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National Inventory Report

1990-2008

Part 3

GREENHOUSE GAS SOURCES AND SINKS IN CANADA

The Canadian Government`s Submission to the UN Framework Convention on Climate Change

Canada

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Annex 12 Canada's Greenhouse Gas Emission Tables, 1990–2008

This annex contains summary tables (Table A12-1 to Table A12-21) illustrating national GHG emissions by year, by gas, and by sector.

Table A12-1: GHG Source/Sink Category Description

ENERGY	
a. Stationary Combustion Sources	
Electricity and Heat Generation	Emissions from fuel consumed by:
Electricity Generation	Utility and industry electricity generation
Heat Generation	Steam generation (for sale)
Fossil Fuel Production and Refining	Emissions from fuel consumed by:
Petroleum Refining and Upgrading	Petroleum refining and oil sands upgrading industries
Fossil Fuel Production	Natural gas production and some conventional and unconventional oil production industries (some refining is included)
Mining & Oil and Gas Extraction	Emissions from commercial fuel sold to: Metal and non metal mines, stone quarries, and gravel pits Oil and gas extraction industries Mineral exploration and contract drilling operations
Manufacturing Industries	Emissions from fuel consumed by the following industries: Iron and Steel (steel foundries, casting and rolling mills) Non-ferrous metals (aluminium, magnesium, and other production) Chemical (fertilizer manufacturing, organic and inorganic chemical manufacturing) Pulp and Paper (primarily pulp, paper, and paper product manufacturers) Cement production Other manufacturing industries not listed (such as automobile manufacturing, textiles, food and beverage industries)
Construction	Emissions from fuels consumed by the construction industry - buildings, highways etc.
Commercial & Institutional	Emissions from fuel consumed by: Service industries related to mining, communication, wholesale and retail trade, finance and insurance, real estate, education, etc.) Federal, provincial, and municipal establishment National Defence and Canadian Coast Guard Train stations, airports, and warehouses
Residential	Emissions from fuel consumed for personal residences (homes, apartment hotels, condominiums, and farm house)
Agriculture & Forestry	Emissions from fuel consumed by: Forestry and logging service industry Agricultural, hunting, and trapping industry (excluding food processing, farm machinery manufacturing, and repair)
b. Transportation	Emissions resulting from the:
Domestic Aviation	-consumption of fossil fuels by Canadian registered airlines flying domestically
Road Transportation	-consumption of fossil fuels (including non-CO2 emissions from ethanol) by vehicles licensed to operate on roads
Railways	-consumption of fossil fuels by Canadian railways
Domestic Marine	-consumption of fossil fuels by Canadian registered marine vessels fuelled domestically
Others - Off Road	-consumption of fossil fuels (including non-CO2 emissions from ethanol) by combustion devices not licensed to operate on roads
Others - Pipelines	-transportation and distribution of crude oil, natural gas, and other products
c. Fugitive Sources	Intentional and unintentional releases of greenhouse gases from the following activities:
Coal Mining	Underground and surface mining
Oil and Natural Gas	Conventional and unconventional oil and gas exploration, production, transportation, and distribution
INDUSTRIAL PROCESSES	Emissions resulting from the following process activities:
a. Mineral Products	Production of cement and lime; use of soda ash, limestone & dolomite, and magnesite
b. Chemical Industry	Production of ammonia, nitric acid, and adipic acid
c. Metal Production	Production of aluminum, iron and steel, magnesium production and casting
d. Production and Consumption of Halocarbons and SF_6	Production of HCFC-22; use of HFCs and/or PFCs in AC units, refrigeration units, fire extinguishers, aerosol cans, solvents, foam blowing, semiconductor manufacturing and electronics industry; use of SF_6 in electrical equipment and semiconductors
e. Other & Undifferentiated Production	Non-energy use of fossil fuels
SOLVENT & OTHER PRODUCT USE	Emissions resulting from the use of N_2O as anaesthetic and propellant
AGRICULTURE	Emissions resulting from:
a. Enteric Fermentation	Livestock enteric fermentation
b. Manure Management	Livestock waste management
c. Agricultural Soils	
Direct sources	Direct N_2O emissions from synthetic fertilizer, manure on cropland, crop residue, tillage, summerfallow, irrigation,
Manure on Pasture, Range, and Paddock	Direct N_2O emissions from manure deposited on pasture, range, and paddock
Indirect Sources	Indirect N_2O emissions from volatilization and leaching of animal manure nitrogen, synthetic fertilizer nitrogen,
WASTE	Emissions resulting from:
a. Solid Waste Disposal on Land	Municipal solid waste management sites (landfills) and dedicated wood waste landfills
b. Wastewater Handling	Domestic and industrial wastewater treatment
c. Waste Incineration	Municipal solid waste and sewage sludge incineration
LAND USE, LAND-USE CHANGE AND FORESTRY	Emissions and removals resulting from:
a. Forest Land	Managed forests and lands converted to forests; includes growth, natural and anthropogenic disturbances
b. Cropland	Mineral and organic cropland soils, liming, woody biomass; lands converted to cropland
c. Grassland	Managed grassland, lands converted to grassland
d. Wetlands	Lands converted to wetlands (peatlands, flooded lands) and wetlands remaining wetlands
e. Settlements	Forest and grassland converted to built-up lands (settlements, transport infrastructure, oil & gas infrastructure etc)
LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL	
Activities under the Kyoto Protocol	
a. Article 3.3	
Afforestation/Reforestation	Human induced, permanent conversion of non-forest land to forest land
Deforestation	Human induced, permanent conversion of forest land to other land categories (excludes harvest and regrowth
b. Article 3.4	
Cropland Management	Management practices on lands in annual crops, summerfallow and perennial crops (forage, specialty crops, orchards), and on cropland that has temporarily been set aside.

