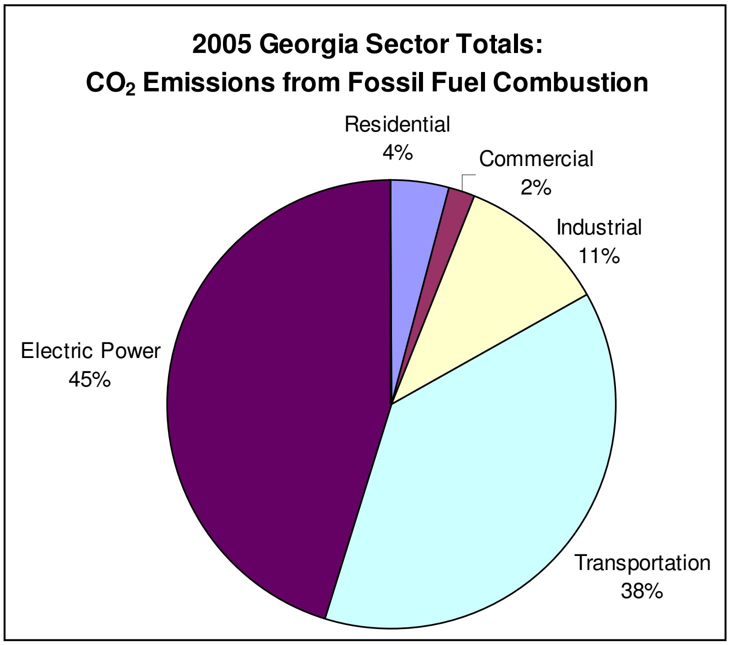
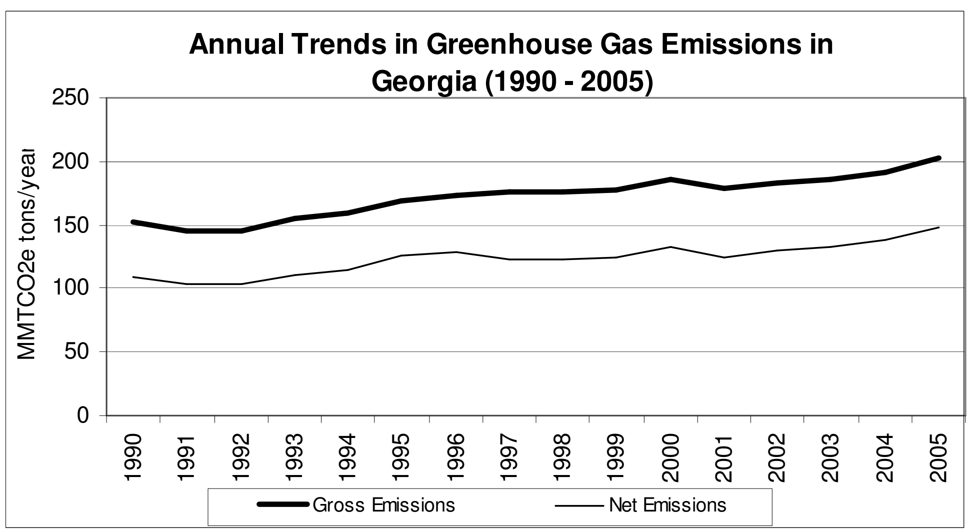
Greenhouse Gas Emissions Inventory for the State of Georgia

Summary Report of 1990 – 2005 baselines and detail on the 2005 inventory, developed using the U.S. EPA State Inventory Tool





Georgia Dept. of Natural Resources
Environmental Protection Division
Air Protection Branch

November 2008

Report on Georgia's Greenhouse Gas Emissions Inventory

Introduction

During recent deliberations in developing Georgia's first comprehensive energy strategy, much discussion related to preparing Georgia for future climate change policies. As a result, the Governor's Energy Policy Council unanimously recommended that Georgia update its greenhouse gas (GHG) inventory (originally released in 1999) and develop a process to keep it current every three years. This report is, in part, a response to that charge. Since that recommendation, the likelihood of mandatory GHG reporting and reduction programs in the United States has become even more apparent[1,2,3,4], further supporting the need for a systematic inventory of statewide GHG emissions.

Available tools and estimation techniques have greatly improved since Georgia developed its first greenhouse gas inventory in 1999. However, this updated inventory is still only a gross estimate due to the lack of necessary data inputs. This updated inventory identifies the major categories of GHG emission sources and their annual trends from 1990 to 2005 using the US EPA's State Inventory Tool version released on July 22, 2008. The GA Environmental Protection Division (EPD) intends to identify areas in this inventory that would benefit most from for further refinement using more accurate currently available or easily obtained data, collect necessary data, and update the inventory as needed or as possible.

Recently, Congress has required the US EPA to release a proposed mandatory Greenhouse Gas Reporting Rule by the end of September 2008, with a final rule required by the end of June 2009[5]. This rule will require mandatory reporting of greenhouse gases "above appropriate thresholds in all sectors of the economy", including both upstream production and downstream sources. The EPA is responsible for determining the reporting thresholds, frequency, and mechanisms. In addition, in response to the U.S. Supreme Court's decision in Massachusetts v. EPA, the US EPA released an Advance Notice of Proposed Rulemaking for public comment on Regulating Greenhouse Gas Emissions under the Clean Air Act [6](July 11, 2008). This greenhouse gas inventory is an initial step for the Georgia EPD in preparing to respond to these potential upcoming federal programs.

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[1] "US ready for 'binding' reductions of greenhouse gases - official UPDATE", Feb 25, 2008, accessed March 5, 2008, http://www.forbes.com/afxnewslimited/feeds/afx/2008/02/25/afx4691077.html

[2] A Comparison of Legislative Climate Change Targets in the 110th Congress as of Sept 9, 2008, http://www.wri.org/chart/comparison-legislative-climate-change-targets-110th-congress-1990-2050 , accessed September 12, 2008.

[3] March 11, 2008 Reps. Waxman and Markey "Moratorium on Uncontrolled Power Plants Act of 2008" addressing permitting and emission allowances for new coal-fired power plants proposed without controls on their global warming emissions. .http://oversight.house.gov/documents/20080311104934.pdf .

[4] Greenhouse Gas Accountability Act of 2007 (H.R. 2651) , National Greenhouse Gas Registry Act of 2007 (S. 1387) , and FY 2008 Interior Appropriations Bill with Feinstein-Boxer Measure to support mandatory economy-wide greenhouse gas emissions registry.

[5] http://www.epa.gov/climatechange/emissions/ghgrulemaking.html, accessed September 12, 2008.

[6] http://www.epa.gov/climatechange/anpr.html , accessed September 12, 2008.

Method

The GA GHG inventory was prepared using the U.S. Environmental Protection Agency's (EPA) State Inventory Tool (SIT)[7] with the state-specific defaults provided with the tool. Emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydroflurocarbons (HFCs), perflurocarbons (PFCs), and sulfur hexafluoride (SF6) are calculated. This set of 6 gases (gas categories) is standard in GHG analysis, inventory development, and emission reduction programs. Results are presented in units of carbon dioxide equivalents (CO2E), often in million metric tons (MMT), for each gas for comparative purposes following the guidance of the Intergovernmental Panel on Climate Change[8], a widely accepted procedure for greenhouse gas analysis. Selected results for emissions in Georgia during the years 1990 - 2005 and a more detailed description of the 2005 inventory are presented here. More information on the SIT is provided in Appendix A.

Results

Results are presented for annual trends in overall GHG emissions between the years 1990 and 2005 and in more detail for the year 2005, which corresponds with the most recent detailed inventories for other types of emissions submitted under the Consolidated Emissions Reporting Rule (CERR)[9]. Results are presented in the following order:

Annual Trends
- **A. Annual Trends by Sector**
- **B. Annual Trends by Gas**
- **C. Annual Trends by Gas per Sector:**

Detailed Emissions for the Year 2005

Annual Trends

Gross GHG emissions in Georgia are estimated to have increased by 33% between 1990 and 2005, with a minimum of 145.0 MMTCO2E tons/year emissions in 1991 and a maximum of 202.2 MMTCO2E in 2005 (Figure 1). Net emissions, which includes the carbon flux of forests (discussed later), increased by 36% due to a slower rate of increase in carbon sinks (26%) than in emissions. Gross emissions trends differ when evaluated with respect to changes in population or gross state product (GSP), a measure referred to as 'emissions intensity'. Emissions intensity decreased by 5% per capita and by 89% per annual GSP between 1990 and 2005 (Figure 2). These results indicate that, while overall emissions increased, they did not increase as rapidly as population or GSP.

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[7] Information available at http://www.epa.gov/climatechange/wycd/stateandlocalgov/analyticaltools.html . The version applied was publicly released on July 22, 2008.

[8] The Intergovernmental Panel on Climate Change (IPCC) assigned each GHG a GWP based on properties such as solar radiative forcing and average atmospheric lifetime and is often reported as an equivalent mass of CO_2 (GWP = 1) integrated over a 100-year period. SIT GWPs are largely based on the IPCC Technical Summary of Working Group I, *Climate Change 2001: The Scientific Basis*. http://www.grida.no/climate/ipcc_tar/wg1/247.htm.

[9] CERR Final Rule. Published in the Federal Register on June 10, 2002 (FR Volume 67, Number 111, pp 39602 - 39616). The CERR requires State agencies under the Clean Air Act to submit emissions inventories for SO_x, VOC, NO_x, CO, Pb, and PM_{10} for the year 2002 and every 3 years afterward, with delayed reporting requirements for $PM_{2.5}$ and NH_3.

