	17,455	21,824	25,267	26,096	26,293	26,675	27,204	27,676
Household Sector	44,340	52,142	68,126	78,788	79,172	80,201	77,037	75,121	75,989
Unclassified*	3,965	4,092	6,590	10,227	11,499	11,119	11,164	12,598	13,019
<b>TOTAL</b>	<b>279,226</b>	<b>308,302</b>	<b>372,147</b>	<b>432,309</b>	<b>424,980</b>	<b>435,562</b>	<b>403,579</b>	<b>365,396</b>	<b>354,251</b>

In the results obtained, we can see that if a percentage distribution is made for emissions of GHGs by branches of activity and household sector highlight, as the main polluting branches, manufacturing industry and production of electricity, gas and water, as well as the household sector:

PERCENTAGE STRUCTURE GHG

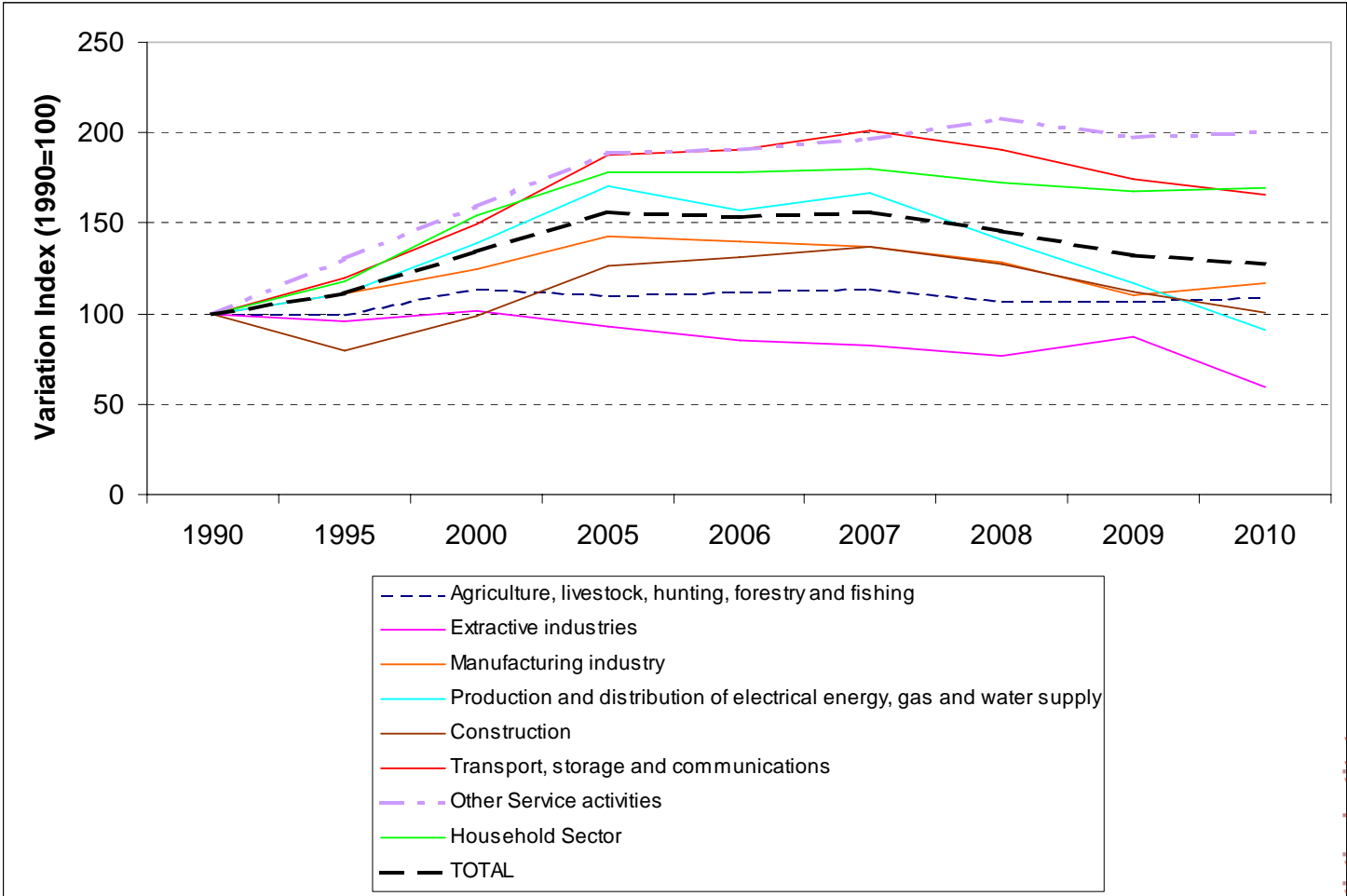
	1990	1995	2000	2005	2006	2007	2008	2009	2010
<b>ECONOMIC ACTIVITY</b>									
Agriculture, livestock, hunting, forestry and fishing	14.9	13.4	12.7	10.5	10.9	10.9	11.0	12.1	12.7
Extractive industries	1.1	0.9	0.8	0.7	0.6	0.6	0.6	0.7	0.5
Manufacturing industry	30.1	30.0	27.9	27.4	27.5	26.4	26.6	25.2	27.6
Production and distribution of electrical energy, gas and water supply	23.4	23.5	24.2	25.6	24.0	24.9	22.6	20.7	16.7
Construction	1.5	1.1	1.1	1.2	1.3	1.3	1.4	1.3	1.2
Transport, storage and communications	6.4	6.9	7.1	7.7	8.0	8.3	8.4	8.5	8.3
Other Service activities	5.0	5.9	5.9	6.0	6.2	6.3	7.1	7.4	7.8
Household Sector	16.1	17.0	18.5	18.4	18.8	18.6	19.1	20.6	21.5
Unclassified*	1.4	1.3	1.8	2.5	2.8	2.7	3.1	3.4	3.7
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