Table A12-2: Canada's 1990–2008 GHG Emissions by Sector

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL[1]	**592,000**	**741,000**	**731,000**	**718,000**	**750,000**	**734,000**
ENERGY	**469,000**	**603,000**	**593,000**	**581,000**	**614,000**	**597,000**
a. Stationary Combustion Sources	**281,000**	**349,000**	**336,000**	**324,000**	**350,000**	**335,000**
Electricity and Heat Generation	95,500	127,000	125,000	117,000	125,000	119,000
Fossil Fuel Production and Refining	51,000	72,000	66,000	66,000	70,000	68,000
Petroleum Refining and Upgrading	16,000	18,000	17,000	16,000	18,000	16,000
Fossil Fuel Production	36,000	53,000	49,000	50,000	52,000	52,000
Mining & Oil and Gas Extraction	6,190	14,900	15,600	16,800	23,200	23,900
Manufacturing Industries	55,000	51,500	47,600	47,000	49,400	43,400
Iron and Steel	6,480	6,460	6,450	6,220	6,920	6,170
Non Ferrous Metals	3,190	3,230	3,270	3,230	3,490	3,480
Chemical	7,140	6,830	6,400	6,820	7,230	6,690
Pulp and Paper	13,700	9,400	7,180	5,860	5,870	4,540
Cement	3,830	4,620	4,890	5,070	4,750	4,280
Other Manufacturing	20,600	20,900	19,400	19,800	21,200	18,200
Construction	1,870	1,340	1,360	1,300	1,290	1,260
Commercial & Institutional	25,700	37,700	36,700	33,400	34,900	34,900
Residential	43,000	43,000	42,000	40,000	44,000	43,000
Agriculture & Forestry	2,390	2,090	1,970	1,910	2,240	2,170
b. Transport[2]	**145,000**	**188,000**	**192,000**	**191,000**	**199,000**	**198,000**
Civil Aviation (Domestic Aviation)	6,400	7,800	7,900	7,700	8,800	8,500
Road Transportation	98,400	129,000	131,000	133,000	136,000	135,000
Light-Duty Gasoline Vehicles	45,800	41,100	39,900	39,900	41,000	40,600
Light-Duty Gasoline Trucks	20,700	42,000	43,100	43,600	44,800	44,800
Heavy-Duty Gasoline Vehicles	7,810	6,400	6,300	6,430	6,620	6,660
Motorcycles	146	245	252	256	264	264
Light-Duty Diesel Vehicles	355	431	432	435	448	446
Light-Duty Diesel Trucks	707	1,990	2,130	2,230	2,320	2,370
Heavy-Duty Diesel Vehicles	20,700	36,500	38,100	38,900	40,000	39,400
Propane & Natural Gas Vehicles	2,200	860	720	790	830	880
Railways	7,000	6,000	6,000	6,000	7,000	7,000
Navigation (Domestic Marine)	5,000	6,600	6,400	5,800	6,100	5,800
Other Transportation	29,000	38,000	41,000	39,000	41,000	41,000
Off-Road Gasoline	6,700	7,700	7,300	6,700	7,100	6,300
Off-Road Diesel	15,000	22,000	23,000	23,000	25,000	28,000
Pipelines	6,850	8,470	10,100	9,610	8,940	7,460
c. Fugitive Sources	**42,700**	**65,600**	**64,700**	**65,800**	**64,700**	**63,800**
Coal Mining	2,000	700	700	700	800	800
Oil and Natural Gas	40,700	64,900	63,900	65,100	64,000	63,100
Oil	4,180	5,940	5,650	5,720	5,810	5,520
Natural Gas	12,900	20,400	20,800	21,400	21,300	21,300
Venting	19,300	33,000	32,000	32,000	31,600	30,800
Flaring	4,400	5,600	5,500	6,000	5,300	5,500
INDUSTRIAL PROCESSES	**54,800**	**55,400**	**55,100**	**54,600**	**53,200**	**52,600**
a. Mineral Products	**8,300**	**9,500**	**9,500**	**9,600**	**9,300**	**8,500**
Cement Production	5,400	7,100	7,200	7,300	7,300	6,600
Lime Production	1,800	1,800	1,700	1,600	1,600	1,500
Mineral Product Use[3]	1,090	585	589	660	404	365
b. Chemical Industry	**17,000**	**11,000**	**10,000**	**9,000**	**8,900**	**10,000**
Ammonia Production	5,000	6,800	6,300	6,600	6,200	6,700
Nitric Acid Production	1,010	1,230	1,250	1,230	1,130	1,230
Adipic Acid Production	11,000	3,100	2,600	1,200	1,500	2,400
c. Metal Production	**19,500**	**16,700**	**16,500**	**16,800**	**15,500**	**15,300**
Iron and Steel Production	7,060	7,200	7,020	7,760	7,720	7,440
Aluminum Production	9,300	7,300	8,200	7,700	7,300	7,400
SF_6 Used in Magnesium Smelters and Casters	3,110	2,190	1,290	1,390	522	460
d. Production and Consumption of Halocarbons and SF_6	**2,300**	**5,500**	**6,400**	**6,500**	**6,700**	**7,300**
e. Other & Undifferentiated Production	**8,000**	**13,000**	**12,000**	**13,000**	**13,000**	**11,000**
SOLVENT & OTHER PRODUCT USE	**170**	**210**	**180**	**320**	**320**	**330**
AGRICULTURE	**48,000**	**62,000**	**62,000**	**61,000**	**61,000**	**62,000**
a. Enteric Fermentation	17,000	23,000	24,000	23,000	23,000	22,000
b. Manure Management	6,000	8,000	8,100	8,000	7,800	7,500
c. Agriculture Soils	26,000	30,000	30,000	30,000	31,000	32,000
Direct Sources	14,000	15,000	15,000	15,000	16,000	17,000
Pasture, Range and Paddock Manure	2,600	4,000	4,100	4,000	3,900	3,800
Indirect Sources	9,000	10,000	10,000	10,000	10,000	10,000
WASTE	**19,000**	**21,000**	**21,000**	**22,000**	**21,000**	**22,000**
a. Solid Waste Disposal on Land	18,000	20,000	20,000	20,000	20,000	20,000
b. Wastewater Handling	740	900	900	910	930	940
c. Waste Incineration	400	230	240	240	250	250
Land Use, Land-use Change and Forestry	**-52,000**	**120,000**	**41,000**	**41,000**	**45,000**	**-13,000**
a. Forest Land	-79,000	110,000	32,000	33,000	38,000	-18,000
b. Cropland	13,000	-960	-2,100	-2,300	-3,400	-4,400
c. Grassland	-	-	-	-	-	
d. Wetlands	5,000	3,000	3,000	3,000	3,000	2,000
e. Settlements	10,000	8,000	8,000	8,000	8,000	7,000
LAND USE, LAND-USE CHANGE AND FORESTRY						
Activities under the Kyoto Protocol						
a. Article 3.3						
Afforestation / reforestation	NA	NA	NA	NA	NA	-738
Deforestation	NA	NA	NA	NA	NA	14,644
b. Article 3.4						
Cropland Management	4,271	NA	NA	NA	NA	-11,503