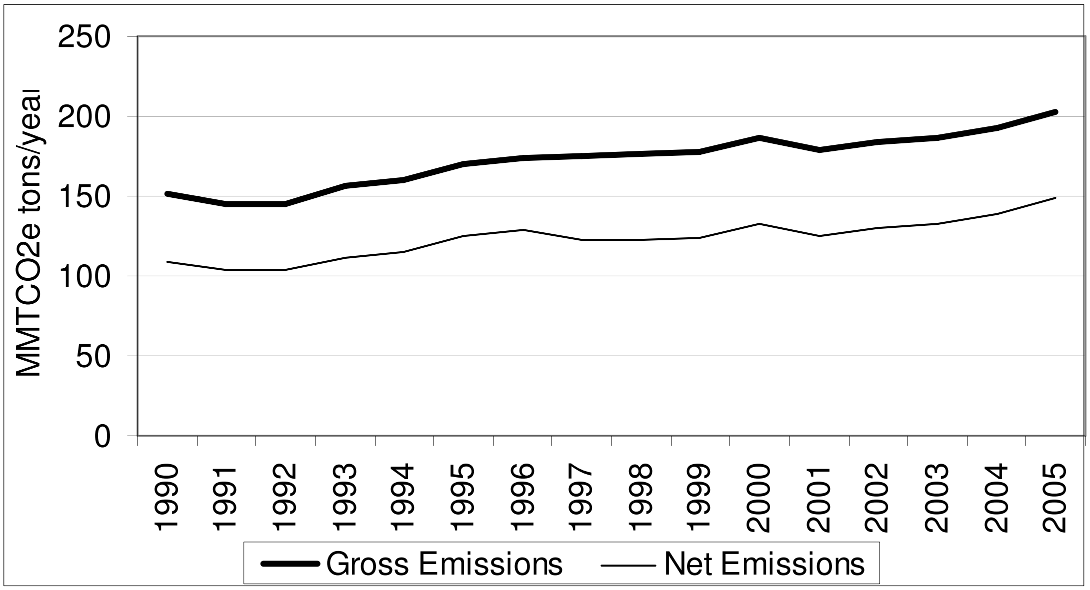


Figure 1. Annual Trends in Greenhouse Gas Emissions in Georgia (1990 - 2005)

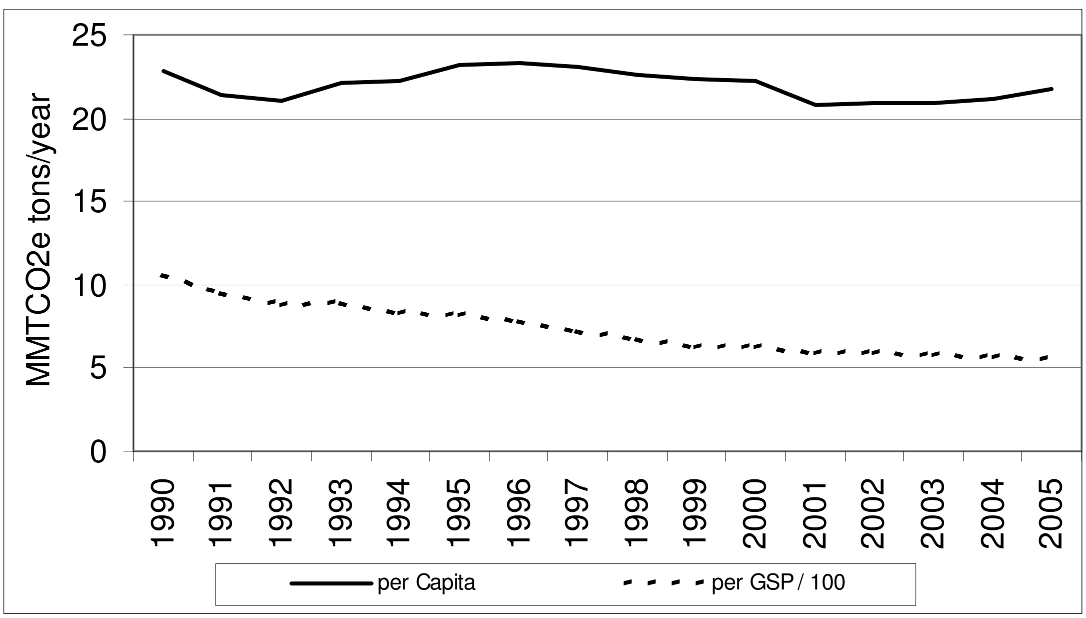


Figure 2. Annual Trends in Gross Emissions of GHGs per Capita and per Gross State Product ($x10^{-2}$)

A. Annual Trends by Sector

The overall sectors and their gases inventoried are shown in Table 1. These sectors are further broken down as shown in the Appendix. As with other U.S. states, the majority of Georgia's GHG emissions and its increasing trend are largely due to increased energy production and use (Figure 3). The increasing trend is slightly offset by increased sequestration of carbon (carbon removed from the atmosphere, indicated by negative emissions values) caused by extensive re-forestation and other tree planting activities reflected in the Land Use, Coverage, and Forestry sector (LUCF) (Figure 3a and 3b).

Category	Sector	Gases	Industries/activities included
Energy	CO_2 from Fossil Fuel Combustion	CO_2	transportation, electric utilities, residential, commercial, industrial, international bunker fuels
	Stationary Combustion	CH_4, N_2O	residential, commercial, industrial, electric utilities
	Natural Gas and Oil	CO_2, CH_4	transmission, distribution, flaring
	Coal Mining	CH_4	surface, underground, abandoned
	Mobile Combustion	CH_4, N_2O	on-road, non-road, aviation, marine, locomotive
Industrial Processes	Industrial Processes	CH_4, N_2O, HFC, PFC, SF_6	cement production, lime manufacture, electric power transmission and distribution
Agriculture	Agriculture	CH_4, N_2O	manure management, residue burning
LUCF	Land Use Change and Forestry	CO_2, CH_4, N_2O	soil liming, fertilization, forest fires (nonCO_2), urban trees, forest management (sources and sinks)
Waste	Municipal Solid Waste	CO_2, CH_4, N_2O	landfill and waste combustion
	Wastewater	CH_4, N_2O	municipal and industrial (pulp and paper, food production)

Table 1. Sectors and their associated emissions inventoried using the US EPA SIT.

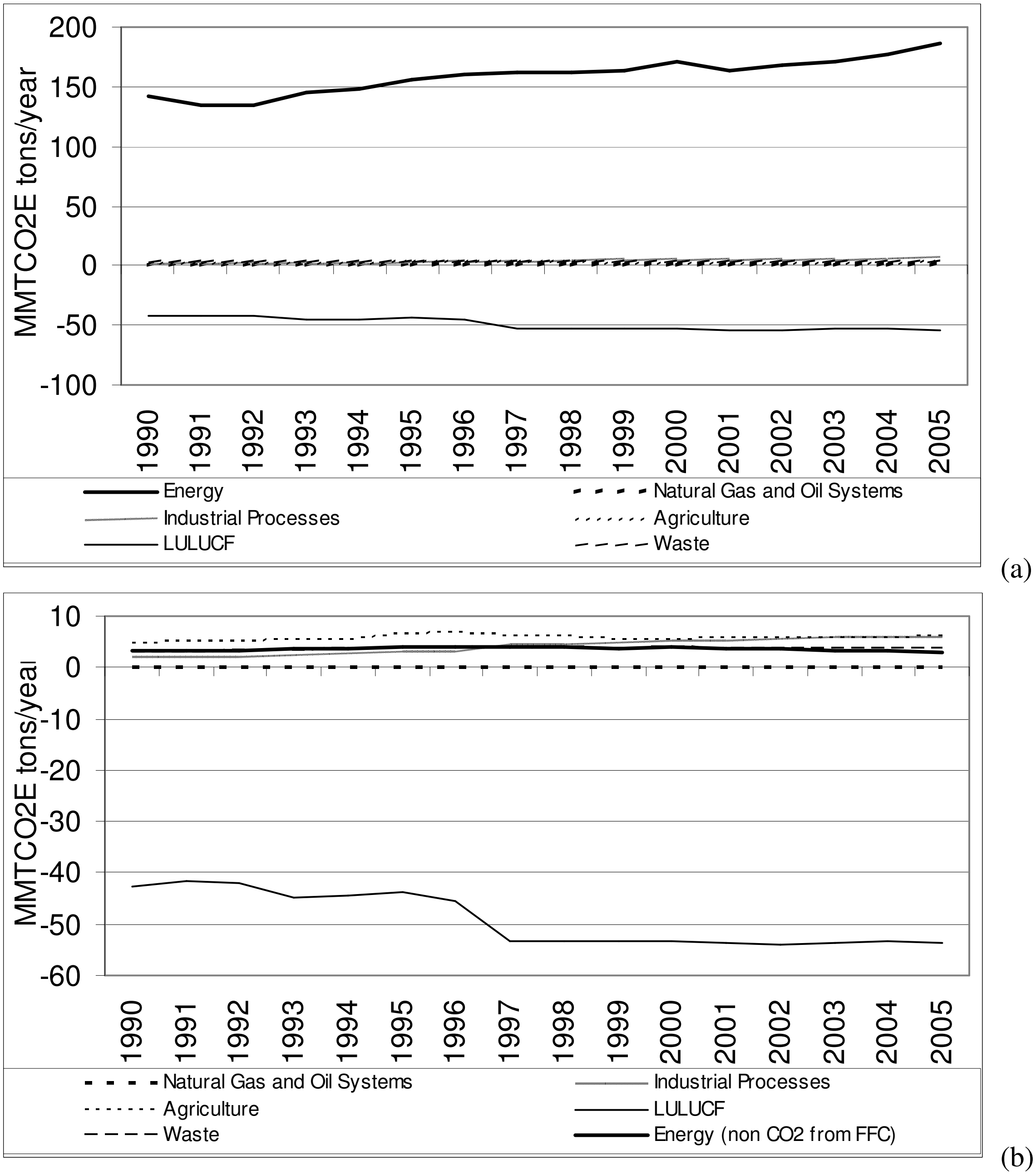


Figure 3. (a) Sector Specific Annual Trends in GHG Emissions and (b) excluding CO_2 from Energy Production.

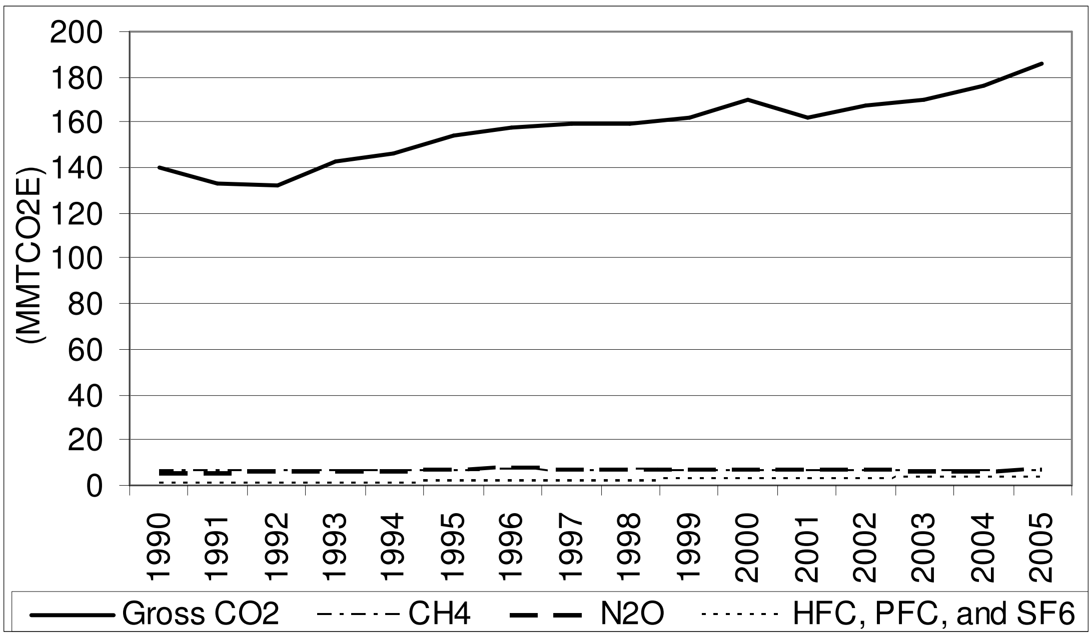
While the increase in carbon sequestration by forested land is believed to reflect actual changes in land management starting during the late 1980s (which has a delayed impact on sequestration)[10], representation of the timing and extent of these changes may be refined. Other sectors slightly contributing to the inventory include Agriculture (e.g. soil management, enteric fermentation, and manure management), Industrial Processes (e.g. electric power transmission and distribution systems, cement manufacture, ammonia and urea production), non-CO_2 Energy production emissions, and Waste (e.g. municipal solid combustion and wastewater). Note that emissions from the Energy sector are 98-99% due to CO_2 emissions from fossil fuel combustion and 1-2% from CH_4 and N_2O emissions

[10] Georgia Forestry Commission, Nathan McClure, personal communication with Michelle Bergin, March 2008.

