

NOVEMBER 2000

The 2000 Colorado Gas Emissions update is an addendum to chapter three of the [1998 Climate Change report](#). This assessment, containing updated data verifies that the State's projections documented in the original 1990 Colorado Greenhouse Emissions Inventory have been accurate. The information acquired in 1995, then revised in 1998 and the latest trends exemplified within, present results portraying trends in emissions through the decade of 1990. Thus far the State's projections have been on target. These data are monitored and upgraded on a consistent basis. A more comprehensive greenhouse emissions inventory is available through the Colorado Department of Public Health and the Environment.

INTRODUCTION

This document represents an updated version of the first inventory of anthropogenic greenhouse gas emissions and sinks for Colorado. The first inventory was revised in 1998 using the most current data at the time. The second revision in 2000 was to get a perspective on the projections presented for 2015 and to determine the most current amount of greenhouse gas emissions. The main purpose was to determine if greenhouse gas emissions were being reduced, and if reduction has failed, than to determine how emissions can be reduced.

DATA AND METHODOLOGY

The inventory developed in 2000 used EPA's *States Workbook: Methodologies for Estimating Greenhouse Gas Emissions Vol. VIII*, which was released in December 1998. The methodology has remained relatively the same since the original inventory developed in 1995 and the revisions in 1998. Sections have been added and slightly different emission factors for certain emission calculations have been added. Different emissions factors or different calculations have altered the emissions totals, but the reason for these changes was to achieve a better estimate on the amount of greenhouse gas emissions being released.

As with the previous inventory, the data obtained for activities, consumption, source and processes were compiled and published by state and federal agencies to the extent possible. The changes in data were the underlying difference between emission inventories, although methodology for certain calculations of emissions did have some effect.

3.2

The 1998 Colorado Greenhouse Gas Inventory was revised in the summer of 2000. The revision used data published most recently to the year 2000. Although no single base year was used for the 2000 inventory, the purpose of the inventory was to portray trends in emissions through the decade of 1990. The emissions were compiled into a single representative year even though emissions for certain sectors were from 1997, 1998, or 1999, whichever was most recent. Methodologies incorporated into the 2000 inventory used EPA's Emissions Inventory Improvement Program (EIIP) *State's Workbook: Methodologies for Estimating Greenhouse Gas Emissions Vol. VIII*. The following technical assessment uses data from the 2000 Greenhouse Gas Inventory

All figures referenced in this document appear at the end of the document.

3.3

As was the case in 1990, carbon dioxide was the most prevalent gas circum 2000, followed by methane, CFCs and nitrous oxide. Figure 3.1 shows the percent of emissions by gas for the year 1990 and circum 2000. In 1990, Colorado produced 25,547,961.14 Metric Tons of Carbon Equivalent (MTCE), which is the equal measure of each gas that incorporates Global Warming Potential. In the 2000 revision 27,000,715.25 MTCE was produced. Although the increase was not as much as expected, the decrease in CFC emissions obscures the increase in almost every other sector. It should be noted that Section 3.4 was included in Section 3.3 in the 2000 Addendum.

Sector	1990 Values (MTCE)	Circum 2000 Values (MTCE)
Fossil Fuel (CO ₂)	19,476,902.98	22,061,260.12
Oil and Natural Gas Systems (CH ₄)	245,733.46	464,824.25
Coal Mining (CH ₄)	589,609.56	1,047,686.48
Production Processes	(CO ₂)	225,690.42
	(CFC)	2,969,018.18
Landfills (CH ₄)	421,193.51	508,482.64
Wastewater Treatment (CH ₄)	17,385.71	21,405.62
Domesticated Animals (CH ₄)	1,125,158.61	1,021,319.92
Manure Management Systems (CH ₄)	69,272.91	223,672.54
Fertilizer (N ₂ O)	228,905.46	254,548.48
Land Use (CO ₂)	179,090.34	4,940.68
Total	25,547,961.14	27,000,715.25

Note: Methane and Nitrous Oxide emissions occur from stationary and mobile combustion and were calculated in the 2000 inventory. Since CH₄ and N₂O was not calculated in 1990 these emissions were not included.

The sector contributing the most to greenhouse gas emissions was fossil fuel consumption (combustion and other uses) and production (natural gas, oil, and coal production). In contrast to the 1990 inventory, the 2000 inventory indicated that emissions from Agriculture was second in magnitude portion of emissions, with Production Processes and Community Wastes following, and Land-Use Changes contributing the least. The difference is mainly from the reduction in CFC emissions, which contributed to the decrease in emissions from Production Processes.

3.5.1 Fossil Fuel Use

Fossil fuel combustion accounted for the largest portion of greenhouse gas emissions in 1997, emitting 89,165,880.86 tons of carbon dioxide or 81.7% of all MTCE emissions. Figure 3.3 displays the portion of emissions by sub-sector within the fossil fuel combustion sector. Table 3.3 provides emissions by fuel type and the sector in which the type of fuel is used.