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector. The estimates for LULUCF activities under the Kyoto Protocol will be accounted for over the five years (2008-2012) of the first commitment period under the Protocol.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

Table A12-3: 2008 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**574,000**	**4,700**	**99,000**	**170**	**52,000**	**5,500**	**2,200**	**2,200**	**734,000**
ENERGY	**535,000**	**2,500**	**53,000**	**30**	**10,000**				**597,000**
a. Stationary Combustion Sources	**328,000**	**200**	**4,000**	**8**	**3,000**				**335,000**
Electricity and Heat Generation	118,000	4.6	96	2	700				119,000
Fossil Fuel Production and Refining	65,300	100	2,000	1	400				68,000
Petroleum Refining and Upgrading	16,000	-	-	0.4	100				16,000
Fossil Fuel Production	49,100	100	2,000	1	300				52,000
Mining & Oil and Gas Extraction	23,700	0.5	10	0.5	200				23,900
Manufacturing Industries	42,900	3	60	1	500				43,400
Iron and Steel	6,110	0.2	5	0.2	60				6,170
Non Ferrous Metals	3,470	0.08	2	0.05	20				3,480
Chemical	6,650	0.14	2.9	0.1	40				6,690
Pulp and Paper	4,280	2	40	0.7	200				4,540
Cement	4,270	0.08	2	0.03	10				4,280
Other Manufacturing	18,100	0.4	7	0.4	100				18,200
Construction	1,250	0.02	0.5	0.03	10				1,260
Commercial & Institutional	34,600	0.6	10	0.7	200				34,900
Residential	40,400	90	2,000	2	500				43,000
Agriculture & Forestry	2,150	0.04	0.8	0.06	20				2,170
b. Transport[2]	**190,000**	**30**	**600**	**30**	**8,000**				**198,000**
Civil Aviation (Domestic Aviation)	8,300	0.5	9	0.8	200				8,500
Road Transportation	132,000	9.2	190	10	3,100				135,000
Light-Duty Gasoline Vehicles	39,600	2.9	61	3.2	1,000				40,600
Light-Duty Gasoline Trucks	43,200	3.2	68	5.0	1,500				44,800
Heavy-Duty Gasoline Vehicles	6,500	0.34	7.2	0.49	150				6,660
Motorcycles	259	0.17	3.6	0.01	1.6				264
Light-Duty Diesel Vehicles	435	0.01	0.2	0.04	10				446
Light-Duty Diesel Trucks	2,310	0.06	1	0.2	60				2,370
Heavy-Duty Diesel Vehicles	39,000	2	40	1	400				39,400
Propane & Natural Gas Vehicles	857	0.8	20	0.02	5				880
Railways	6,290	0.3	7	3	800				7,000
Navigation (Domestic Marine)	5,500	0.4	9	1	300				5,800
Other Transportation	38,000	20	300	10	3,000				41,000
Off-Road Gasoline	6,100	7	200	0.1	40				6,300
Off-Road Diesel	25,000	1	30	10	3,000				28,000
Pipelines	7,240	7.3	150	0.2	60				7,460
c. Fugitive Sources	**16,000**	**2,300**	**48,000**	**0.1**	**40**				**63,800**
Coal Mining		40	800						800
Oil and Natural Gas	16,200	2,230	46,800	0.1	40				63,100
Oil	210	252	5,280	0.1	30				5,520
Natural Gas	67.8	1,010	21,200	-	-				21,300
Venting	10,600	962	20,200	0.01	4				30,800
Flaring	5,400	3.7	78	0.01	4				5,500
INDUSTRIAL PROCESSES	**39,000**			**11.7**	**3,640**	**5,500**	**2,200**	**2,200**	**52,600**
a. Mineral Products	**8,500**								**8,500**
Cement Production	6,600								6,600
Lime Production	1,500								1,500
Mineral Product Use[3]	365								365
b. Chemical Industry	**6,700**			**11.7**	**3,640**				**10,000**
Ammonia Production	6,700								6,700
Nitric Acid Production				3.96	1,230				1,230
Adipic Acid Production				7.8	2,400				2,400
c. Metal Production	**12,600**						**2,200**	**464**	**15,300**
Iron and Steel Production	7,440								7,440
Aluminum Production	5,200						2,200	3.74	7,400
SF_6 Used in Magnesium Smelters and Casters								460	460
d. Production and Consumption of Halocarbons and SF_6[4]						**5,500**	**4**	**1,800**	**7,300**
e. Other & Undifferentiated Production	**11,000**								**11,000**
SOLVENT & OTHER PRODUCT USE				**1.1**	**330**				**330**
AGRICULTURE		**1,200**	**25,000**	**120**	**37,000**				**62,000**
a. Enteric Fermentation		1,100	22,000						22,000
b. Manure Management		140	2,800	15	4,700				7,500
c. Agriculture Soils				100	32,000				32,000
Direct Sources				54	17,000				17,000
Pasture, Range and Paddock Manure				12	3,800				3,800
Indirect Sources				40	10,000				10,000
WASTE	**200**	**990**	**21,000**	**2**	**700**				**22,000**
a. Solid Waste Disposal on Land		970	20,000		-				20,000
b. Wastewater Handling		13	260	2	700				940
c. Waste Incineration	200	0.08	2	0.2	50				250
Land Use, Land-use Change and Forestry	**-19,000**	**200**	**4,100**	**8.2**	**2,500**				**-13,000**
a. Forest Land	-25,000	180	3,900	7.7	2,400				-18,000
b. Cropland	-4,700	7	100	0.3	100				-4,400
c. Grassland	-	-	-	-	-				-
d. Wetlands	2,000	0	-	0	-				2,000
e. Settlements	7,000	4	90	0.1	50				7,000
LAND USE, LAND-USE CHANGE AND FORESTRY									
Activities under the Kyoto Protocol									
a. Article 3.3									
Afforestation / reforestation	-738	-	-	-	-				-738
Deforestation	14,261	11.3	236.8	0.5	146.3				14,644
b. Article 3.4									
Cropland Management	-11,504	0	-	0	1				-11,503

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector. The estimates for LULUCF activities under the Kyoto Protocol will be accounted for over the five years (2008-2012) of the first commitment period under the Protocol.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

– Indicates no emissions.