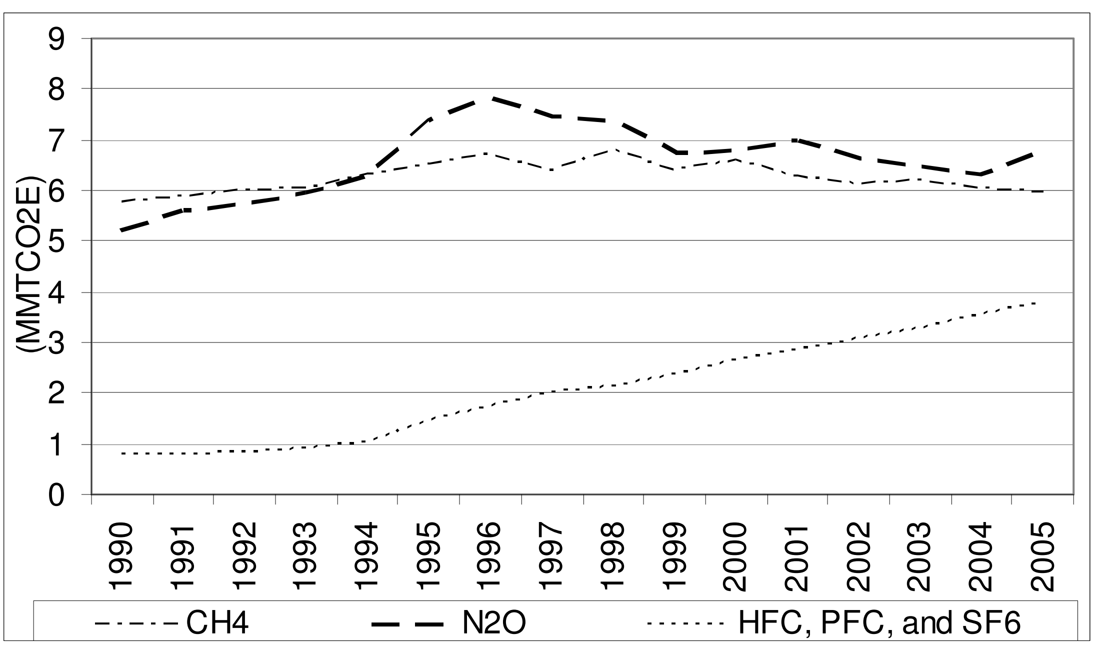
from mobile and stationary combustion sources. Emissions estimates for the sectors Natural Gas and Oil Systems and Coal Mining are zero for Georgia.

B. Annual Trends by Gas

Viewing the inventory by gas shows that of the six greenhouse gases inventoried, the large majority of emissions and growth is from CO_2, followed by N_2O, CH_4, and combined emissions of HFC, PFC, and SF_6 (Figure 4). The HFC, PFC, and SF_6 category, representing a number of compounds with extremely long atmospheric lifetimes, is shown to be steadily increasing.



(a)



(b)

Figure 4. Annual Trends in Emissions of (a) CO_2, CH_4, N_2O, and HFC, PFC, and SF_6, and (b) excluding CO_2.

The large majority of emissions and growth is from CO_2 emitted during fossil fuel combustion from petroleum use in the transportation sector and coal use in the electric utility sector (increasing by 30% and 26% from 1990 to 2005, respectively) (Figure 5). The remainder of CO_2 emitted during fossil fuel combustion is estimated to be from the industrial sector, followed by residential and then commercial activities (mostly natural gas combustion).

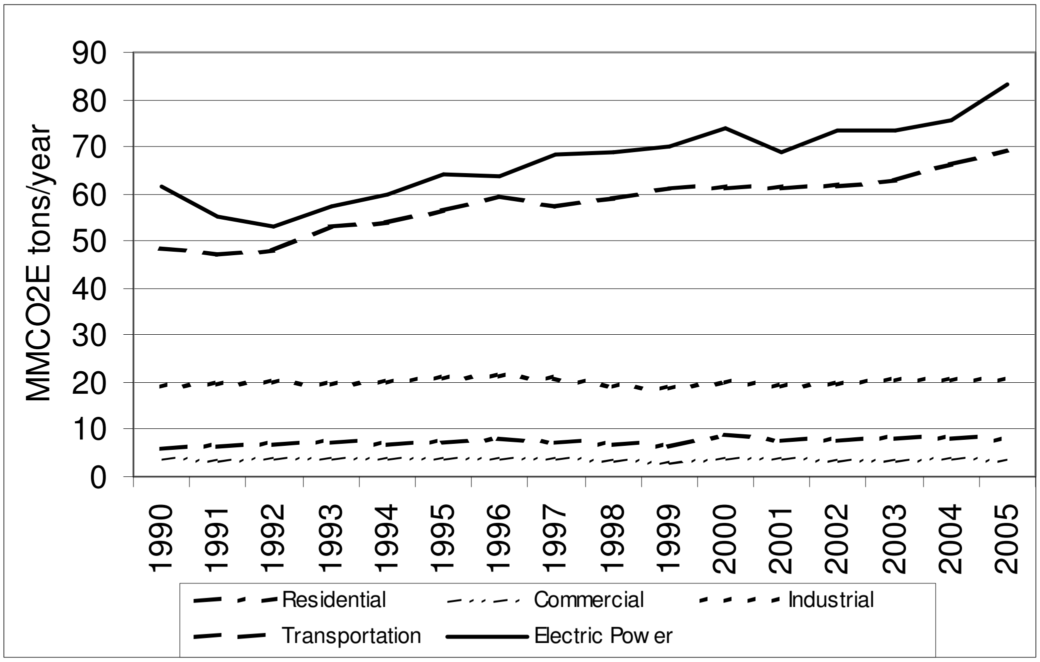


Figure 5. Annual Trends in CO2 emissions from fossil fuel combustion.

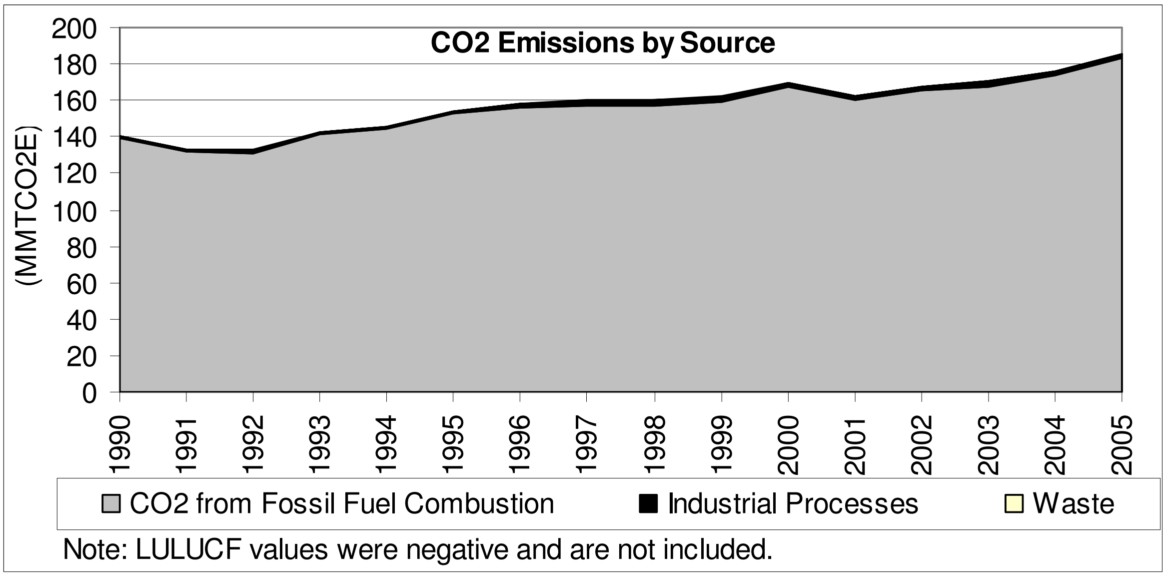
C. Annual Trends by Gas per Sector

A further look at emissions by source sector reveals the differences in contribution to individual greenhouse gases (Figure 6). First, as previously stated, we see that the emissions of CO_2 are much higher than of CH_4, N_2O, HFC, PFC, and SF_6 (up to over 180 MMTCO2E compared with slightly over 16.5 MMTCO2E of the other gases combined). CO_2 emissions are overwhelmingly dominated by fossil fuel combustion (Figure 6a), which has been generally increasing since 1992 and was 184 MMTCO2E in 2005. Methane and N_2O total emissions combined were 12.5 MMTCO2E in 2005 (about 6% of total inventoried greenhouse gas emissions). The HFC, PFC, and SF_6 category, responsible for approximately 2% of the total inventory in recent years (3.80 MMTCO2E in 2005), is considered to be emitted entirely from industrial processes.