Table 3.3: 1997 Carbon Dioxide Emissions by Fuel Type and Sub-Sector

Fuel Type	CO ₂ Emissions (tons) by Sub-sector						Percent of Total
	Residential	Commercial	Industrial	Transport	Utilities	Total	
Asphalt & Road Oil	0.00	0.00	1,410,596.97	0.00	0.00	1,410,596.97	1.60%
Aviation Gasoline	0.00	0.00	0.00	54,503.62	0.00	54,503.62	0.06%
Coal, Anthracite	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Coal, Bituminous	55,848.13	101,983.54	1,893,980.09	0.00	41,560,722.03	43,612,533.79	48.91%
Distillate Fuel	32,097.73	551,708.82	1,891,440.18	3,924,761.63	0.00	6,400,008.36	7.17%
Ethanol	0.00	0.00	0.00	3,757,527.73	0.00	3,757,527.73	-----
Gasoline	0.00	15,098.35	0.00	13,799,814.40	0.00	13,814,912.75	15.50%
Jet Fuel	0.00	0.00	0.00	3,211,517.68	0.00	3,211,517.68	3.60%
Kerosene	8,505.55	2,238.30	2,238.30	0.00	0.00	12,982.15	0.01%
Liquefied Petroleum Gas (LPG)	577,883.62	102,092.77	413,324.38	18,437.24	0.00	1,111,738.01	1.25%
Lubricants	0.00	0.00	117,338.41	197,855.14	0.00	315,193.55	0.35%

In 1997, Colorado consumed 1,133.4 trillion Btus of energy, ranking 28th in the nation for energy consumption. Fossil fuels supplied 99% of the energy consumption in 1997, with coal accounting for 41.9%, petroleum 37.3%, and 20.7% from natural gas.

Natural Gas	6,952,650.72	4,135,628.45	6,173,474.35	719,239.73	359,619.87	18,340,613.12	20.60%
Other Liquids	0.00	0.00	828,958.78	0.00	52,322.07	881,280.85	0.99%
Petroleum Coke	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Residual Fuel Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Total	7,626,985.76	4,908,750.24	12,731,351.45	21,926,129.44	41,972,663.97	89,165,880.86	

Percent of Total	8.3%	5.4%	14.2%	24.5%	47.6%	100%	
-------------------------	-------------	-------------	--------------	--------------	--------------	-------------	--

*Note: Ethanol is no longer included in greenhouse gas emissions

3.5.1.1 - Utilities

Carbon dioxide emissions from utilities remained the single largest greenhouse gas source for any sector or sub-sector for fossil fuels. The large majority of emissions have resulted from the combustion of bituminous coal, with natural gas and other petroleum liquids following. Biomass is no longer included in the inventory as it was in 1990. (see inventory for details)

The proportion of emissions from utilities amounted to 47.6%, which is almost the same proportion in 1990. The amount of carbon dioxide emitted from this sector has increased 7.5% from 38,966,332 tons in 1990, to 41,972,663.97 tons in 1997.

Table3.4: 1997 CO₂ Emissions from Utilities Fossil Fuel Use by Fuel Type

Fuel Type	CO₂ Emissions (tons)	Percent of Sub-Sector
Bituminous Coal	41,560,722.03	99.0%
Natural Gas	359,619.87	0.9%
Other Liquids	52,322.07	0.1%
Total	41,972,663.97	100.0%

3.5.1.2 - Transportation

In 1997, transportation was the second largest sub-sector of carbon dioxide emissions from fossil fuel combustion. The amount of emissions resulted in 21,926,129.44 tons of carbon dioxide, which was a 12.8% increase since 1990 amounting to 24.5% of emissions from fossil fuel use. Emissions resulting from ethanol combustion was not included as it was in the 1998 version of the *Climate Change & Colorado - A Technical Assessment* because ethanol is a biogas and emissions from this type of fuel is not considered to be a greenhouse gas emission. The amount of ethanol used was subtracted from gasoline usage since ethanol is an additive to gasoline. (see inventory for details)

Table 3.5: 1997 CO₂ Emissions from Transportation Fossil Fuel Use by Fuel Type

Fuel Type	CO₂ Emissions (tons)	Percent of Sub-Sector
Gasoline	13,799,814.40	63.0%
Distillate Fuel	3,924,761.63	17.9%
Jet Fuel	3,211,517.68	14.6%
Natural Gas	719,239.73	3.3%
Lubric ants	197,855.14	0.9%
Aviation Gasoline	54,503.62	0.2%

Liquefied Petroleum Gas (LPG)	18,437.24	0.1%
Total	21,926,129.44	100.0%

3.5.1.3 - Industrial

The third largest sub-sector contributor of carbon dioxide was from industrial fossil fuel use. As with the two previous sub-sectors, the 1997 emissions of carbon dioxide from this sub-sector have increased 29.5% since 1990. Emissions from industrial fossil fuel use in 1997 accounted for 14.2% of fossil fuel emissions with the total amounting to 12,731,351.45 tons of carbon dioxide.