On the other hand, we can see how, of the total emissions of GHGs, the emissions from the household sector have increased its percentage-wage systematically year after year. This result in 2010 is higher than those generated from the production of electrical energy, water and gas.

Regarding the increase or reduction of the total emissions of GHGs, in the following table and graph, the variation indices are presented, with base 1990:

VARIATION INDEX (1990=100)

ECONOMIC ACTIVITY	1990	1995	2000	2005	2006	2007	2008	2009	2010
Agriculture, livestock, hunting, forestry and fishing	100	99	114	110	112	114	107	107	109
Extractive industries	100	96	101	93	85	83	77	87	60
Manufacturing industry	100	111	124	142	140	137	128	110	117
Production and distribution of electrical energy, gas and water supply	100	111	139	171	157	167	141	116	91
Construction	100	80	98	126	132	137	128	112	101
Transport, storage and communications	100	119	149	187	190	201	191	174	166
Other Service activities	100	130	159	189	191	196	208	197	200
Household Sector	100	117	154	178	178	180	172	168	170
Unclassified*	100	103	175	273	306	297	319	322	333
TOTAL	100	111	134	156	153	156	145	132	128



Lastly we analyse for the year 2010 the percentage represented by each gas over the total GHG emissions in equivalent carbon dioxide mass. Emissions of carbon dioxide represent, in 2010, approximately 81% of the total, although over the years analysed in the Air Emissions Accounts this percentage has varied between 82 and 85%. Regarding CH<sub>4</sub> (methane) and N<sub>2</sub>O (nitrous oxide), these represent approximately 10% and 6% of the total, respectively

PERCENTAGE STRUCTURE GHG YEAR 2010

	CO2	SF6	N2O	CH4	PFC	HFC	TOTAL
<b>ECONOMIC ACTIVITY</b>							
Agriculture, livestock, hunting, forestry and fishing	24.61	0.00	34.38	41.01	0.00	0.00	100.00
Extractive industries	66.93	0.00	0.57	32.50	0.00	0.00	100.00
Manufacturing industry	96.88	0.37	1.17	1.24	0.08	0.26	100.00
Production and distribution of electrical energy, gas and water supply	98.31	0.00	0.73	0.96	0.00	0.00	100.00
Construction	98.86	0.00	1.09	0.05	0.00	0.00	100.00
Transport, storage and communications	98.75	0.00	0.83	0.42	0.00	0.00	100.00
Other Service activities	40.06	0.00	11.87	48.07	0.00	0.00	100.00
Household Sector	96.86	0.00	1.05	0.95	0.01	1.14	100.00
Unclassified*	33.10	0.00	1.00	1.90	1.75	62.26	100.00
<b>TOTAL</b>	<b>81.16</b>	<b>0.10</b>	<b>6.09</b>	<b>9.95</b>	<b>0.09</b>	<b>2.60</b>	<b>100.00</b>

Analysed separately below are the emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O, the gases that contribute the most to the so-called greenhouse effect.