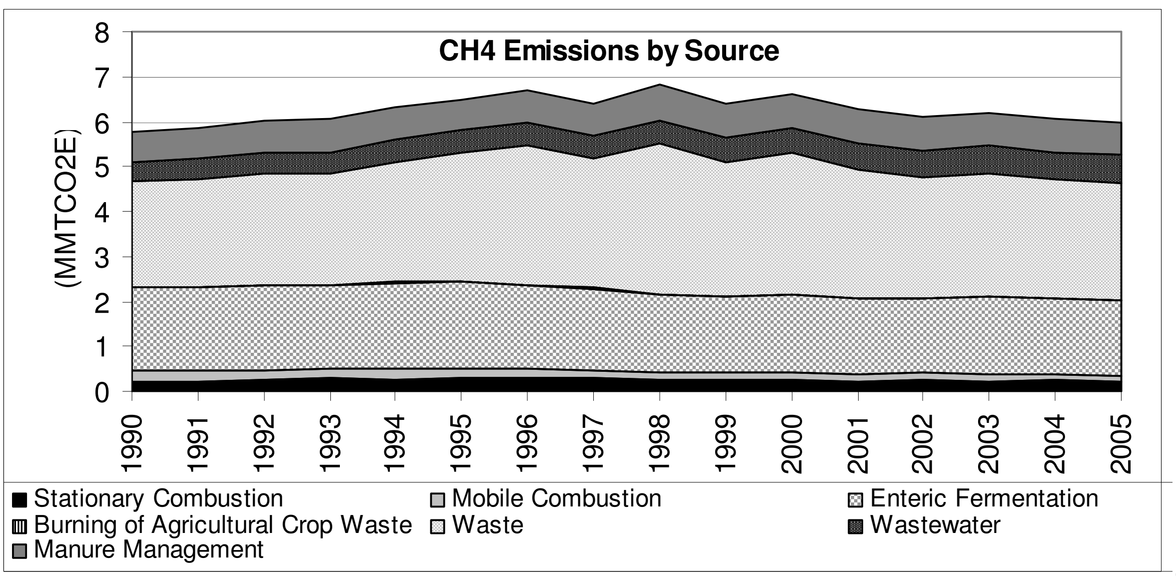
Methane emissions are largely emitted from waste processes, including waste combustion and industrial and municipal wastewater treatment. Agricultural processes, including enteric fermentation and manure management are also contributors, and lower emissions result from mobile and stationary source combustion (Figure 6b). These emissions are estimated to have been fairly steady since the mid 1990s.

N_2O emissions are emitted at an overall similar level to CH_4, with dominant contributions from agricultural processes including soil and manure management, followed by mobile and stationary combustion, and then wastewater treatment (Figure 6c). These emissions are estimated to have increased between 1992 and 1996 and then to have begun to gradually decrease until the early 2000s, mostly due to changes in mobile combustion and agricultural soil management practices.

It should be noted that other anthropogenic gases, such as NF_3, may be required for inclusion in greenhouse gas emissions inventories in the future.



(a)



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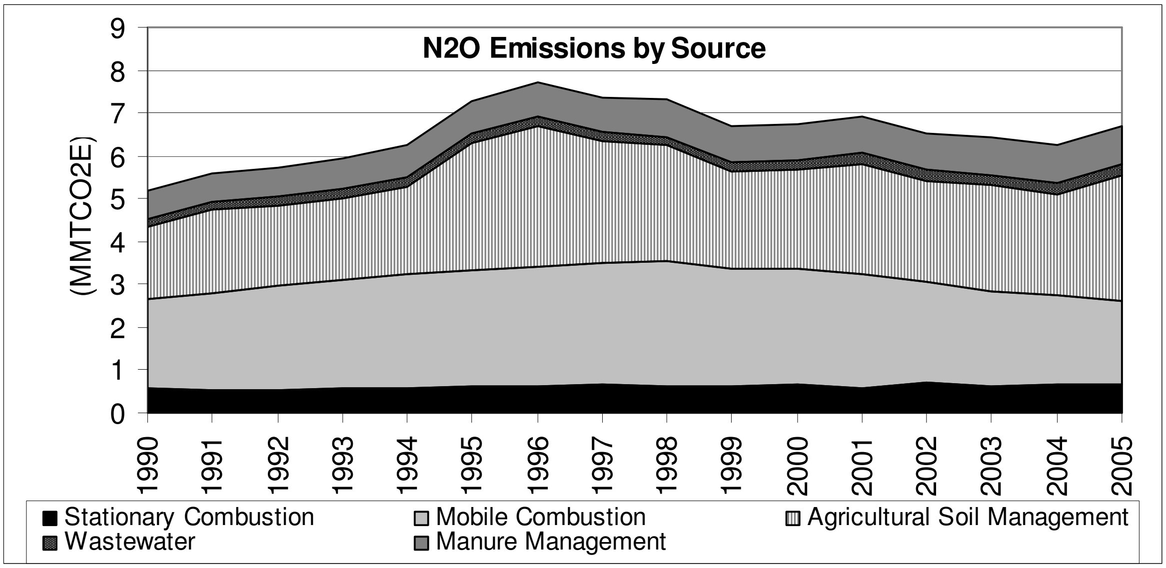

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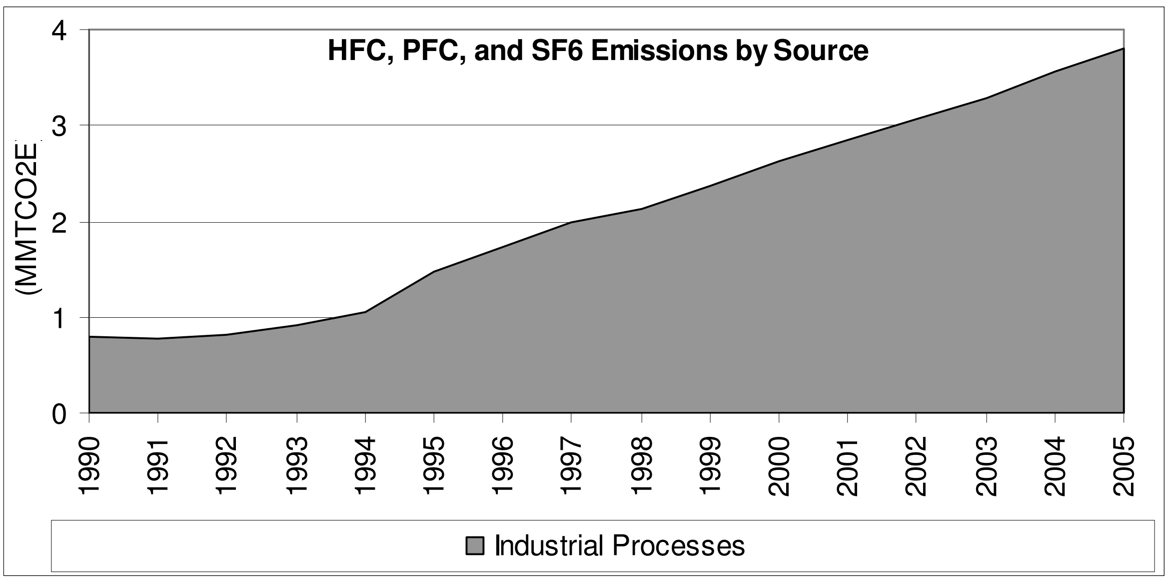

(d)

Figure 6. (a) CO_2 , (b) CH_4, (c) N_2O, and (d) HFC, PFC, and SF6 emissions by source.

Detailed Emissions for the Year 2005

Gross emissions during the year 2005 were 202 MMTCO2E, with source patterns typical of other recent years. The majority of emitted Global Warming Potential (GWP), approximately 92%, was due to CO_2 emissions from activities related to energy production and use (Figure 7 a,b).

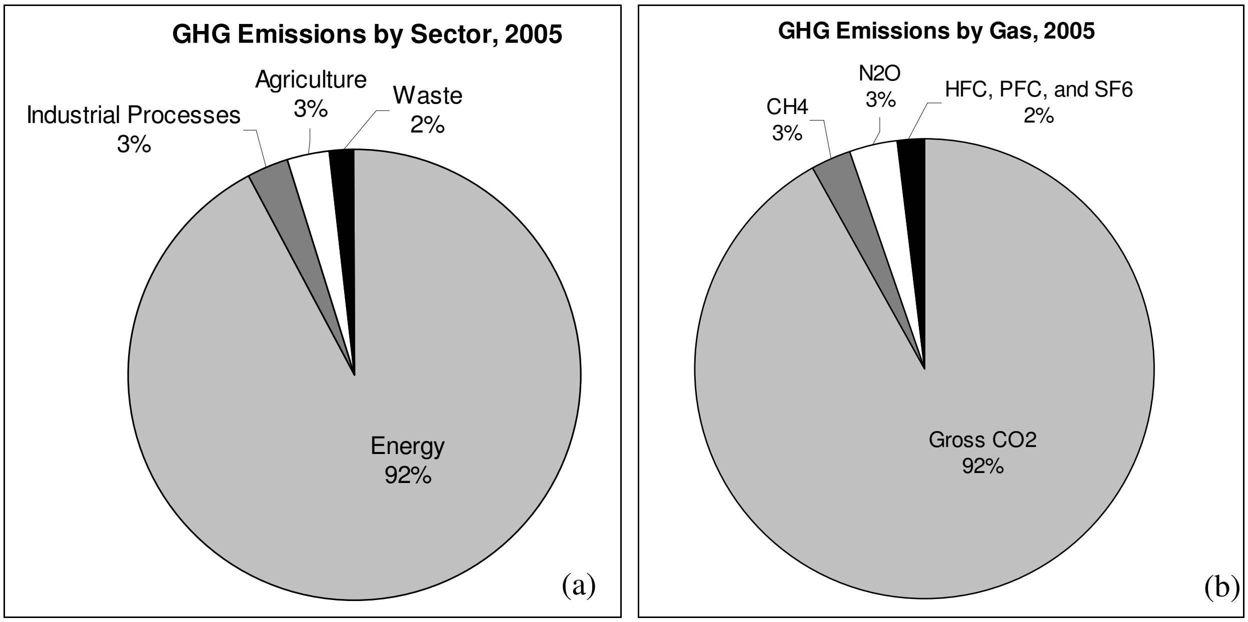

Figure 7. GHG Emissions in Georgia by (a) sector and (b) gas during 2005. Gross emissions were 202 MMTCO2E.

Viewing the inventory in more detail, it can be seen that the large majority of GHG emissions from energy production and use were contributed by CO_2 emissions from fossil fuel combustion (Figure 8a), largely resulting from the electric power (45%) and transportation (38%) sectors (Figure 8b).