Table 3.6: 1997 CO₂ Emissions from Industrial Fossil Fuel Use by Fuel Type

Fuel Type	CO ₂ Emissions (tons)	Percent of Sub-Sector
Distillate Fuel	1,891,440.18	14.9%
LPG	413,324.38	3.2%
Other Liquids	828,958.78	6.5%
Lubricants	117,338.41	0.9%
Kerosene	2,238.30	0.02%
Bituminous Coal	1,893,980.09	14.9%
Asphalt & Road Oil	1,410,596.97	11.0%
Natural Gas	6,173,474.35	48.5%
Total	12,731,351.45	100.0%

3.5.1.4 - Residential

The residential sub-sector of fossil fuel use contributed the fourth largest amount of carbon dioxide emissions. Colorado's residential emissions increased 26% since 1990 to 7,626,985.76 tons of carbon dioxide emissions, with this sector accounting for 8.3% of fossil fuel use emissions in 1997. It can be assumed that the increase in emissions from the residential sub-sector coincides with the 20% increase in Colorado's residents between 1990 and 1997, as can the other sectors. Natural gas, as in the 1998 *Climate Change* report for the base year 1990, comprised the majority of emissions from residential fossil fuel use.

Table 3.7: 1997 CO₂ Emissions from Residential Fossil Fuel Use by Fuel Type

Fuel Type	CO ₂ Emissions (tons)	Percent of Sub-Sector
Distillate Fuel	32,097.73	0.4%
Liquefied Petroleum Gas (LPG)	577,883.62	7.6%
Kerosene	8,505.55	0.1%

Bituminous Coal	55,848.13	0.7%
Natural Gas	6,952,650.72	91.1%
Total	7,626,985.76	100.0%

3.5.1.5 - Commercial

In 1990 and 1997, the commercial sub-sector contributed the smallest amount of carbon dioxide emissions of the fossil fuel use sector. In 1997, this amounted to 4,908,750.24 tons carbon dioxide emissions from commercial use of fossil fuels, which was 5.4% of emissions from the fossil fuel use sector. As with all the previous sub-sectors, commercial fossil fuel use and carbon dioxide emissions increased since 1990 by 12.4%.

Table 3.8: 1997 CO₂ Emissions from Commercial Fossil Fuel Use by Fuel Type

Fuel Type	CO ₂ Emissions (tons)	Percent of Sub-Sector
Gasoline	15,098.35	0.3%
Distillate Fuel	551,708.82	11.2%
Natural Gas	4,135,628.45	84.2%
LPG	102,092.77	2.1%
Kerosene	2,238.30	0.1%
Bituminous Coal	101,983.54	2.1%
Total	4,908,750.24	100.0%

3.5.2 Production Processes

In opposition to the results in 1990 with Production Processes ranking second, the amount of MTCE of all gases from production processes ranked fourth out of all the sectors for emissions circum 2000. MTCE was used to better estimate the GWP of the amount of each gas released. CFCs were the leading MTCE emissions from the Production Processes sector in 1990, and CFCs continued to be the largest emitter from Production Processes circum 2000. The reason for this sector's 56% decline is the reduction in CFC emissions. CFCs and carbon dioxide are both emitted from this sector. The amount of emissions from limestone usage and lime manufacture had increased 23H from 1990 levels to the circum 2000 levels. In 1999, carbon dioxide from cement manufacturing declined only slightly since the base year 1990. The proportion of emissions from production processes compromised 5% of the states total MTCE emissions circum 2000.

Table 3.9: Emissions from Production Processes ~2000 MTCE Apportionment

Component	MTCE (tons)	Percent of Production Process Emissions

CFCs (1998)	989,672.72	69.0%
Cement Manufacture (1999)	239,496.15	16.7%
Lime Production (1998)	9,753.03	0.7%
Limestone Usage (1997)	194,866.56	13.6%
Total	1,433,788.46	100.0%

3.5.3 Domestic Animals

In 1999, methane emissions from domestic animals ranked third out of all the sectors for MTCE emissions. This was the same ranking in 1990. The amount of emissions from domestic animals amounted to 196,567.13 tons or 1,021,319.92 MTCE. Methane emissions from domestic animals decreased since 1990 due to a difference in methodologies used in the 1990 and circa 2000 version of the inventories. This amount of methane emissions accounted for 3.8% of Colorado's total emissions. In 1999 and 1990, beef cattle was the main source of emissions from this sector.

Table 3.10: 1999 Methane Emissions from Domestic Animals

Animal	CH₄ Produced (tons /year)	Percent of Total Domestic Animal CH₄ Emissions
Dairy Cattle (total)	16,805.20	8.6%
Beef Cattle (total)	172,640.50	87.8%
Sheep (total)	3,872.00	2.0%
Hogs & Pigs (total)	1,435.50	0.7%
Other (total)*	1,813.93	0.9%
Total	196,567.13	100.0%

* Other animals include mules, burros and donkeys, horses, and goats with methane emissions of 118.83, 1,623.60, and 71.50 tons/year respectively.