0.0 Indicates emissions truncated due to rounding.

Table A12-4: 2007 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**591,000**	**4,800**	**100,000**	**160**	**50,000**	**5,400**	**2,200**	**1,800**	**750,000**
ENERGY	**550,000**	**2,600**	**54,000**	**30**	**10,000**				**614,000**
a. Stationary Combustion Sources	**343,000**	**200**	**4,000**	**8**	**3,000**				**350,000**
Electricity and Heat Generation	124,000	5.3	110	2	700				125,000
Fossil Fuel Production and Refining	67,600	100	2,000	1	400				70,000
Petroleum Refining and Upgrading	18,000	-	-	0.4	100				18,000
Fossil Fuel Production	49,300	100	2,000	1	300				52,000
Mining & Oil and Gas Extraction	23,000	0.4	9	0.5	200				23,200
Manufacturing Industries	48,900	3	60	2	500				49,400
Iron and Steel	6,860	0.3	5	0.2	60				6,920
Non Ferrous Metals	3,480	0.08	2	0.05	20				3,490
Chemical	7,190	0.15	3.2	0.1	40				7,230
Pulp and Paper	5,590	2	40	0.8	200				5,870
Cement	4,730	0.09	2	0.04	10				4,750
Other Manufacturing	21,000	0.4	9	0.4	100				21,200
Construction	1,280	0.02	0.5	0.03	10				1,290
Commercial & Institutional	34,700	0.6	10	0.7	200				34,900
Residential	41,000	90	2,000	2	500				44,000
Agriculture & Forestry	2,220	0.04	0.8	0.07	20				2,240
b. Transport[2]	**191,000**	**30**	**600**	**20**	**8,000**				**199,000**
Civil Aviation (Domestic Aviation)	8,590	0.5	10	0.8	200				8,800
Road Transportation	133,000	9.4	200	11	3,300				136,000
Light-Duty Gasoline Vehicles	39,800	3.0	63	3.5	1,100				41,000
Light-Duty Gasoline Trucks	43,200	3.3	68	5.2	1,600				44,800
Heavy-Duty Gasoline Vehicles	6,470	0.36	7.6	0.48	150				6,620
Motorcycles	258	0.17	3.6	0.01	1.6				264
Light-Duty Diesel Vehicles	437	0.01	0.2	0.04	10				448
Light-Duty Diesel Trucks	2,260	0.06	1	0.2	60				2,320
Heavy-Duty Diesel Vehicles	39,600	2	40	1	400				40,000
Propane & Natural Gas Vehicles	812	0.7	20	0.02	5				830
Railways	6,010	0.3	7	2	800				7,000
Navigation (Domestic Marine)	5,740	0.4	9	1	400				6,100
Other Transportation	38,000	20	400	10	3,000				41,000
Off-Road Gasoline	6,900	8	200	0.2	50				7,100
Off-Road Diesel	22,000	1	30	9	3,000				25,000
Pipelines	8,680	8.8	180	0.2	70				8,940
c. Fugitive Sources	**16,000**	**2,300**	**49,000**	**0.1**	**40**				**64,700**
Coal Mining		40	800						800
Oil and Natural Gas	15,800	2,290	48,100	0.1	40				64,000
Oil	220	265	5,560	0.1	30				5,810
Natural Gas	65.1	1,010	21,200	-	-				21,300
Venting	10,400	1,010	21,300	0.01	4				31,600
Flaring	5,200	3.6	76	0.01	2				5,300
INDUSTRIAL PROCESSES	**41,000**			**8.46**	**2,620**	**5,400**	**2,200**	**1,800**	**53,200**
a. Mineral Products	**9,300**								**9,300**
Cement Production	7,300								7,300
Lime Production	1,600								1,600
Mineral Product Use[3]	404								404
b. Chemical Industry	**6,200**			**8.46**	**2,620**				**8,900**
Ammonia Production	6,200								6,200
Nitric Acid Production				3.65	1,130				1,130
Adipic Acid Production				4.8	1,500				1,500
c. Metal Production	**12,800**						**2,200**	**535**	**15,500**
Iron and Steel Production	7,720								7,720
Aluminum Production	5,100						2,200	12.4	7,300
SF_6 Used in Magnesium Smelters and Casters								522	522
d. Production and Consumption of Halocarbons and SF_6[4]						**5,400**	**4**	**1,300**	**6,700**
e. Other & Undifferentiated Production	**13,000**								**13,000**
SOLVENT & OTHER PRODUCT USE				**1.0**	**320**				**320**
AGRICULTURE		**1,200**	**26,000**	**110**	**36,000**				**61,000**
a. Enteric Fermentation		1,100	23,000						23,000
b. Manure Management		140	3,000	15	4,800				7,800
c. Agriculture Soils				99	31,000				31,000
Direct Sources				51	16,000				16,000
Pasture, Range and Paddock Manure				13	3,900				3,900
Indirect Sources				40	10,000				10,000
WASTE	**190**	**970**	**20,000**	**2**	**700**				**21,000**
a. Solid Waste Disposal on Land		960	20,000		-				20,000
b. Wastewater Handling		12	260	2	700				930
c. Waste Incineration	190	0.07	2	0.2	50				250
Land Use, Land-use Change and Forestry	**35,000**	**290**	**6,200**	**12**	**3,800**				**45,000**
a. Forest Land	29,000	280	5,900	12	3,700				38,000
b. Cropland	-3,600	7	200	0.3	100				-3,400
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-5: 2006 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**558,000**	**4,800**	**100,000**	**150**	**48,000**	**5,000**	**2,600**	**2,900**	**718,000**
ENERGY	**516,000**	**2,600**	**55,000**	**30**	**10,000**				**581,000**
a. Stationary Combustion Sources	**317,000**	**200**	**4,000**	**8**	**2,000**				**324,000**
Electricity and Heat Generation	116,000	4.5	94	2	700				117,000
Fossil Fuel Production and Refining	63,700	100	2,000	1	400				66,000
Petroleum Refining and Upgrading	16,000	-	-	0.4	100				16,000
Fossil Fuel Production	47,800	100	2,000	1	300				50,000
Mining & Oil and Gas Extraction	16,700	0.3	7	0.4	100				16,800