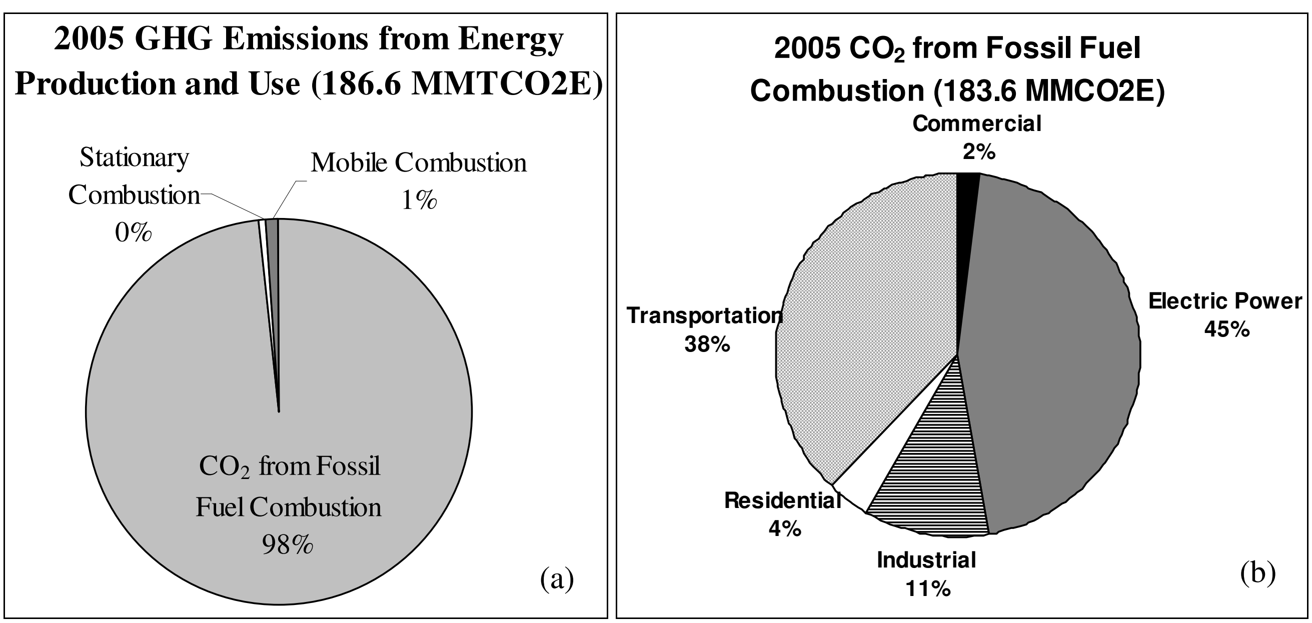

Figure 8. GHG Emissions in Georgia from (a) energy production and use and from (b) fossil fuel combustion during 2005.

Of the three fossil fuels calculated, combustion of coal (45%) and petroleum (43%) resulted in the largest emissions of CO_2 (Figure 9a). Coal was mostly used for electric power generation (95%) (Figure 9b) and petroleum was mostly used was for transportation (88%) (Figure 9c). Natural gas emissions are more evenly split from use by the industrial (37%) and residential (30%) sectors, with smaller contributions from the electric power (18%) and commercial (13%) sectors (Figure 9d).

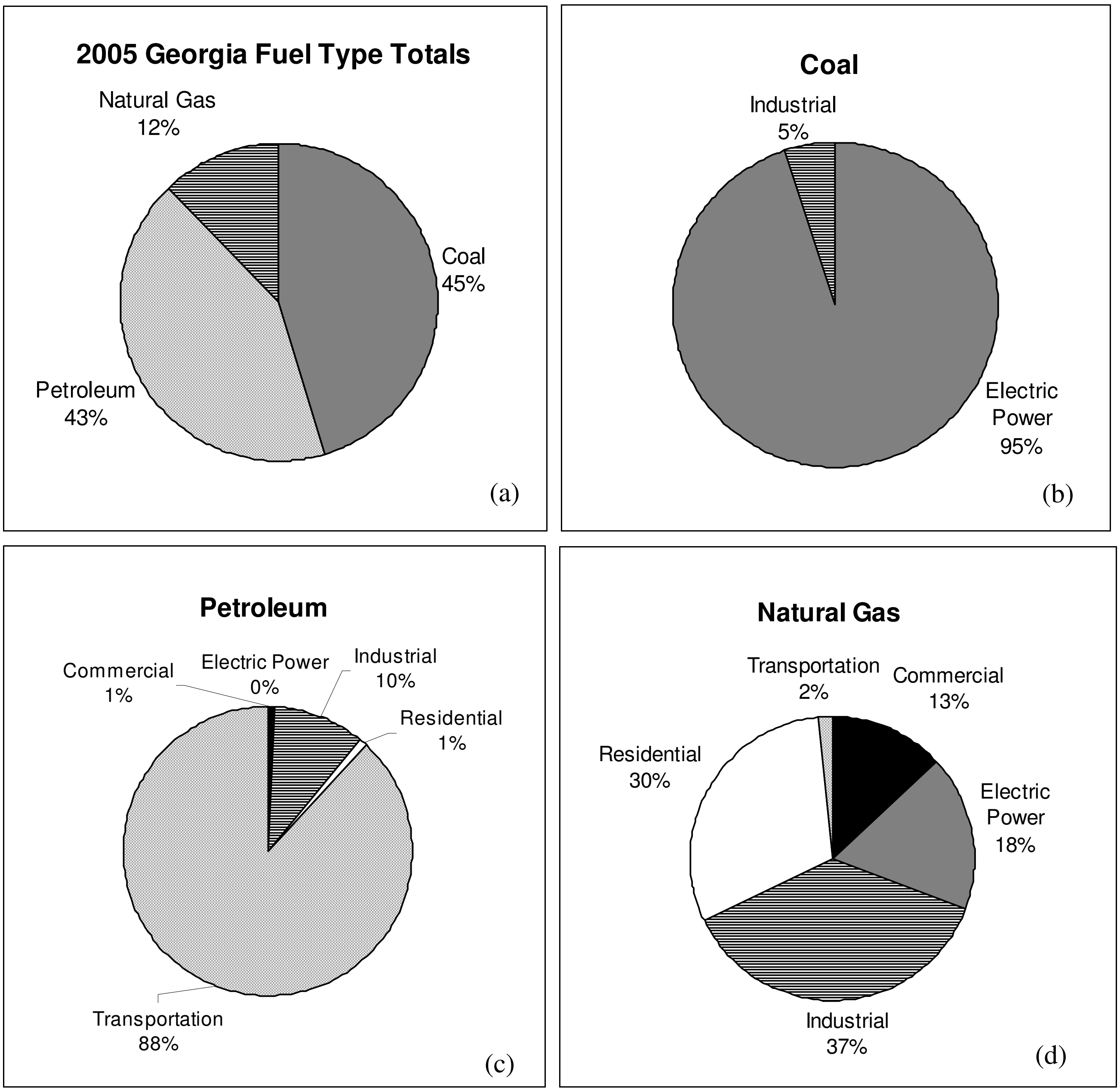

Figure 9. Georgia 2005 CO_2 contributions from fossil fuel combustion by (a) fuel type and by sector for each fuel type, including (b) coal, (c) petroleum, and (d) natural gas.

Future Activity

In its Fiscal Year 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), Congress directed the US EPA to draft a mandatory GHG reporting rule by September 2008 and a final rule by June 2009[11]. This rule will cover both "upstream" and "downstream" sources (e.g. fossil fuel and chemical producers and importers and direct emitters such as large industrial facilities, respectively). The GA EPD is preparing to respond to this rule and will continue to explore ways to refine and improve future GHG inventories. More accurate data may available for some sources from information already routinely collected by the EPD for permitting and for the derivation of criteria pollutant emissions inventories, and some sectors will likely be identified for the collection of additional data. The state of Georgia is a member of The Climate Registry[12], with five companies in the state already signed onto the Registry as Founding Reporters. Further industries may join the registry, providing an additional, reliable source of greenhouse gas emissions data. The years 2002 and 2005, which align with GA EPD detailed emissions inventories assembled in compliance with the Consolidated Emissions Reporting Rule (CERR), will likely be targeted for more detailed analysis and refinement.

For questions, comments, or suggestions, please contact:

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[11] http://www.epa.gov/climatechange/emissions/ghgrulemaking.html
[12] The Climate Registry is a U.S. state-led international organization with currently 39 U.S. states, 1 Mexican state, 3 Canadian provinces, and 3 Native American tribes signed as members. The Registry is expected to open to voluntary reporters early in 2008. http://www.theclimateregistry.org/ .

Appendix

The EPA's State Inventory Tool (SIT)

The SIT is a set of Microsoft Excel based workbooks and is composed of 10 'modules', each addressing a different sector and/or gas type. Six greenhouse gases/categories are accounted for by this system, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF_6), and are reported in units of million metric tons of carbon dioxide equivalent (MMTCO2E) based on the gas' Global Warming Potential (GWP). The Intergovernmental Panel on Climate Change (IPCC) assigned each GHG a GWP based on properties such as solar radiative forcing and average atmospheric lifetime, and is often reported as an equivalent mass of CO_2 integrated over a 100-year period.[13] Contribution of these gases to the inventory may differ if normalized over different periods (e.g. 200 years, 500 years.)

The SIT modules are as follows:

	Module Name	Gases	Examples
1	CO_2 from Fossil Fuel Combustion	CO_2	transportation, electric utilities, residential, commercial, industrial, international bunker fuels
2	Stationary Combustion	CH_4, N_2O	residential, commercial, industrial, electric utilities
3	Natural Gas and Oil	CO_2, CH_4	transmission, distribution, flaring
4	Coal Mining	CH_4	surface, underground, abandoned
5	Mobile Combustion	CH_4, N_2O	on-road, non-road, aviation, marine, locomotive
6	Industrial Processes	CH_4, N_2O, HFC, PFC, SF_6	cement production, lime manufacture, electric power transmission and distribution
7	Agriculture	CH_4, N_2O	manure management, residue burning
8	Land Use Change and Forestry	CO_2, CH_4, N_2O	soil liming, fertilization, forest fires (nonCO_2), urban trees, forest management (sources and sinks)
9	Municipal Solid Waste	CO_2, CH_4, N_2O	landfill and waste combustion
10	Wastewater	CH_4, N_2O	municipal and industrial (pulp and paper, food production)

These sectors are further categorized as:

Energy	CO2 from Fossil Fuel Combustion Stationary Combustion Mobile Combustion Coal Mining Natural Gas and Oil Systems
Industrial Processes	Industrial Processes
Agriculture	Enteric Fermentation Manure Management Rice Cultivation

[13] SIT GWPs are largely based on the IPCC Technical Summary of Working Group I, Climate Change 2001: The Scientific Basis. http://www.grida.no/climate/ipcc_tar/wg1/247.htm .

	Agricultural Soil Management Burning of Agricultural Crop Waste
LUCF	LUCF
Waste	Municipal Solid Waste Wastewater

The following tables contain a summary of these modules for the state of Georgia through 2005.

Appendix to Greenhouse Gas Emissions Inventory for the State of Georgia

September 2008

The following tables are from the summery sheets of each module of the US EPA State Inventory Tool calculated for the state of Georgia.