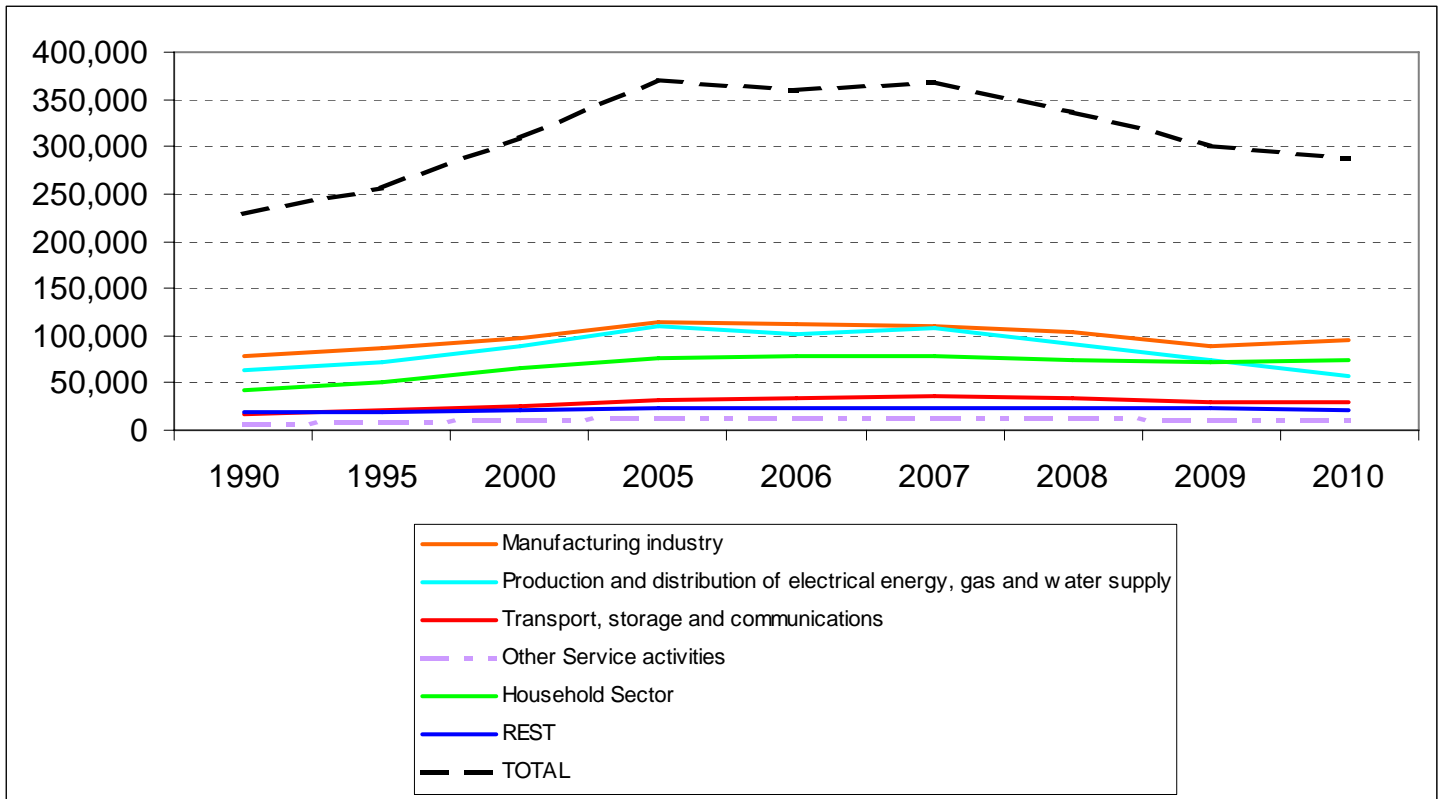
**RESULTS FOR EMISSIONS OF CO<sub>2</sub> (series 1990, 1995-2010)**