Manufacturing Industries	46,500	3	50	1	500				47,000
Iron and Steel	6,150	0.2	5	0.2	60				6,220
Non Ferrous Metals	3,210	0.07	2	0.05	10				3,230
Chemical	6,780	0.14	3.0	0.1	40				6,820
Pulp and Paper	5,620	2	30	0.7	200				5,860
Cement	5,060	0.1	2	0.04	10				5,070
Other Manufacturing	19,700	0.4	8	0.4	100				19,800
Construction	1,290	0.02	0.5	0.03	10				1,300
Commercial & Institutional	33,200	0.6	10	0.7	200				33,400
Residential	37,300	100	2,000	2	500				40,000
Agriculture & Forestry	1,890	0.03	0.7	0.06	20				1,910
b. Transport[2]	**183,000**	**30**	**600**	**20**	**7,000**				**191,000**
Civil Aviation (Domestic Aviation)	7,480	0.4	9	0.7	200				7,700
Road Transportation	129,000	9.3	190	11	3,300				133,000
Light-Duty Gasoline Vehicles	38,700	3.0	64	3.7	1,200				39,900
Light-Duty Gasoline Trucks	41,900	3.2	66	5.2	1,600				43,600
Heavy-Duty Gasoline Vehicles	6,280	0.36	7.6	0.45	140				6,430
Motorcycles	251	0.17	3.5	0.01	1.6				256
Light-Duty Diesel Vehicles	424	0.01	0.2	0.03	10				435
Light-Duty Diesel Trucks	2,170	0.06	1	0.2	50				2,230
Heavy-Duty Diesel Vehicles	38,500	2	40	1	400				38,900
Propane & Natural Gas Vehicles	770	0.7	20	0.02	5				790
Railways	5,660	0.3	7	2	700				6,000
Navigation (Domestic Marine)	5,380	0.4	8	1	400				5,800
Other Transportation	36,000	20	400	9	3,000				39,000
Off-Road Gasoline	6,500	8	200	0.1	40				6,700
Off-Road Diesel	20,000	1	20	8	3,000				23,000
Pipelines	9,340	9.4	200	0.3	80				9,610
c. Fugitive Sources	**16,000**	**2,400**	**50,000**	**0.1**	**40**				**65,800**
Coal Mining		30	700						700
Oil and Natural Gas	16,200	2,330	48,800	0.1	40				65,100
Oil	190	262	5,500	0.1	30				5,720
Natural Gas	65.4	1,020	21,300	-	-				21,400
Venting	10,100	1,040	21,900	0.01	5				32,000
Flaring	5,900	4.1	86	0.01	3				6,000
INDUSTRIAL PROCESSES	**42,000**			**7.88**	**2,440**	**5,000**	**2,600**	**2,900**	**54,600**
a. Mineral Products	**9,600**								**9,600**
Cement Production	7,300								7,300
Lime Production	1,600								1,600
Mineral Product Use[3]	660								660
b. Chemical Industry	**6,600**			**7.88**	**2,440**				**9,000**
Ammonia Production	6,600								6,600
Nitric Acid Production				3.98	1,230				1,230
Adipic Acid Production				3.9	1,200				1,200
c. Metal Production	**12,800**						**2,600**	**1,410**	**16,800**
Iron and Steel Production	7,760								7,760
Aluminum Production	5,100						2,600	13.1	7,700
SF_6 Used in Magnesium Smelters and Casters								1,390	1,390
d. Production and Consumption of Halocarbons and SF_6[4]						**5,000**	**5**	**1,500**	**6,500**
e. Other & Undifferentiated Production	**13,000**								**13,000**
SOLVENT & OTHER PRODUCT USE				**1.0**	**320**				**320**
AGRICULTURE		**1,200**	**26,000**	**110**	**35,000**				**61,000**
a. Enteric Fermentation		1,100	23,000						23,000
b. Manure Management		150	3,100	16	4,900				8,000
c. Agriculture Soils				96	30,000				30,000
Direct Sources				48	15,000				15,000
Pasture, Range and Paddock Manure				13	4,000				4,000
Indirect Sources				30	10,000				10,000
WASTE	**190**	**990**	**21,000**	**2**	**700**				**22,000**
a. Solid Waste Disposal on Land		970	20,000		-				20,000
b. Wastewater Handling		12	260	2	700				910
c. Waste Incineration	190	0.07	1	0.2	50				240
Land Use, Land-use Change and Forestry	**31,000**	**310**	**6,600**	**13**	**4,100**				**41,000**
a. Forest Land	23,000	300	6,300	13	3,900				33,000
b. Cropland	-2,600	8	200	0.4	100				-2,300
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-6: 2005 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**569,000**	**4,800**	**100,000**	**160**	**50,000**	**5,200**	**3,300**	**2,500**	**731,000**
ENERGY	**529,000**	**2,600**	**54,000**	**30**	**10,000**				**593,000**
a. Stationary Combustion Sources	**329,000**	**200**	**4,000**	**8**	**3,000**				**336,000**
Electricity and Heat Generation	124,000	4.8	100	2	700				125,000
Fossil Fuel Production and Refining	63,800	100	2,000	1	400				66,000
Petroleum Refining and Upgrading	17,000	-	-	0.4	100				17,000
Fossil Fuel Production	46,600	100	2,000	1	300				49,000
Mining & Oil and Gas Extraction	15,500	0.3	6	0.4	100				15,600
Manufacturing Industries	47,100	3	60	2	500				47,600
Iron and Steel	6,390	0.2	5	0.2	60				6,450
Non Ferrous Metals	3,250	0.08	2	0.05	20				3,270
Chemical	6,360	0.13	2.7	0.1	30				6,400
Pulp and Paper	6,880	2	40	0.8	300				7,180
Cement	4,880	0.1	2	0.04	10				4,890
Other Manufacturing	19,300	0.4	8	0.4	100				19,400
Construction	1,350	0.02	0.5	0.03	10				1,360
Commercial & Institutional	36,400	0.6	10	0.7	200				36,700
Residential	39,300	90	2,000	2	500				42,000
Agriculture & Forestry	1,950	0.03	0.7	0.06	20				1,970
b. Transport[2]	**184,000**	**30**	**600**	**20**	**8,000**				**192,000**
Civil Aviation (Domestic Aviation)	7,650	0.4	9	0.7	200				7,900