Module names

1 CO2 from Fossil Fuel Combustion (e.g. energy production, transportation)
2 Stationary Combustion (CH4 and N2O emissions)
3 Natural Gas and Oil (e.g. transmission, distribution, flaring)
4 Coal Mining
5 Mobile Combustion (CH4 and N2O emissions)
6 Industrial Processes (e.g. cement production, lime manufacture)
7 Agriculture (CH4 and N2O, e.g. manure management, residue burning)
8 Land Use Change and Forestry (sources and sinks)
9 Municipal Solid Waste (landfill and combustion)
10 Wastewater

1 CO2 from Fossil Fuel Combustion (e.g. energy production, transportation)

MMTCO2E	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Residential	5.87	6.23	6.95	7.42	6.82	7.29	7.94	7.33	6.82	6.44	8.78	7.43	7.69	8.05	7.94	7.57
Coal	0.01	0.00	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.01
Petroleum	0.95	0.97	1.05	1.12	1.05	1.04	1.05	1.09	0.97	1.06	1.17	0.85	0.81	0.85	0.93	0.76
Natural Gas	4.91	5.26	5.88	6.30	5.76	6.24	6.89	6.23	5.85	5.38	7.60	6.58	6.88	7.19	7.00	6.79
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial	3.77	3.52	3.85	3.91	3.80	4.02	4.03	3.95	3.57	3.16	4.01	3.67	3.27	3.37	3.71	3.51
Coal	0.04	0.02	0.07	0.04	0.06	0.12	0.01	0.04	0.02	0.04	0.02	0.02	0.01	-	0.01	0.10
Petroleum	1.03	0.73	0.85	0.74	0.79	0.82	0.70	0.79	0.53	0.75	0.82	0.87	0.61	0.58	0.65	0.52
Natural Gas	2.69	2.78	2.93	3.13	2.95	3.07	3.33	3.12	3.02	2.37	3.17	2.78	2.64	2.78	3.05	2.89
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial	19.18	19.58	19.92	19.34	20.04	20.91	21.20	20.66	19.12	18.72	19.87	19.29	19.46	20.43	20.55	20.22
Coal	5.22	4.91	4.18	4.01	4.51	4.57	4.64	4.77	4.61	4.59	4.75	4.77	4.40	4.24	4.23	4.05
Petroleum	5.32	5.76	6.55	6.38	6.26	6.57	6.93	6.58	5.78	5.99	6.42	7.19	7.49	7.60	7.68	7.92
Natural Gas	8.64	8.91	9.20	8.94	9.28	9.78	9.64	9.30	8.73	8.14	8.70	7.33	7.56	8.59	8.64	8.24
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transportation	48.57	47.32	47.79	53.21	53.91	56.35	59.51	57.20	59.15	61.23	61.31	61.19	61.35	62.84	66.14	69.18
Coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	48.17	46.91	47.38	52.83	53.53	55.93	59.04	56.75	58.72	60.72	60.98	60.76	60.89	62.40	65.75	68.82
Natural Gas	0.40	0.40	0.41	0.39	0.39	0.43	0.47	0.45	0.43	0.50	0.33	0.43	0.46	0.44	0.39	0.36
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric Power	61.45	55.08	52.88	57.33	59.77	63.91	63.67	68.20	68.66	69.96	73.79	68.58	73.32	73.37	75.41	83.14
Coal	61.19	54.95	52.69	56.94	59.54	63.09	63.08	67.05	66.13	67.54	70.81	66.40	70.02	71.29	72.75	78.92
Petroleum	0.15	0.09	0.12	0.23	0.16	0.22	0.28	0.24	0.72	0.65	0.72	0.31	0.23	0.33	0.15	0.21

	Natural Gas	0.10	0.05	0.06	0.16	0.07	0.60	0.31	0.91	1.81	1.77	2.26	1.87	3.07	1.75	2.51	4.01
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	International Bunker Fuels	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.01
	Petroleum	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.01
	TOTAL	138.84	131.74	131.38	141.22	144.34	152.48	156.36	157.33	157.33	159.51	167.76	160.17	165.07	168.05	173.75	183.61
	Coal	66.47	59.88	56.96	61.00	64.11	67.79	67.72	71.87	70.77	72.18	75.58	71.20	74.43	75.53	77.00	83.08
	Petroleum	55.63	54.46	55.95	61.29	61.78	64.57	67.99	65.45	66.72	69.17	70.11	69.97	70.03	71.76	75.16	78.23
	Natural Gas	16.75	17.40	18.47	18.92	18.45	20.12	20.64	20.02	19.84	18.16	22.07	18.99	20.61	20.76	21.58	22.29
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	**Stationary Combustion (CH4 and N2O emissions)**																
	2a. Stationary Combustion N_2O emissions																
	MMTCO2E	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Residential	0.018	0.019	0.021	0.027	0.026	0.026	0.027	0.023	0.020	0.021	0.024	0.017	0.017	0.018	0.018	0.018
	Coal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	0.000
	Petroleum	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.003	0.002
	Natural Gas	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004
	Wood	0.013	0.014	0.014	0.021	0.020	0.020	0.020	0.016	0.014	0.015	0.016	0.011	0.011	0.011	0.012	0.012
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Commercial	0.006	0.005	0.006	0.007	0.007	0.007	0.007	0.007	0.006	0.006	0.007	0.006	0.005	0.005	0.005	0.005
	Coal	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	0.001
	Petroleum	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.001
	Natural Gas	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.001	0.002	0.002	0.002
	Wood	0.001	0.001	0.002	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Industrial	0.248	0.239	0.238	0.241	0.247	0.260	0.264	0.278	0.260	0.260	0.254	0.225	0.331	0.241	0.254	0.238
	Coal	0.026	0.025	0.021	0.020	0.023	0.023	0.023	0.024	0.023	0.023	0.024	0.024	0.022	0.021	0.021	0.020
	Petroleum	0.010	0.010	0.012	0.011	0.011	0.012	0.013	0.013	0.011	0.012	0.013	0.014	0.015	0.015	0.016	0.017
	Natural Gas	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.004	0.004	0.005	0.005	0.004
	Wood	0.207	0.200	0.200	0.205	0.208	0.220	0.222	0.237	0.222	0.221	0.213	0.183	0.290	0.200	0.212	0.196
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electric Utilities	0.307	0.275	0.265	0.286	0.297	0.315	0.315	0.337	0.338	0.344	0.361	0.338	0.357	0.363	0.370	0.402
	Coal	0.306	0.275	0.264	0.285	0.297	0.314	0.314	0.334	0.334	0.342	0.358	0.336	0.354	0.361	0.368	0.399
	Petroleum	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.001
	Natural Gas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.002
	Wood	-	-	-	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	0.579	0.539	0.529	0.561	0.577	0.608	0.612	0.645	0.624	0.632	0.646	0.585	0.710	0.627	0.647	0.663
	Coal	0.333	0.300	0.286	0.305	0.320	0.337	0.337	0.358	0.358	0.365	0.382	0.360	0.376	0.382	0.389	0.420
	Petroleum	0.016	0.015	0.017	0.017	0.017	0.018	0.019	0.019	0.017	0.018	0.020	0.020	0.019	0.020	0.021	0.021
	Natural Gas	0.009	0.009	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.010	0.012	0.010	0.011	0.011	0.012	0.012
	Wood	0.221	0.215	0.216	0.228	0.231	0.242	0.245	0.257	0.239	0.239	0.232	0.195	0.304	0.214	0.225	0.211

	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2b. Stationary Combustion CH_4 emissions																
	MMTCO2E	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Residential	0.079	0.082	0.088	0.121	0.114	0.116	0.120	0.098	0.087	0.091	0.101	0.070	0.071	0.074	0.076	0.077
	Coal	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	0.001
	Petroleum	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003
	Natural Gas	0.009	0.010	0.011	0.012	0.011	0.012	0.013	0.012	0.011	0.010	0.014	0.012	0.013	0.014	0.013	0.013
	Wood	0.066	0.069	0.072	0.105	0.099	0.099	0.103	0.082	0.073	0.077	0.082	0.054	0.055	0.058	0.059	0.061
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Commercial	0.015	0.015	0.016	0.022	0.022	0.022	0.022	0.022	0.019	0.019	0.022	0.017	0.017	0.017	0.018	0.017
	Coal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	0.000
	Petroleum	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002
	Natural Gas	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.004	0.006	0.005	0.005	0.005	0.006	0.005
	Wood	0.007	0.007	0.008	0.014	0.013	0.014	0.014	0.014	0.012	0.013	0.013	0.010	0.010	0.010	0.010	0.010
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Industrial	0.123	0.119	0.119	0.120	0.123	0.130	0.131	0.139	0.130	0.130	0.126	0.111	0.165	0.120	0.126	0.118
	Coal	0.012	0.011	0.009	0.009	0.010	0.010	0.011	0.011	0.010	0.010	0.011	0.011	0.010	0.010	0.010	0.009
	Petroleum	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.006
	Natural Gas	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	Wood	0.105	0.102	0.102	0.104	0.106	0.112	0.113	0.120	0.113	0.112	0.108	0.093	0.148	0.102	0.107	0.100
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electric Power	0.014	0.013	0.012	0.013	0.014	0.015	0.015	0.016	0.016	0.017	0.018	0.016	0.017	0.017	0.018	0.020
	Coal	0.014	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.015	0.015	0.016	0.015	0.016	0.016	0.017	0.018
	Petroleum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	Natural Gas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
	Wood	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	0.231	0.229	0.234	0.276	0.272	0.282	0.288	0.274	0.253	0.256	0.267	0.214	0.270	0.228	0.237	0.231
	Coal	0.026	0.024	0.023	0.023	0.024	0.026	0.025	0.026	0.026	0.026	0.027	0.026	0.026	0.026	0.026	0.028
	Petroleum	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.010	0.011	0.010	0.010	0.010	0.011	0.010
	Natural Gas	0.018	0.018	0.020	0.021	0.020	0.021	0.023	0.021	0.021	0.018	0.024	0.021	0.022	0.023	0.023	0.023
	Wood	0.178	0.178	0.182	0.223	0.219	0.224	0.230	0.216	0.198	0.202	0.204	0.157	0.212	0.170	0.177	0.171
	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	**Natural Gas and Oil (e.g. transmission, distribution, flaring)**																
	Emissions (MMTCO2 Eq.)																
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Natural Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Emissions by Gas (MMTCO2)																
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Natural Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Flaring																
4	**Coal Mining**																
	Emissions (MTCO2E)																
		1990	**1991***	**1992***	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Coal Mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Abandoned Coal Mines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Vented	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sealed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Flooded	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	**Mobile Combustion (CH4 and N2O emissions)**																
	CH4 Emissions from Mobile Sources (MTCO2E)																
	Fuel Type/Vehicle Type	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Gasoline Highway	**200,472**	**201,422**	**206,902**	**200,959**	**201,171**	**193,808**	**186,926**	**180,414**	**172,642**	**156,059**	**151,215**	**149,107**	**125,990**	**115,144**	**107,187**	**98,145**
	Passenger Cars	123,510	116,919	117,782	112,879	113,208	108,566	104,588	100,318	96,727	90,913	87,851	82,250	74,506	67,296	62,635	56,354
	Light-Duty Trucks	63,755	70,360	75,571	75,301	74,855	72,236	70,309	69,060	65,815	55,699	54,711	59,762	44,735	41,526	38,471	36,070
	Heavy-Duty Vehicles	12,512	13,420	12,778	12,003	12,289	12,152	11,208	10,235	9,305	8,572	7,771	6,301	5,977	5,565	5,288	4,926
	Motorcycles	695	723	771	777	819	854	821	801	794	874	881	794	771	757	793	795
	Diesel Highway	**710**	**745**	**770**	**801**	**878**	**934**	**971**	**1,047**	**1,082**	**1,040**	**1,126**	**1,158**	**1,176**	**1,166**	**1,203**	**1,180**
	Passenger Cars	7	6	7	6	6	6	6	6	6	5	5	5	5	5	5	5
	Light-Duty Trucks	15	17	19	21	22	23	24	26	27	26	28	30	29	30	31	32
	Heavy-Duty Vehicles	687	722	744	774	850	906	942	1,015	1,049	1,009	1,093	1,123	1,142	1,131	1,167	1,143
	Non-Highway	**14,204**	**11,619**	**12,839**	**12,000**	**11,933**	**13,340**	**13,961**	**13,105**	**13,161**	**13,426**	**12,648**	**13,867**	**14,360**	**13,809**	**16,303**	**17,097**
	Boats	1,665	1,665	3,529	2,656	2,016	1,614	1,502	1,415	1,238	1,086	1,110	1,011	2,158	2,403	4,239	4,624
	Locomotives	1,307	988	1,022	920	1,143	1,238	1,442	1,880	1,397	1,379	1,284	1,326	2,134	1,890	1,989	2,014
	Farm Equipment	2,845	1,878	1,733	2,182	2,017	3,298	3,538	3,201	3,875	3,505	3,604	4,606	3,863	2,756	2,557	2,567
	Construction Equipment	1,491	1,254	1,332	1,334	1,461	1,604	2,102	1,772	1,967	2,186	2,156	2,664	2,373	2,469	2,470	2,724
	Aircraft	5,468	4,458	3,896	4,544	4,899	5,225	5,028	4,487	4,344	4,458	3,668	2,857	2,423	2,899	3,416	3,592
	Other*	1,428	1,376	1,327	364	397	362	350	349	340	812	825	1,402	1,409	1,392	1,632	1,577
	Alternative Fuel Vehicles	**273**	**288**	**304**	**385**	**404**	**540**	**711**	**974**	**1,087**	**1,176**	**1,358**	**1,765**	**2,062**	**2,725**	**3,049**	**2,674**
	Light Duty Vehicles	94	100	108	116	115	218	280	476	527	582	646	763	872	965	984	842