**DISTRIBUTION BY BRANCH OF ECONOMIC ACTIVITY AND HOUSEHOLD SECTOR OF EMISSIONS OF CO<sub>2</sub>**

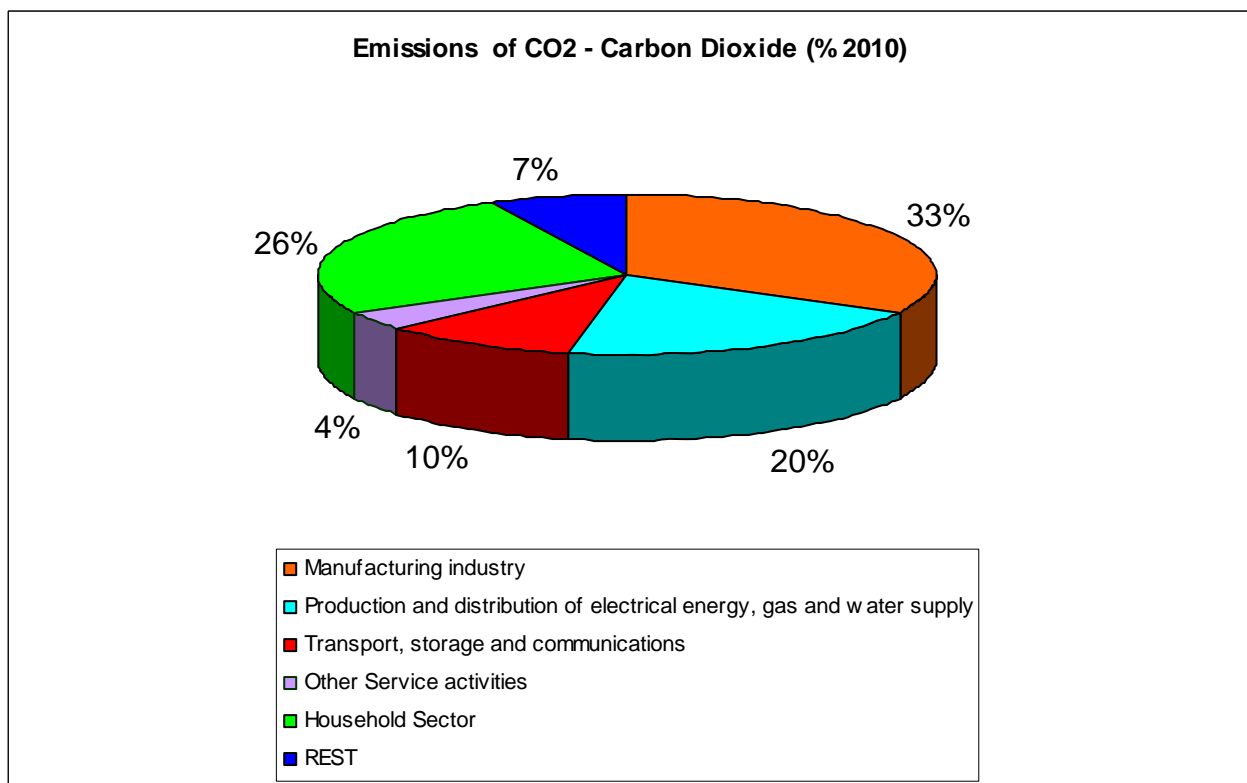
CO<sub>2</sub>-Carbon Dioxide Emissions (Equivalent kilotonnes (Gg) of CO<sub>2</sub>)