3.5.4 Coal Mining Sector

The production of coal from active mines has increased from 1990 to 1999, although the number of mines has decreased. The total emissions of methane from coalmines amounted to 182,929.38 tons or 1,047,686.48 MTCE, an increase of 78% since 1990. The proportion of this greenhouse gas emission from this sector also increased. This sector contributed the second largest amount of emissions accounting for 3.9% of all emissions. The sector has climbed to the second largest source of greenhouse gases in 1998 from the fourth largest source in 1990, which is due to an increase in emissions from coal mining and a decrease in emissions from domestic animals and production processes. In 1998, underground coal mining emitted the largest amount of methane emissions in this sector, as was the case in 1990.

Table 3.10: 1999 Methane Emissions from Coal Mining

Type of Process	Methane (metric tons)	Percent of Total Coal Mining Emissions
Underground Coal Mining	147,579.88	80.7%
Surface Coal Mining	5,588.08	3.0%
Post Underground Coal Processing	28,848.34	15.6%
Post Surface Coal Mining	913.08	0.7%
Total	182,929.38	100.0%

3.5.5 Landfill Sector

The amount of methane emissions increased 21% from 81,064.51 tons (421,193.51 MTCE) in 1990 to 97,864.51 tons (508,482.64 MTCE) in 1998. This was the fifth largest amount of all sectors in both 1990 and 1998. The amount of emissions is dependent on the size of a population. Since the population of Colorado has increased since 1990 by 20%, there is clear evidence as to the cause of this increase. The portion of greenhouse gas emissions from this sector comprised 1.8% of total greenhouse gas emissions, which is almost the same portion in 1990 of 1.7%. Large landfills continue to emit the most methane when compared to small and industrial landfills. The amount of emissions was reduced in 1998 from methane recovery systems at two of the state's large landfills

Table 3.12: 1998 Methane Emissions from Landfills

Type of Landfill	Methane Emissions (tons)	Percent of Total Landfill Emissions
Large Landfills	79,769.18	81.5%
Small Landfills	11,884.08	12.1%
Industrial Landfills	6,211.25	6.4%
Total	97,864.51	100.0%

3.5.6 Natural Gas and Oil Production Sector

In 1998, the amount of methane emissions increased from 1990 levels by 89%. Although Colorado's annual oil production level decreased, the natural gas production has increased. The median amount of methane emitted in 1998 was 89,461.85 tons or 464,824.25 MTCE, which was the sixth largest amount of all sectors. This sector had the same ranking in 1990.

Table 3.13: 1998 Methane Emissions from Natural Gas and Oil Production

Type of Fuel Produced and Processed	Median Methane Emissions (tons)	Percent of Total Natural Gas and Oil Production Emissions

Oil Production	404.06	0.5%
Gas Production	53,193.68	59.4%
Oil Venting and Flaring	645.21	0.7%
Gas Venting and Flaring	3,487.53	3.9%
Gas Processing, Transport, and Distribution	31,731.37	35.5%
Total	89,461.85	100.0%

3.5.7 Nitrogen Fertilizer Use Sector

As was the status of this sector in 1990, the 1999 nitrous oxide emissions from fertilizer use ranked seventh among the various sectors. The annual emissions increased 11% since 1990 from 2,984.44 tons or 228,905.46 MTCE to 3,318.77 tons or 254,548.48 MTCE. These emissions comprised 0.9% of total greenhouse gas emissions in 1998. Similar portions were calculated in 1990 (at 0.8% of greenhouse gas emissions). Anhydrous ammonia was the most common nitrogen fertilizer, contributing most to this sector's source of nitrous oxide emissions.

Table 3.14: 1999 Nitrous Oxide Emissions from Nitrogen Fertilizer Use

Fertilizer	N₂O Emissions	Percent of Fertilizer Emissions
Anhydrous Ammonia	1,492.73	44.9%
Urea - Form.	3.32	0.1%
Nitrogen Solutions - 32%	1,105.12	33.3%
Nitrogen Solutions - 28%	64.11	1.9%
Ammonium Nitrate	149.21	4.5%
Ammonium Sulfate	34.94	1.0%
Urea	356.10	10.7%
Urea Solution	6.30	0.2%
Calcium Nitrate	0.19	0.15%
Ammonium Thiosulfate	74.62	2.2%
Magnesium Nitrate	0.34	0.1%
Other	31.79	0.95%
Total Tons N₂O	3,318.77	100.0%

3.5.8 Land Use/Forest Conversion Sector

The 1998 emissions from land use and forest conversion amounted to the smallest amount of emission per sector, emitting 19,968.96 tons of carbon dioxide and a negligible 0.06313 tons of nitrous oxide. There is indication that the forests of Colorado are growing faster than the harvest or mortality rates. The average growth rate of Colorado's forests were 24.97 cubic feet (cf)/acre, and when compared to the 1.25 cf/acre cut rate (from all types of anthropogenic activities) and the 7.63 cf/acre mortality rate, the forests of Colorado are growing faster than dying. The smaller amount of CO₂ released in 1999 compared to 1990 from

land use changes can be attributed to a decrease in commercial harvests. However inconsistent data sources are probably the underlying reason for this decrease. The data to calculate much of these figures were incomplete or unavailable. The quality assurance of CO₂ released from land use changes is insufficient due to missing or incomplete data. Since there were no discrepancies in the type of land use changes in 1998, an accompanying pie chart was not created.