Road Transportation	127,000	9.4	200	11	3,500				131,000
Light-Duty Gasoline Vehicles	38,600	3.2	67	4.1	1,300				39,900
Light-Duty Gasoline Trucks	41,400	3.2	67	5.3	1,700				43,100
Heavy-Duty Gasoline Vehicles	6,160	0.38	8.0	0.43	130				6,300
Motorcycles	247	0.17	3.5	0.01	1.5				252
Light-Duty Diesel Vehicles	421	0.01	0.2	0.03	10				432
Light-Duty Diesel Trucks	2,080	0.05	1	0.2	50				2,130
Heavy-Duty Diesel Vehicles	37,700	2	40	1	400				38,100
Propane & Natural Gas Vehicles	706	0.7	10	0.01	4				720
Railways	5,480	0.3	6	2	700				6,000
Navigation (Domestic Marine)	6,050	0.4	9	1	400				6,400
Other Transportation	38,000	20	400	9	3,000				41,000
Off-Road Gasoline	7,100	8	200	0.2	50				7,300
Off-Road Diesel	21,000	1	20	9	3,000				23,000
Pipelines	9,780	9.8	210	0.3	80				10,100
c. Fugitive Sources	**15,000**	**2,300**	**49,000**	**0.1**	**40**				**64,700**
Coal Mining		30	700						700
Oil and Natural Gas	15,400	2,310	48,500	0.1	40				63,900
Oil	170	260	5,450	0.1	30				5,650
Natural Gas	61.0	990	20,800	-	-				20,800
Venting	9,810	1,050	22,100	0.01	5				32,000
Flaring	5,400	3.7	78	0.01	2				5,500
INDUSTRIAL PROCESSES	**40,000**			**12.6**	**3,900**	**5,200**	**3,300**	**2,500**	**55,100**
a. Mineral Products	**9,500**								**9,500**
Cement Production	7,200								7,200
Lime Production	1,700								1,700
Mineral Product Use[3]	589								589
b. Chemical Industry	**6,300**			**12.6**	**3,900**				**10,000**
Ammonia Production	6,300								6,300
Nitric Acid Production				4.04	1,250				1,250
Adipic Acid Production				8.5	2,600				2,600
c. Metal Production	**11,900**						**3,300**	**1,310**	**16,500**
Iron and Steel Production	7,020								7,020
Aluminum Production	4,800						3,300	17.6	8,200
SF_6 Used in Magnesium Smelters and Casters								1,290	1,290
d. Production and Consumption of Halocarbons and SF_6[4]						**5,200**	**5**	**1,200**	**6,400**
e. Other & Undifferentiated Production	**12,000**								**12,000**
SOLVENT & OTHER PRODUCT USE				**0.58**	**180**				**180**
AGRICULTURE		**1,300**	**27,000**	**110**	**35,000**				**62,000**
a. Enteric Fermentation		1,100	24,000						24,000
b. Manure Management		150	3,100	16	5,000				8,100
c. Agriculture Soils				96	30,000				30,000
Direct Sources				48	15,000				15,000
Pasture, Range and Paddock Manure				13	4,100				4,100
Indirect Sources				30	10,000				10,000
WASTE	**190**	**960**	**20,000**	**2**	**700**				**21,000**
a. Solid Waste Disposal on Land		950	20,000		-				20,000
b. Wastewater Handling		12	250	2	700				900
c. Waste Incineration	190	0.06	1	0.2	50				240
Land Use, Land-use Change and Forestry	**32,000**	**290**	**6,000**	**12**	**3,700**				**41,000**
a. Forest Land	23,000	270	5,700	11	3,600				32,000
b. Cropland	-2,300	7	200	0.3	100				-2,100
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	2	30	0.06	20				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-7: 2004 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**578,000**	**4,800**	**100,000**	**160**	**51,000**	**4,700**	**3,100**	**3,000**	**741,000**
ENERGY	**538,000**	**2,600**	**55,000**	**30**	**10,000**				**603,000**
a. Stationary Combustion Sources	**342,000**	**200**	**5,000**	**8**	**3,000**				**349,000**
Electricity and Heat Generation	126,000	4.8	100	2	700				127,000
Fossil Fuel Production and Refining	68,900	100	2,000	1	500				72,000
Petroleum Refining and Upgrading	18,000	-	-	0.4	100				18,000
Fossil Fuel Production	50,700	100	2,000	1	300				53,000
Mining & Oil and Gas Extraction	14,800	0.3	6	0.3	100				14,900
Manufacturing Industries	50,900	3	70	2	500				51,500
Iron and Steel	6,400	0.2	5	0.2	60				6,460
Non Ferrous Metals	3,210	0.07	2	0.05	10				3,230
Chemical	6,790	0.14	2.9	0.1	40				6,830
Pulp and Paper	9,070	2	50	0.9	300				9,400
Cement	4,610	0.09	2	0.04	10				4,620
Other Manufacturing	20,800	0.4	9	0.4	100				20,900
Construction	1,330	0.02	0.5	0.03	10				1,340
Commercial & Institutional	37,500	0.7	10	0.8	200				37,700
Residential	40,400	90	2,000	2	500				43,000
Agriculture & Forestry	2,070	0.04	0.7	0.06	20				2,090
b. Transport[2]	**180,000**	**30**	**600**	**20**	**8,000**				**188,000**
Civil Aviation (Domestic Aviation)	7,610	0.4	9	0.7	200				7,800
Road Transportation	126,000	9.7	200	12	3,700				129,000
Light-Duty Gasoline Vehicles	39,600	3.5	73	4.6	1,400				41,100
Light-Duty Gasoline Trucks	40,200	3.2	66	5.4	1,700				42,000
Heavy-Duty Gasoline Vehicles	6,260	0.41	8.7	0.42	130				6,400
Motorcycles	240	0.16	3.4	0.00	1.5				245
Light-Duty Diesel Vehicles	420	0.01	0.2	0.03	10				431
Light-Duty Diesel Trucks	1,940	0.05	1	0.2	50				1,990
Heavy-Duty Diesel Vehicles	36,100	2	40	1	300				36,500
Propane & Natural Gas Vehicles	842	0.7	20	0.02	5				860
Railways	5,220	0.3	6	2	700				6,000
Navigation (Domestic Marine)	6,230	0.5	10	1	400				6,600
Other Transportation	35,000	20	400	9	3,000				38,000