	1990	1995	2000	2005	2006	2007	2008	2009	2010
<b>ECONOMIC ACTIVITY</b>									
Agriculture, livestock, hunting, forestry and fishing	9,946	10,160	10,427	10,773	10,870	10,913	10,977	11,084	11,093
Extractive industries	1,070	1,335	1,759	1,804	1,593	1,562	1,569	1,948	1,211
Manufacturing industry	78,076	87,060	98,043	114,715	112,875	110,978	103,519	89,060	94,612
Production and distribution of electrical energy, gas and water supply	64,292	71,355	89,221	109,727	101,026	106,960	90,035	74,431	58,149
Construction	4,213	3,359	4,148	5,334	5,548	5,760	5,384	4,711	4,243
Transport, storage and communications	17,441	20,766	25,985	32,662	33,471	35,511	33,642	30,602	29,206
Other Service activities	6,171	7,676	9,577	12,341	11,997	12,289	11,952	11,196	11,088
Household Sector	43,189	50,829	65,949	77,046	77,358	78,221	74,558	72,670	73,600
Unclassified*	3,370	3,485	4,165	5,184	5,416	5,607	5,224	4,656	4,309
<b>TOTAL</b>	<b>227,768</b>	<b>256,025</b>	<b>309,273</b>	<b>369,587</b>	<b>360,154</b>	<b>367,802</b>	<b>336,858</b>	<b>300,356</b>	<b>287,512</b>

### EVOLUTION OF EMISSIONS OF CO<sub>2</sub> (year 2010)



### PERCENTAGE STRUCTURE OF EMISSIONS OF CO<sub>2</sub> (year 2010)



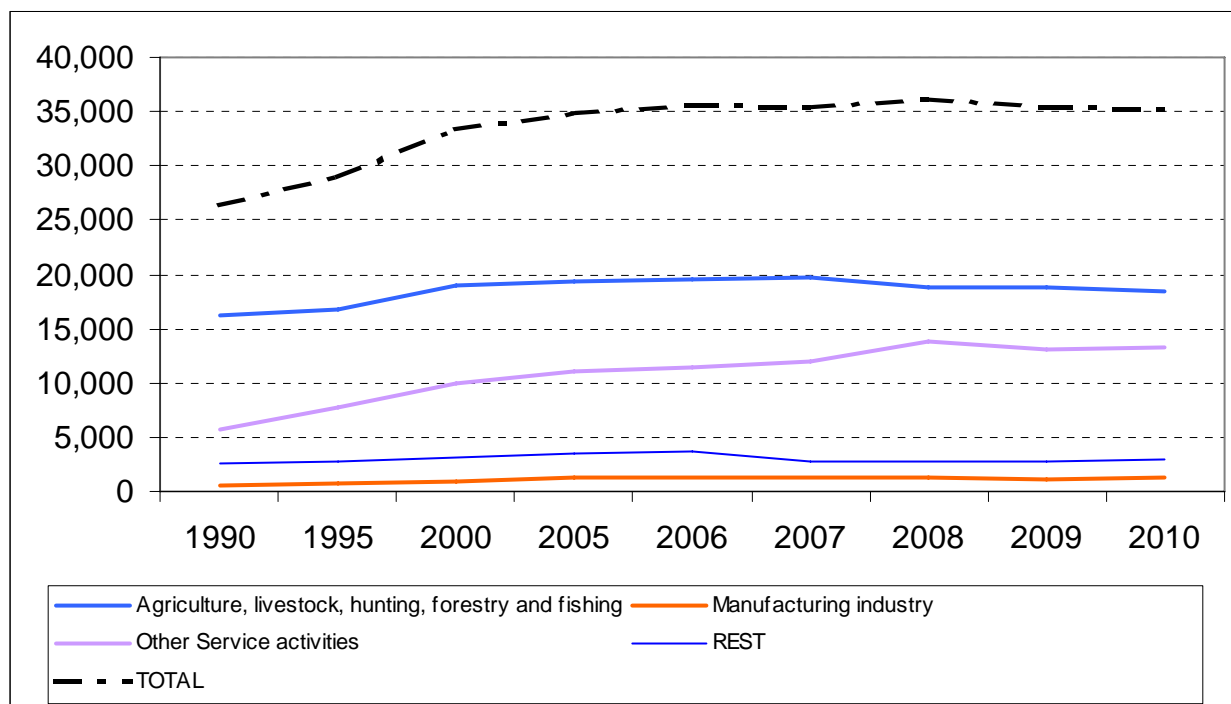
## RESULTS FOR EMISSIONS OF CH<sub>4</sub> (series 1990, 1995-2010)