Heavy Duty Vehicles	99	98	97	129	143	175	275	328	377	397	505	781	942	1,477	1,750	1,557
Buses	80	90	99	139	146	147	155	170	183	197	207	221	247	282	314	275
Total	**215,659**	**214,074**	**220,815**	**214,144**	**214,386**	**208,622**	**202,569**	**195,541**	**187,972**	**171,701**	**166,347**	**165,897**	**143,587**	**132,844**	**127,741**	**119,095**

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

N2O Emissions from Mobile Sources (MTCO2E)

Fuel Type/Vehicle Type	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Gasoline Highway	**1,975,268**	**2,134,214**	**2,347,795**	**2,411,387**	**2,549,046**	**2,600,653**	**2,677,845**	**2,750,256**	**2,783,926**	**2,606,301**	**2,624,281**	**2,560,214**	**2,251,528**	**2,091,437**	**1,974,277**	**1,834,115**
Passenger Cars	1,254,287	1,263,681	1,340,655	1,338,706	1,399,869	1,405,879	1,421,383	1,427,579	1,441,809	1,386,000	1,380,506	1,321,734	1,224,483	1,132,101	1,079,985	997,446
Light-Duty Trucks	685,996	829,016	963,995	1,029,138	1,101,884	1,145,602	1,201,014	1,261,371	1,275,053	1,157,697	1,179,765	1,180,088	965,967	897,029	829,396	773,768
Heavy-Duty Vehicles	33,987	40,480	42,039	42,430	46,118	47,948	54,258	60,135	65,895	61,323	62,712	57,218	59,934	61,181	63,715	61,716
Motorcycles	997	1,037	1,106	1,114	1,175	1,224	1,189	1,171	1,169	1,281	1,297	1,174	1,143	1,125	1,181	1,186
Diesel Highway	**10,132**	**10,631**	**10,995**	**11,431**	**12,518**	**13,298**	**13,826**	**14,897**	**15,379**	**14,789**	**16,010**	**16,459**	**16,695**	**16,572**	**17,094**	**16,777**
Passenger Cars	227	208	212	204	202	192	188	189	182	171	170	157	157	157	162	162
Light-Duty Trucks	348	390	445	472	500	518	549	593	612	599	645	698	667	690	706	726
Heavy-Duty Vehicles	9,556	10,032	10,338	10,755	11,816	12,587	13,089	14,115	14,585	14,019	15,196	15,604	15,871	15,725	16,227	15,889
Non-Highway	**113,692**	**92,104**	**93,734**	**94,522**	**99,662**	**108,026**	**107,724**	**98,234**	**97,614**	**101,039**	**91,930**	**89,064**	**85,314**	**88,388**	**100,949**	**105,949**
Boats	8,548	8,547	18,119	13,639	10,351	8,285	7,710	7,265	6,357	5,576	5,699	5,191	11,078	12,339	21,765	23,742
Locomotives	6,173	4,666	4,829	4,345	5,397	5,846	6,813	8,882	6,601	6,516	6,065	6,266	10,082	8,930	9,395	9,511
Farm Equipment	7,467	4,928	4,549	5,726	5,293	8,655	9,284	8,401	10,170	9,200	9,458	12,089	10,138	7,232	6,711	6,736
Construction Equipment	9,785	8,229	8,736	8,755	9,587	10,521	13,788	11,628	12,906	14,343	14,148	17,480	15,569	16,202	16,204	17,869
Aircraft	72,354	56,705	48,792	59,668	66,428	72,345	67,833	59,767	59,352	60,079	51,145	38,841	29,204	34,555	36,165	37,743
Other*	9,366	9,029	8,708	2,389	2,606	2,374	2,296	2,292	2,229	5,326	5,414	9,197	9,242	9,131	10,708	10,348
Alternative Fuel Vehicles	**3,736**	**3,554**	**3,390**	**4,277**	**4,124**	**4,082**	**4,415**	**4,919**	**5,123**	**4,799**	**5,429**	**6,499**	**7,535**	**8,819**	**9,552**	**8,343**
Light Duty Vehicles	885	880	888	940	872	1,011	1,137	1,370	1,438	1,442	1,709	1,927	2,265	2,511	2,659	2,369
Heavy Duty Vehicles	2,736	2,544	2,358	3,135	3,040	2,867	3,063	3,322	3,439	3,089	3,448	4,281	4,945	5,937	6,481	5,612
Buses	115	130	144	203	212	205	216	227	246	268	272	290	325	371	413	361
Total	**2,102,828**	**2,240,503**	**2,455,915**	**2,521,617**	**2,665,349**	**2,726,058**	**2,803,810**	**2,868,306**	**2,902,042**	**2,726,929**	**2,737,651**	**2,672,235**	**2,361,072**	**2,205,216**	**2,101,871**	**1,965,183**

	* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.																
6	**Industrial Processes (e.g. cement production, lime manufacture)**																
	Emissions were not calculated for the following sources: Nitric Acid Production, Adipic Acid Production, Semiconductor Manufacturing, Magnesium Production, HCFC-22 Production, and Aluminum Production.																
	Emissions in MTCO2E	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Carbon Dioxide Emissions	1,039,204	976,824	1,007,618	1,445,815	1,526,556	1,588,240	1,286,840	2,291,350	2,373,871	2,249,184	2,337,387	2,273,061	2,391,871	2,320,718	2,287,053	2,039,265
	Cement Manufacture	491,342	435,760	445,938	815,840	830,015	845,236	421,683	424,831	450,914	465,596	509,716	496,933	458,851	420,274	420,443	391,048
	Lime Manufacture	-	-	-	84,887	76,383	86,407	78,683	-	-	-	-	-	-	-	-	-
	Limestone and Dolomite Use	-	-	-	-	27,877	56,958	76,550	105,530	132,305	75,680	57,395	48,237	46,642	31,952	38,225	43,926
	Soda Ash	70,681	68,436	69,516	69,700	70,314	73,786	73,310	75,179	76,811	76,213	77,338	78,199	79,629	78,298	79,052	79,250
	Ammonia & Urea	477,180	472,629	492,164	475,388	521,968	525,853	636,614	596,832	610,942	600,442	546,089	431,600	577,722	463,666	513,884	490,935
	Iron & Steel Production	-	-	-	-	-	-	-	1,088,979	1,102,899	1,031,253	1,146,848	1,218,093	1,229,027	1,326,528	1,235,449	1,034,107
	Nitrous Oxide Emissions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nitric Acid Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Adipic Acid Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HFC, PFC, and SF6 Emissions	800,585	772,365	815,582	916,313	1,045,609	1,465,481	1,738,260	1,999,788	2,128,893	2,360,038	2,627,603	2,847,917	3,073,250	3,288,228	3,561,510	3,800,410
	ODS Substitutes	8,634	16,807	45,948	145,691	332,157	780,423	1,097,073	1,414,753	1,609,855	1,828,046	2,103,153	2,326,716	2,558,988	2,798,447	3,053,682	3,295,997
	Semiconductor Manufacturing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Magnesium Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electric Power Transmission and Distribution Systems	791,950	755,558	769,635	770,622	713,452	685,058	641,188	585,035	519,038	531,992	524,450	521,201	514,262	489,781	507,828	504,413
	HCFC-22 Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aluminum Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	1,839,7	1,749,1	1,823,2	2,362,1	2,572,1	3,053,	3,025,1	4,291,1	4,502,	4,609,	4,964,	5,120,9	5,465,1	5,608,	5,848,	5,839,

Emissions	88	90	00	28	65	721	01	39	764	222	990	79	22	946	562	675

7 Agriculture (CH4 and N2O, e.g. manure management, residue burning)

Note: Totals below do not account for emissions from the following animals, fertilizers, crops, or harvested areas:

Enteric Fermentation:	
Manure Management and Ag Soils-Animal:	
Ag Soils-Plant-Residues, Legumes, Histosols:	Red Clover, White Clover, Birdsfoot Trefoil, Arrowleaf Clover, Crimson Clover,
Ag Soils-Plant-Fertilizers:	Organic: Dried Blood, Compost, Other Sewage Sludge, Tankage
Rice Cultivation:	
Ag Residue Burning:	

The "National Adjustment Factor" is applied to reconcile differences between the methodologies for estimating nitrous oxide emissions from agricultural soils of the National Inventory of Greenhouse Gas Emissions and the State Inventory Tool. The method used in the SIT underestimates indirect emissions from fertilizers and overestimates indirect emissions from livestock and all direct sources of agricultural soils emissions relative to the National Inventory. Other sources will not be affected.