Table 3.15(a): 1999 Summary of Emissions from Land Use Changes in Colorado Forests

CO ₂ Released (tons)	Forest Sink Capability (tons)	Nitrogen Released (tons)
19,968.96	76,918,806.00	0.06313

Source: Dr. Dennis Lynch Colorado State University, 2000.

Table 3.15(b): 1990 Summary of Emissions from Land Use Changes in Colorado Forests

Forest/Land Use Changes	CO ₂ Released (tons)	Forest Sink Capability (tons)	Nitrogen Released (tons)	
Commercial Harvest	700,277.60			
Forest Developed	3,621.90			
Soil Disturbances	19,485.00			0.457
Other Harvests	2.14			
Total	723,386.64	76,918,806.00	0.457	

Source: Tom Ostermann, Forest Management Division Supervisor, Colorado State Forest Service, 1996.

3.5.9 Manure Management Systems

Manure management systems were the eighth largest emitter of all sectors for greenhouse gases in 1999. In Colorado, the amount of methane emitted from these systems was 13,332.53 tons of methane (69,272.91 MTCE) in 1990. Emissions more than tripled in 1999 to 43,048.97 tons of methane (223,672.54 MTCE). Cattle was the major contributor to this sector's methane emissions, followed by swine, poultry, sheep, and other domestic animals.

Table 3.16: 1999 Methane Emissions from Manure Management Systems Apportionment per Animal

Animal Type	Methane Emissions (tons)	Percent of Manure Management Emissions Total
Beef Cattle	10,019.55	23.3%
Feedlot Cattle	10,846.49	25.2%
Dairy Cattle	2,963.00	6.9%
Swine	17,272.00	40.1%

Poultry and Others	1,947.83	4.5%
Total	43,48.87	100.0%

3.5.9 Manure Management Systems

The manure management systems that contribute the most methane are anaerobic lagoons and “other,” accounting for 73% of the methane emissions from manure management systems. The major reason for the high emissions from anaerobic lagoons is due to the process in which the manure is decomposed (anaerobically). The reason “other” manure management system portion is high is that these systems also facilitate the production of methane. There has been an increase in emissions from anaerobic lagoons since 1990, indicating an increase in reliance on these types of systems as well as an increase in animal populations. The rest of the manure management systems have relatively low emissions. There has not been any significant increase in emissions from any type of system (except for pit storage which had an increase).

Table 3.17: 1999 Methane Emissions from Manure Management Systems Apportionment per System

Manure System	Methane (tons)	Percent of Total
Lagoon	15,273	36.93
Other*	15,168	36.68
Pasture	4,017	9.71
Pit Storage	3,775	9.13
Drylot	1,512	3.66
Slurry	925	2.24
Deep Pit	570	1.38
Spread	78	0.18
Litter	35	0.09
Total	41,353	100.00

*"Other" manure management systems were not defined by the EPA.

3.5.10 Wastewater Treatment Sector

The methane emissions from wastewater treatment facilities are population dependent, meaning that as population increases the amount of methane emitted increases. The amount of emissions in 1998 was 3,737.49 tons of methane or 21,405.62 MTCE an increase from the 1990 level of 3,035.60 tons of methane or 17,385.71 MTCE. This 23% increase in emission parallels 20% increase in population of the same given period of time.

Table 3.18 Wastewater Treatment Systems Sector

Type of Treatment	Population	BOD* (lbs BOD/day)	Quantity of BOD treated anaerobically (lbs BOD/yr)	CH ₄ Emissions (lbs)	CH ₄ Recovered (lbs)	Net CH ₄ Emissions (tons)
Wastewater	4,056,133	730,103.94	39,973,190.72	8,794,101.96	1,319,115.29	3,737.49
Wastewater (1990)	3,294,394	592,990.92	32,466,252.87	7,142,575.63	1,071,386.35	3,035.60

- BOD - Biological Oxygen Demand

Figures referenced in this document

Figure 3.1A: Greenhouse Gas Emissions by Gas, MTCE (~2000)

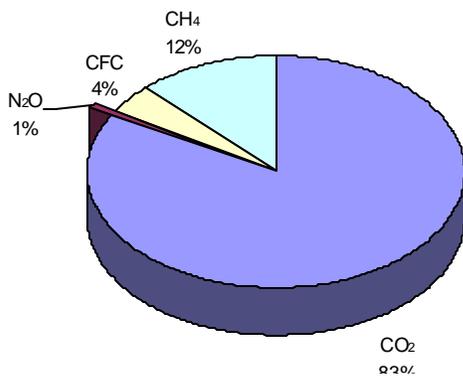


Figure 3.1B: Greenhouse Gas Emissions by Gas, MTCE (1990)