### DISTRIBUTION BY BRANCH OF ECONOMIC ACTIVITY AND HOUSEHOLD SECTOR OF EMISSIONS OF CH<sub>4</sub>

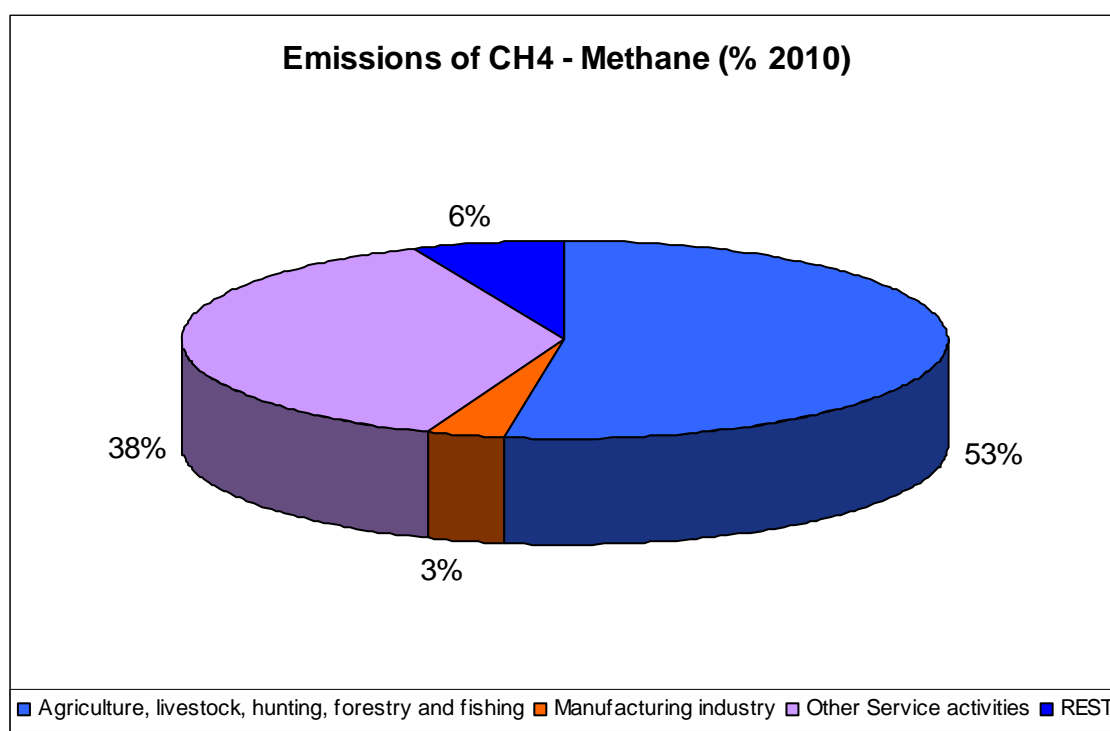
CH<sub>4</sub>-Methane Emissions (Equivalent kilotonnes (Gg) of CO<sub>2</sub>)

	1990	1995	2000	2005	2006	2007	2008	2009	2010
<b>ECONOMIC ACTIVITY</b>									
Agriculture, livestock, hunting, forestry and fishing	16,160	16,764	19,015	19,266	19,460	19,795	18,841	18,838	18,486
Extractive industries	1,958	1,557	1,309	998	982	934	742	672	588
Manufacturing industry	618	712	971	1,307	1,308	1,256	1,283	1,105	1,213
Production and distribution of electrical energy, gas and water supply	350	471	375	481	519	536	549	571	569
Construction	4	3	4	4	4	3	3	2	2
Transport, storage and communications	199	313	407	508	200	126	122	121	125
Other Service activities	5,704	7,818	9,886	10,971	11,467	11,921	13,830	13,013	13,304
Household Sector	1,046	964	854	788	768	752	709	737	722
Unclassified*	372	376	505	495	856	83	103	271	247
<b>TOTAL</b>	<b>26,411</b>	<b>28,978</b>	<b>33,324</b>	<b>34,818</b>	<b>35,563</b>	<b>35,407</b>	<b>36,179</b>	<b>35,330</b>	<b>35,255</b>