Emissions (MMTCO2 Eq.)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Enteric Fermentation	1.852	1.885	1.905	1.883	1.929	1.956	1.880	1.822	1.706	1.687	1.706	1.663	1.637	1.731	1.688	1.669
Manure Management	1.350	1.371	1.391	1.451	1.472	1.473	1.517	1.539	1.630	1.611	1.575	1.598	1.626	1.580	1.598	1.611
Ag Soils	1.659	1.946	1.865	1.941	2.053	2.972	3.282	2.834	2.705	2.268	2.270	2.560	2.348	2.474	2.351	2.920
Rice Cultivation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agricultural Residue Burning	0.006	0.008	0.009	0.005	0.008	0.005	0.007	0.006	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.005
TOTAL	**4.867**	**5.210**	**5.171**	**5.282**	**5.462**	**6.406**	**6.686**	**6.201**	**6.045**	**5.570**	**5.555**	**5.826**	**5.615**	**5.789**	**5.642**	**6.204**

8 Land Use Change and Forestry (sources and sinks)

Emissions were not calculated for the following sector: Forest Fires. If you skipped any of these by mistake, please return to the control worksheet and complete each skipped source.

	Emissions* (MMTCO2E)																
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Forest Carbon Flux	(33.07)	(33.07)	(33.07)	(36.68)	(36.68)	(36.68)	(38.72)	(46.53)	(46.53)	(46.53)	(46.53)	(46.53)	(46.53)	(46.53)	(46.53)	(46.53)
	Aboveground Biomass	(10.99)	(10.99)	(10.99)	(10.99)	(10.99)	(10.99)	(13.33)	(22.36)	(22.36)	(22.36)	(22.36)	(22.36)	(22.36)	(22.36)	(22.36)	(22.36)
	Belowground Biomass	(2.14)	(2.14)	(2.14)	(2.14)	(2.14)	(2.14)	(2.64)	(4.55)	(4.55)	(4.55)	(4.55)	(4.55)	(4.55)	(4.55)	(4.55)	(4.55)
	Dead Wood	(1.11)	(1.11)	(1.11)	(1.11)	(1.11)	(1.11)	(1.30)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)
	Litter	1.08	1.08	1.08	1.08	1.08	1.08	0.88	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
	Soil Organic Carbon	(4.04)	(4.04)	(4.04)	(4.04)	(4.04)	(4.04)	(2.84)	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
	Total wood products and landfills	(15.87)	(15.87)	(15.87)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)	(19.48)
	Liming of Agricultural Soils	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-
	Limestone	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-
	Dolomite	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-
	Urea Fertilization	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Urban Trees	(3.11)	(3.24)	(3.37)	(3.50)	(3.62)	(3.75)	(3.88)	(4.00)	(4.13)	(4.26)	(4.39)	(4.51)	(4.64)	(4.77)	(4.89)	(5.02)
	Landfilled Yard Trimmings and Food Scraps	(6.34)	(5.42)	(5.39)	(4.71)	(4.21)	(3.53)	(2.90)	(2.83)	(2.78)	(2.56)	(2.53)	(2.63)	(2.73)	(2.26)	(2.03)	(2.13)
	Grass	(0.52)	(0.49)	(0.48)	(0.39)	(0.33)	(0.24)	(0.16)	(0.17)	(0.17)	(0.15)	(0.16)	(0.19)	(0.21)	(0.15)	(0.13)	(0.15)
	Leaves	(2.56)	(2.47)	(2.46)	(2.17)	(1.96)	(1.67)	(1.40)	(1.36)	(1.33)	(1.23)	(1.22)	(1.26)	(1.30)	(1.09)	(0.99)	(1.03)
	Branches	(2.55)	(2.46)	(2.45)	(2.15)	(1.92)	(1.62)	(1.34)	(1.30)	(1.27)	(1.17)	(1.15)	(1.19)	(1.23)	(1.02)	(0.92)	(0.96)
	Landfilled Food Scraps	(0.71)	(0.64)	(0.64)	(0.61)	(0.60)	(0.51)	(0.59)	(0.72)	(0.87)	(0.88)	(1.10)	(1.07)	(1.07)	(1.02)	(1.18)	(1.10)
	Forest Fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	N2O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	N2O from Settlement Soils	-	-	-	-	0.03	0.09	0.09	0.09	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.07
	Total	**(42.52)**	**(41.73)**	**(41.82)**	**(44.87)**	**(44.47)**	**(43.86)**	**(45.38)**	**(53.26)**	**(53.35)**	**(53.27)**	**(53.37)**	**(53.61)**	**(53.82)**	**(53.48)**	**(53.37)**	**(53.61)**
	* Note that parentheses indicate net sequestration.																
9	**Waste (municipal solid: landfill and combustion)**																
	Total Emissions from Landfills and Waste Combustion (MMTCO2E)																
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	CH4	2.362	2.388	2.484	2.468	2.687	2.862	3.115	2.889	3.354	2.980	3.152	2.883	2.717	2.766	2.660	2.612
	CO2	0.082	0.073	0.073	0.103	0.111	0.112	0.047	0.071	0.053	0.059	0.054	0.047	0.035	0.057	0.083	0.092

	N_2O	0.003	0.002	0.002	0.003	0.003	0.003	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002
	Total	**2.446**	**2.463**	**2.559**	**2.574**	**2.801**	**2.977**	**3.163**	**2.961**	**3.408**	**3.040**	**3.208**	**2.931**	**2.752**	**2.824**	**2.744**	**2.705**
	CH_4 Emissions from Landfills (MTCO2E)																
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Potential CH_4	**2,718,723**	**2,821,398**	**2,928,419**	**3,090,819**	**3,334,640**	**3,596,622**	**3,848,333**	**4,051,607**	**4,418,149**	**4,630,400**	**4,858,546**	**5,035,269**	**5,319,622**	**5,721,596**	**6,105,468**	**6,471,948**
	MSW Generation	2,540,863	2,636,821	2,736,840	2,888,616	3,116,486	3,361,329	3,596,572	3,786,549	4,129,111	4,327,477	4,540,697	4,705,859	4,971,609	5,347,286	5,706,045	6,048,549
	Industrial Generation	177,860	184,577	191,579	202,203	218,154	235,293	251,760	265,058	289,038	302,923	317,849	329,410	348,013	374,310	399,423	423,398
	CH_4 Avoided	**(94,703)**	**(168,382)**	**(168,382)**	**(348,708)**	**(348,708)**	**(416,369)**	**(386,963)**	**(842,130)**	**(691,136)**	**(1,319,470)**	**(1,355,978)**	**(1,831,681)**	**(2,301,016)**	**(2,648,717)**	**(3,150,378)**	**(3,570,210)**
	Flare	-	(73,680)	(73,680)	(254,005)	(254,005)	(321,667)	(292,260)	(674,579)	(523,586)	(1,151,920)	(1,188,427)	(1,664,130)	(2,133,465)	(2,481,166)	(2,780,695)	(3,200,527)
	Landfill Gas-to-Energy	(94,703)	(94,703)	(94,703)	(94,703)	(94,703)	(94,703)	(94,703)	(167,551)	(167,551)	(167,551)	(167,551)	(167,551)	(167,551)	(167,551)	(369,683)	(369,683)
	Oxidation at MSW Landfills	**244,616**	**246,844**	**256,846**	**253,991**	**276,778**	**294,496**	**320,961**	**294,442**	**343,797**	**300,801**	**318,472**	**287,418**	**267,059**	**269,857**	**255,567**	**247,834**
	Oxidation at Industrial Landfills	**17,786**	**18,458**	**19,158**	**20,220**	**21,815**	**23,529**	**25,176**	**26,506**	**28,904**	**30,292**	**31,785**	**32,941**	**34,801**	**37,431**	**39,942**	**42,340**
	Total CH_4 Emissions	**2,361,619**	**2,387,714**	**2,484,033**	**2,467,900**	**2,687,339**	**2,862,228**	**3,115,233**	**2,888,529**	**3,354,311**	**2,979,837**	**3,152,312**	**2,883,229**	**2,716,746**	**2,765,591**	**2,659,581**	**2,611,564**
	CO_2 and N_2O Emissions from Waste Combustion (MTCO2E)																
	Gas/Waste Product	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	CO_2	**82,024**	**72,835**	**73,104**	**103,404**	**110,620**	**111,746**	**46,528**	**70,665**	**52,844**	**58,609**	**54,031**	**46,865**	**34,776**	**57,006**	**82,751**	**91,886**
	Plastics	55,009	48,958	48,847	69,303	73,283	74,514	31,030	47,672	35,671	40,128	36,756	31,747	23,547	38,355	54,630	59,330
	Synthetic Rubber in MSW	11,981	10,354	10,012	13,824	14,602	13,286	5,457	7,975	5,871	6,181	5,805	5,149	3,770	6,223	11,538	15,070
	Synthetic Fibers	15,034	13,522	14,246	20,277	22,734	23,946	10,041	15,018	11,302	12,301	11,471	9,969	7,460	12,428	16,583	17,486
	N_2O	**2,722**	**2,178**	**2,227**	**2,933**	**3,155**	**3,155**	**1,222**	**1,812**	**1,330**	**1,413**	**1,267**	**1,046**	**761**	**1,218**	**1,675**	**1,675**
	Total CO_2 and N_2O Emissions	**84,746**	**75,013**	**75,332**	**106,336**	**113,775**	**114,901**	**47,749**	**72,477**	**54,174**	**60,022**	**55,298**	**47,911**	**35,537**	**58,224**	**84,426**	**93,561**
10	**Wastewater**																
	Emissions were not calculated for the following sources: Industrial Fruits & Vegetables, and Industrial Pulp & Paper.																
	Emissions	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**

	(MMTCO2E)																
	Municipal CH4	0.44	0.45	0.45	0.46	0.47	0.48	0.49	0.50	0.51	0.52	0.55	0.57	0.58	0.59	0.60	0.61
	Municipal N2O	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.24	0.25	0.25	0.25	0.26	0.27
	Industrial CH4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	Fruits & Vegetables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Red Meat	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	Poultry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pulp & Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Emissions	0.62	0.64	0.66	0.67	0.69	0.70	0.71	0.72	0.74	0.76	0.80	0.82	0.83	0.85	0.87	0.89