Off-Road Gasoline	7,500	9	200	0.2	50				7,700
Off-Road Diesel	20,000	1	20	8	3,000				22,000
Pipelines	8,230	8.3	170	0.2	70				8,470
c. Fugitive Sources	**16,000**	**2,400**	**50,000**	**0.1**	**40**				**65,600**
Coal Mining		30	700						700
Oil and Natural Gas	15,900	2,330	49,000	0.1	40				64,900
Oil	180	273	5,720	0.1	30				5,940
Natural Gas	57.2	968	20,300	-	-				20,400
Venting	10,200	1,090	22,900	0.02	5				33,000
Flaring	5,500	3.8	80	0.01	2				5,600
INDUSTRIAL PROCESSES	**40,000**			**13.9**	**4,320**	**4,700**	**3,100**	**3,000**	**55,400**
a. Mineral Products	**9,500**								**9,500**
Cement Production	7,100								7,100
Lime Production	1,800								1,800
Mineral Product Use[3]	585								585
b. Chemical Industry	**6,800**			**13.9**	**4,320**				**11,000**
Ammonia Production	6,800								6,800
Nitric Acid Production				3.96	1,230				1,230
Adipic Acid Production				10	3,100				3,100
c. Metal Production	**11,400**						**3,000**	**2,220**	**16,700**
Iron and Steel Production	7,200								7,200
Aluminum Production	4,200						3,000	31.9	7,300
SF_6 Used in Magnesium Smelters and Casters								2,190	2,190
d. Production and Consumption of Halocarbons and SF_6[4]						**4,700**	**20**	**820**	**5,500**
e. Other & Undifferentiated Production	**13,000**								**13,000**
SOLVENT & OTHER PRODUCT USE				**0.68**	**210**				**210**
AGRICULTURE		**1,300**	**26,000**	**110**	**35,000**				**62,000**
a. Enteric Fermentation		1,100	23,000						23,000
b. Manure Management		150	3,100	16	4,900				8,000
c. Agriculture Soils				98	30,000				30,000
Direct Sources				49	15,000				15,000
Pasture, Range and Paddock Manure				13	4,000				4,000
Indirect Sources				40	10,000				10,000
WASTE	**180**	**950**	**20,000**	**2**	**700**				**21,000**
a. Solid Waste Disposal on Land		940	20,000		-				20,000
b. Wastewater Handling		12	250	2	700				900
c. Waste Incineration	180	0.06	1	0.2	50				230
Land Use, Land-use Change and Forestry	**99,000**	**540**	**11,000**	**23**	**7,000**				**120,000**
a. Forest Land	89,000	520	11,000	22	6,800				110,000
b. Cropland	-1,200	8	200	0.4	100				-960
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	1	20	0.04	10				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-8: 2003 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**582,000**	**4,700**	**100,000**	**150**	**48,000**	**4,400**	**3,000**	**4,200**	**741,000**
ENERGY	**544,000**	**2,600**	**55,000**	**30**	**10,000**				**609,000**
a. Stationary Combustion Sources	**353,000**	**200**	**5,000**	**9**	**3,000**				**360,000**
Electricity and Heat Generation	134,000	5.1	110	2	800				135,000
Fossil Fuel Production and Refining	70,800	100	2,000	1	500				74,000
Petroleum Refining and Upgrading	19,000	-	-	0.3	100				19,000
Fossil Fuel Production	51,400	100	2,000	1	400				54,000
Mining & Oil and Gas Extraction	15,700	0.3	7	0.3	100				15,800
Manufacturing Industries	49,200	3	60	2	500				49,800
Iron and Steel	6,290	0.2	5	0.2	60				6,350
Non Ferrous Metals	3,190	0.07	1	0.05	10				3,200
Chemical	5,840	0.12	2.5	0.1	30				5,870
Pulp and Paper	8,750	2	40	0.9	300				9,060
Cement	4,440	0.08	2	0.04	10				4,450
Other Manufacturing	20,700	0.4	9	0.4	100				20,800
Construction	1,280	0.02	0.5	0.03	9				1,290
Commercial & Institutional	37,500	0.7	10	0.8	200				37,700
Residential	42,500	90	2,000	2	500				45,000
Agriculture & Forestry	2,170	0.04	0.8	0.06	20				2,190
b. Transport[2]	**175,000**	**30**	**600**	**20**	**8,000**				**183,000**
Civil Aviation (Domestic Aviation)	7,020	0.4	9	0.6	200				7,200
Road Transportation	121,000	9.7	200	12	3,800				125,000
Light-Duty Gasoline Vehicles	39,700	3.7	78	5.1	1,600				41,400
Light-Duty Gasoline Trucks	38,700	3.1	66	5.5	1,700				40,500
Heavy-Duty Gasoline Vehicles	5,920	0.42	8.9	0.38	120				6,050
Motorcycles	222	0.15	3.2	0.00	1.4				226
Light-Duty Diesel Vehicles	388	0.01	0.2	0.03	10				398
Light-Duty Diesel Trucks	1,840	0.05	1	0.1	50				1,880
Heavy-Duty Diesel Vehicles	33,800	2	30	1	300				34,100
Propane & Natural Gas Vehicles	795	0.7	10	0.02	5				820
Railways	5,130	0.3	6	2	700				6,000
Navigation (Domestic Marine)	5,820	0.4	9	1	300				6,100
Other Transportation	35,000	20	400	8	3,000				38,000
Off-Road Gasoline	7,500	9	200	0.2	50				7,800
Off-Road Diesel	19,000	1	20	8	2,000				22,000
Pipelines	8,790	8.8	190	0.2	70				9,050
c. Fugitive Sources	**16,000**	**2,300**	**49,000**	**0.1**	**40**				**65,700**
Coal Mining		40	900						900
Oil and Natural Gas	16,400	2,300	48,400	0.1	40				64,800
Oil	170	266	5,580	0.1	40				5,780
Natural Gas	55.3	953	20,000	-	-				20,100
Venting	10,600	1,080	22,700	0.02	5				33,300
Flaring	5,600	3.7	77	0.00	1				5,700
INDUSTRIAL PROCESSES	**37,000**			**7.58**	**2,350**	**4,400**	**3,000**	**4,200**	**51,200**
a. Mineral Products	**9,100**								**9,100**