### EVOLUTION OF EMISSIONS OF CH<sub>4</sub>



## PERCENTAGE STRUCTURE OF EMISSIONS OF CH<sub>4</sub> (year 2010)



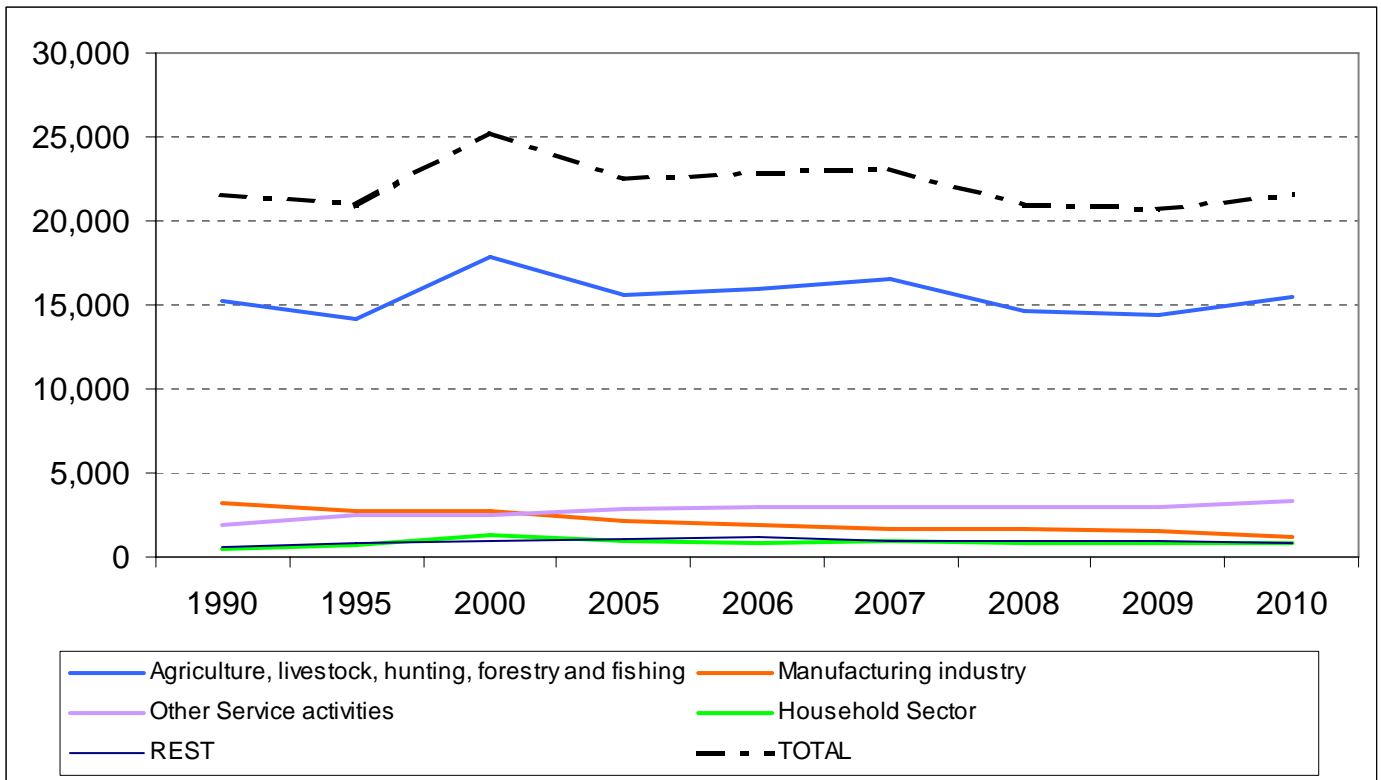
## RESULTS FOR EMISSIONS OF N<sub>2</sub>O (series 1990, 1995-2010)