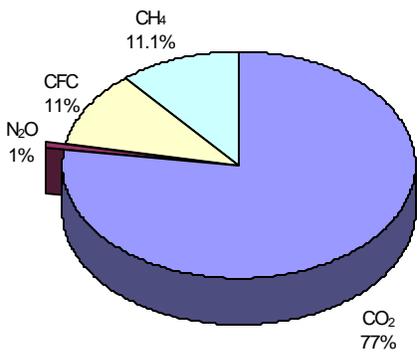


Figure 3.2A~2000 Colorado Greenhouse Gas Emissions by Sector

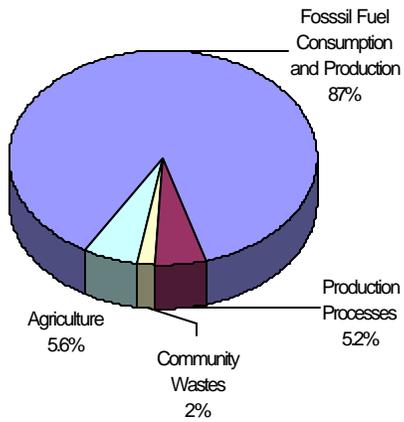


Figure 3.2B - 1990 Colorado Greenhouse Gas Emissions by Sector

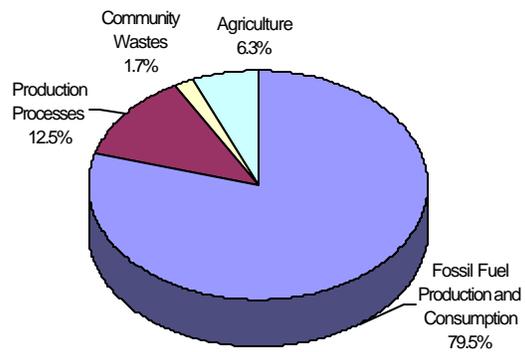


Figure 3.3: 1997 CO₂ Emissions from Fossil Fuel Consumption by Sector

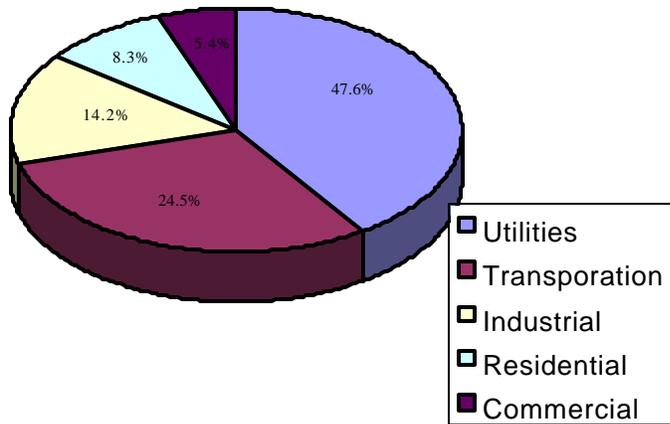


Figure 3.4: 1997 CO₂ Emissions from Utilities Fossil Fuel Use by Fuel Type

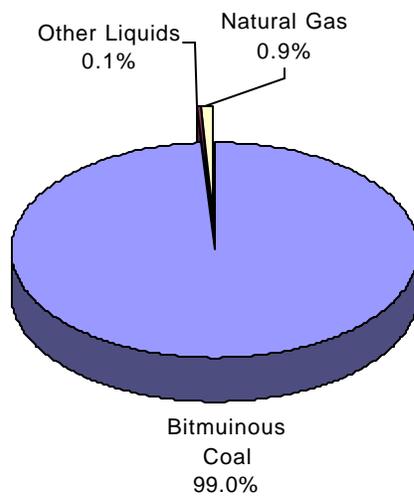


Figure 3.5: 1997 CO₂ Emissions from Transportation Fossil Fuel Use by Fuel Type

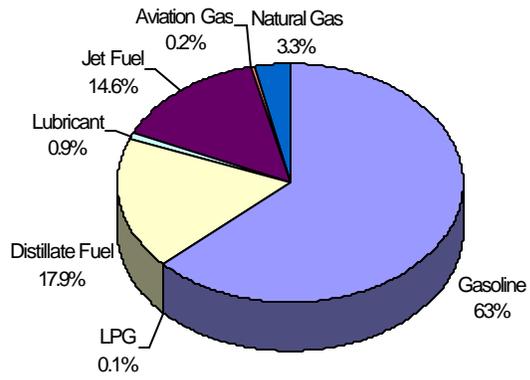