### DISTRIBUTION BY BRANCH OF ECONOMIC ACTIVITY AND HOUSEHOLD SECTOR OF EMISSIONS OF N<sub>2</sub>O

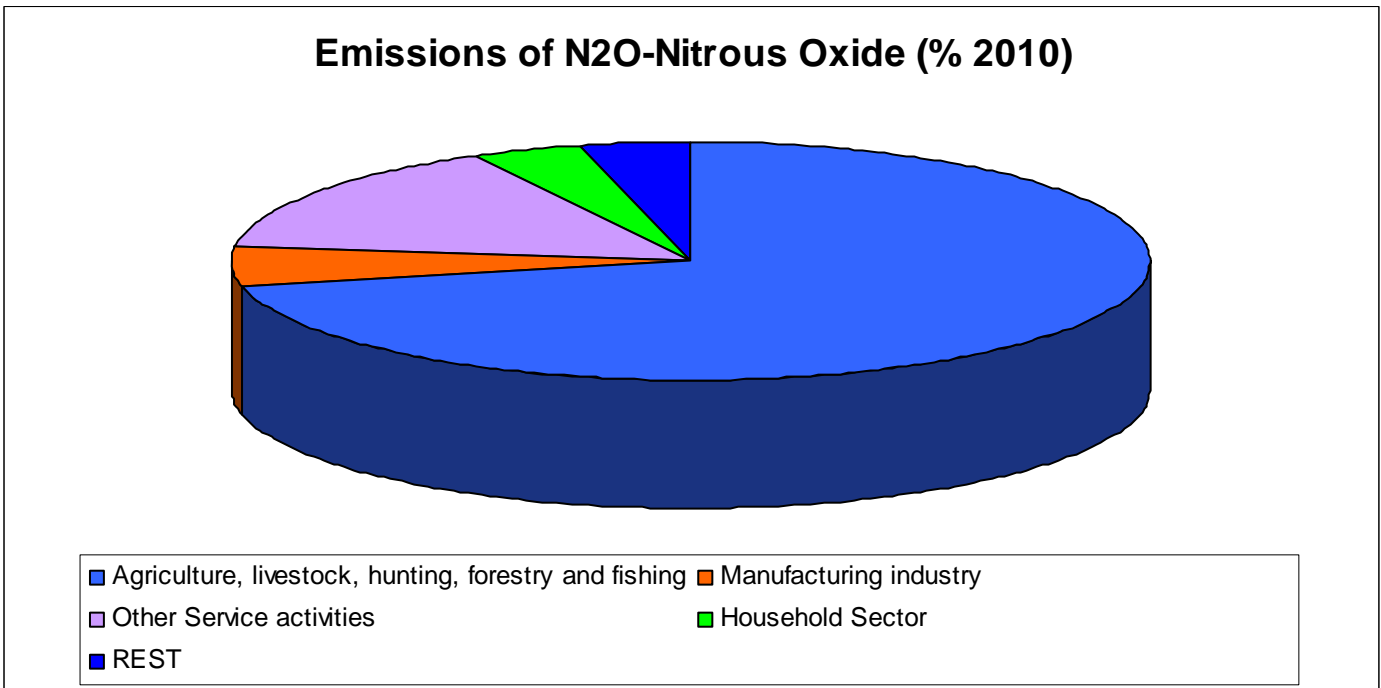
N<sub>2</sub>O-Nitrous Oxide Emissions (Equivalent kilotonnes (Gg) of CO<sub>2</sub>)

	1990	1995	2000	2005	2006	2007	2008	2009	2010
<b>ECONOMIC ACTIVITY</b>									
Agriculture, livestock, hunting, forestry and fishing	15,280	14,220	17,800	15,569	15,952	16,584	14,632	14,434	15,498
Extractive industries	7	10	13	14	12	12	12	16	10
Manufacturing industry	3,272	2,703	2,713	2,188	1,896	1,713	1,662	1,504	1,143
Production and distribution of electrical energy, gas and water supply	187	427	470	579	538	560	560	505	431
Construction	47	37	44	52	55	58	56	51	47
Transport, storage and communications	171	200	231	211	223	244	246	242	246
Other Service activities	1,943	2,529	2,489	2,806	2,920	2,932	2,927	2,994	3,284
Household Sector	486	704	1,298	894	890	893	844	776	800
Unclassified*	174	179	232	219	363	62	71	138	130
<b>TOTAL</b>	<b>21,566</b>	<b>21,010</b>	<b>25,289</b>	<b>22,532</b>	<b>22,849</b>	<b>23,058</b>	<b>21,011</b>	<b>20,661</b>	<b>21,588</b>

### EVOLUTION OF EMISSIONS OF N<sub>2</sub>O



### PERCENTAGE STRUCTURE OF EMISSIONS OF N<sub>2</sub>O (year 2010)



\* Unclassified\* - amount not distributed by branches of economic activity and household sector.