Figure 3.6: 1997 CO₂ Emissions from Industrial Fossil Fuel Use by Fuel Type

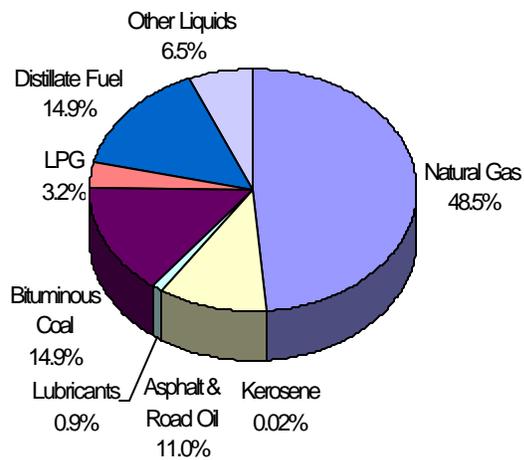


Figure 3.7: 1997 CO₂ Emissions from Residential Fossil Fuel Use by Fuel Type

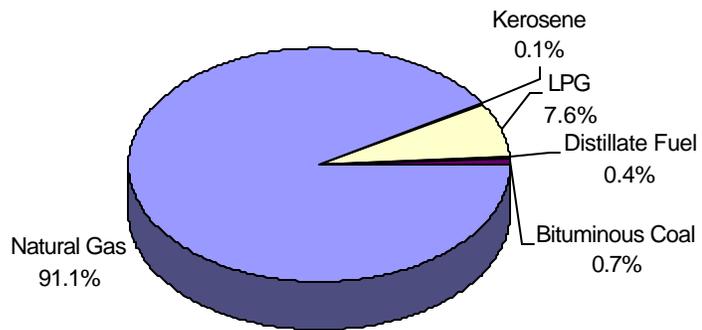


Figure 3.8: 1997 CO₂ Emissions from Commercial Fossil Fuel Use by Fuel Type

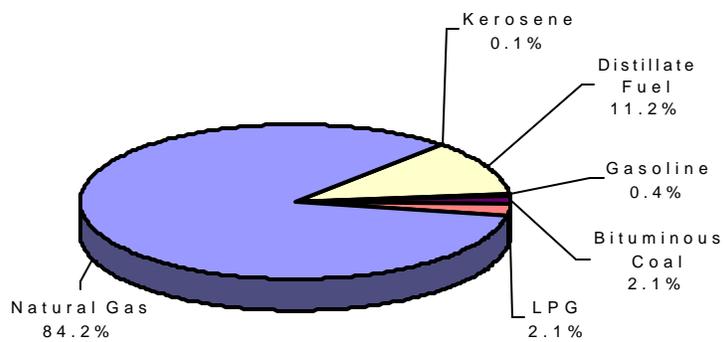


Figure 3.9: Emissions from Production Processes ~2000 MTCE Apportionment

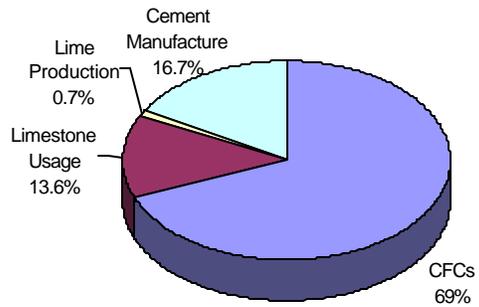


Figure 3.10: 1999 Methane Emissions from Domestic Animals

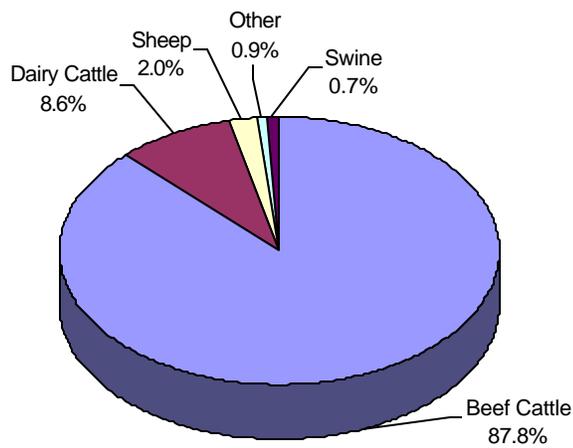


Figure 3.11: 1999 Methane Emissions from Coal Mining

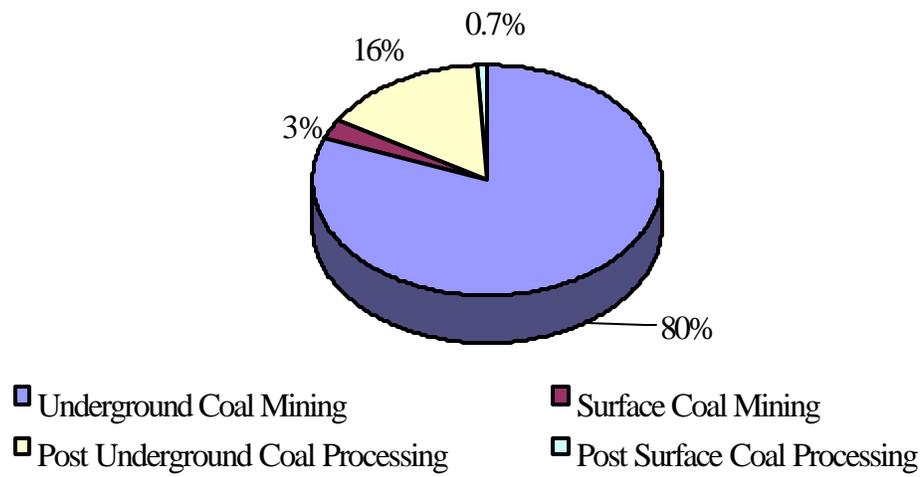


Figure 3.12: 1998 Methane emissions from Landfills

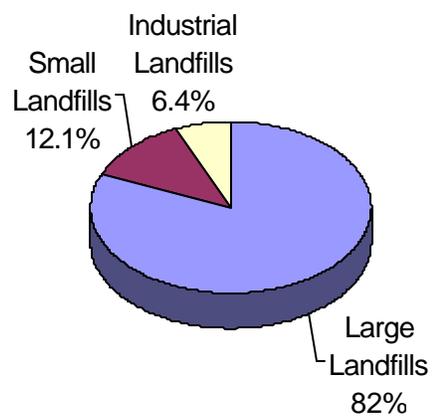


Figure 3.13: 1998 Methane Emissions from Natural Gas and Oil Production

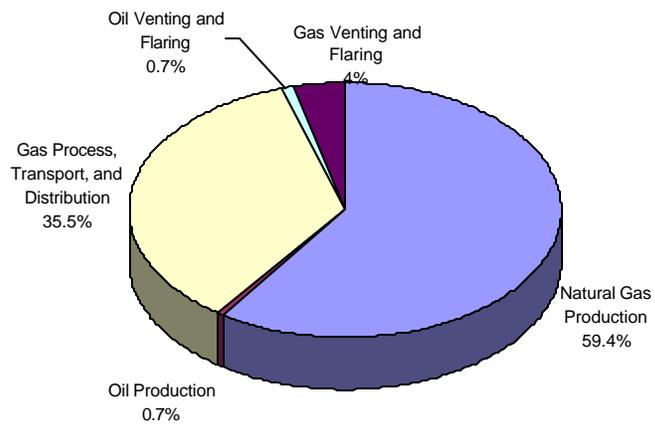


Figure 3.14: 1999 Nitrous Oxide Emissions from Nitrogen Fertilizer Use

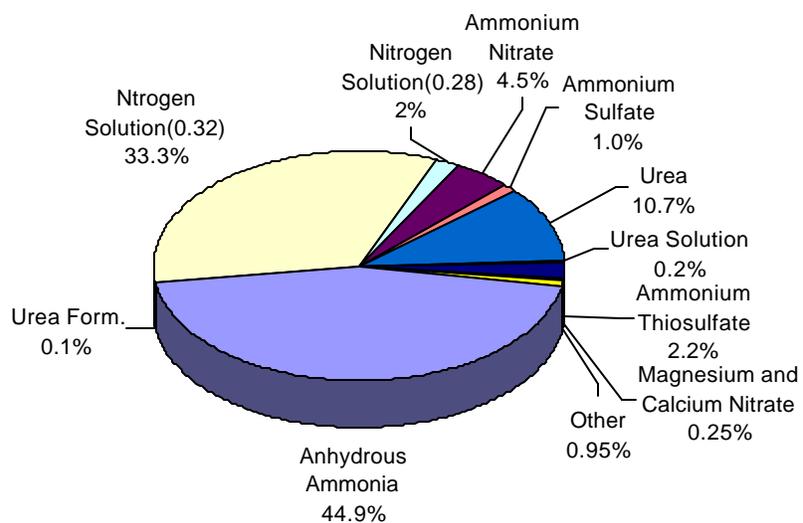


Figure 3.16: 1999 Methane Emissions from Manure Management Systems Apportionment per Animal

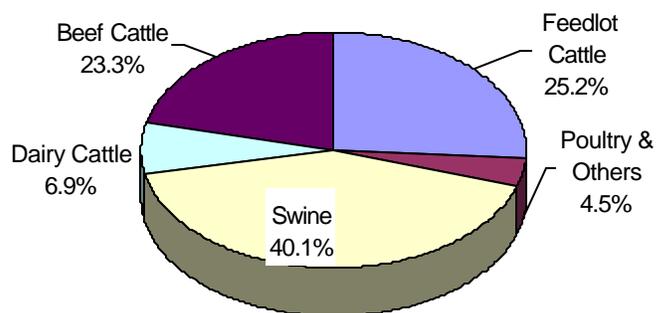


Figure 3.17: 1999 Methane Emissions from Manure Management Systems Apportionment per System