Cement Production	6,800								6,800
Lime Production	1,700								1,700
Mineral Product Use[3]	612								612
b. Chemical Industry	**6,100**			**7.58**	**2,350**				**8,500**
Ammonia Production	6,100								6,100
Nitric Acid Production				4.08	1,260				1,260
Adipic Acid Production				3.5	1,100				1,100
c. Metal Production	**11,600**						**3,000**	**2,550**	**17,200**
Iron and Steel Production	7,040								7,040
Aluminum Production	4,600						3,000	70.4	7,700
SF_6 Used in Magnesium Smelters and Casters								2,480	2,480
d. Production and Consumption of Halocarbons and SF_6[4]						**4,400**	**20**	**1,600**	**6,000**
e. Other & Undifferentiated Production	**10,000**								**10,000**
SOLVENT & OTHER PRODUCT USE				**0.71**	**220**				**220**
AGRICULTURE		**1,200**	**25,000**	**110**	**34,000**				**60,000**
a. Enteric Fermentation		1,100	22,000						22,000
b. Manure Management		150	3,100	15	4,800				7,800
c. Agriculture Soils				95	29,000				29,000
Direct Sources				48	15,000				15,000
Pasture, Range and Paddock Manure				12	3,900				3,900
Indirect Sources				30	10,000				10,000
WASTE	**180**	**940**	**20,000**	**2**	**700**				**21,000**
a. Solid Waste Disposal on Land		930	19,000		-				19,000
b. Wastewater Handling		12	240	2	600				890
c. Waste Incineration	180	0.05	1	0.1	50				230
Land Use, Land-use Change and Forestry	**40,000**	**480**	**10,000**	**20**	**6,300**				**56,000**
a. Forest Land	30,000	470	9,800	20	6,100				46,000
b. Cropland	-760	7	200	0.3	100				-490
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0.8	20	0.03	10				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-9: 2002 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**562,000**	**4,700**	**99,000**	**150**	**45,000**	**3,900**	**3,000**	**4,000**	**717,000**
ENERGY	**525,000**	**2,600**	**54,000**	**30**	**10,000**				**589,000**
a. Stationary Combustion Sources	**339,000**	**200**	**5,000**	**8**	**3,000**				**347,000**
Electricity and Heat Generation	128,000	4.7	99	2	700				129,000
Fossil Fuel Production and Refining	71,300	100	2,000	1	500				74,000
Petroleum Refining and Upgrading	19,000	-	-	0.3	100				19,000
Fossil Fuel Production	52,700	100	2,000	1	400				56,000
Mining & Oil and Gas Extraction	11,800	0.2	5	0.3	90				11,900
Manufacturing Industries	48,800	3	60	2	500				49,400
Iron and Steel	6,400	0.2	5	0.2	60				6,470
Non Ferrous Metals	3,200	0.07	1	0.05	10				3,220
Chemical	6,130	0.12	2.6	0.1	30				6,170
Pulp and Paper	8,940	2	40	0.9	300				9,250
Cement	4,480	0.08	2	0.04	10				4,490
Other Manufacturing	19,700	0.4	8	0.4	100				19,800
Construction	1,220	0.02	0.5	0.03	9				1,230
Commercial & Institutional	35,000	0.6	10	0.7	200				35,200
Residential	40,700	90	2,000	2	500				43,000
Agriculture & Forestry	2,070	0.03	0.7	0.06	20				2,090
b. Transport[2]	**170,000**	**30**	**700**	**20**	**7,000**				**178,000**
Civil Aviation (Domestic Aviation)	6,540	0.4	9	0.6	200				6,700
Road Transportation	119,000	10	210	13	4,000				123,000
Light-Duty Gasoline Vehicles	40,000	4.0	83	5.7	1,800				41,900
Light-Duty Gasoline Trucks	37,300	3.1	66	5.6	1,700				39,100
Heavy-Duty Gasoline Vehicles	5,760	0.44	9.3	0.35	110				5,870
Motorcycles	202	0.14	3.0	0.00	1.3				206
Light-Duty Diesel Vehicles	379	0.01	0.2	0.03	9				389
Light-Duty Diesel Trucks	1,760	0.05	1	0.1	40				1,810
Heavy-Duty Diesel Vehicles	32,300	2	30	1	300				32,700
Propane & Natural Gas Vehicles	824	0.7	20	0.02	5				840
Railways	5,150	0.3	6	2	700				6,000
Navigation (Domestic Marine)	5,110	0.4	8	1	400				5,500
Other Transportation	35,000	20	400	7	2,000				37,000
Off-Road Gasoline	7,300	9	200	0.2	50				7,600
Off-Road Diesel	17,000	0.9	20	7	2,000				19,000
Pipelines	10,500	11	220	0.3	90				10,800
c. Fugitive Sources	**16,000**	**2,300**	**49,000**	**0.1**	**40**				**64,500**
Coal Mining		50	1,000						1,000
Oil and Natural Gas	15,800	2,270	47,700	0.1	40				63,600
Oil	180	256	5,370	0.1	30				5,580
Natural Gas	51.7	937	19,700	-	-				19,700
Venting	10,400	1,080	22,600	0.01	4				33,000
Flaring	5,200	3.5	73	0.01	2				5,300
INDUSTRIAL PROCESSES	**36,000**			**8.09**	**2,510**	**3,900**	**3,000**	**4,000**	**49,700**
a. Mineral Products	**9,100**								**9,100**
Cement Production	6,700								6,700
Lime Production	1,700								1,700
Mineral Product Use[3]	636								636
b. Chemical Industry	**6,200**			**8.09**	**2,510**				**8,700**
Ammonia Production	6,200								6,200
Nitric Acid Production				4.05	1,260				1,260
Adipic Acid Production				4.0	1,300				1,300
c. Metal Production	**11,500**						**3,000**	**3,020**	**17,500**
Iron and Steel Production	7,120								7,120
Aluminum Production	4,400						3,000	80.2	7,500
SF_6 Used in Magnesium Smelters and Casters								2,940	2,940
d. Production and Consumption of Halocarbons and SF_6[4]						**3,900**	**20**	**1,000**	**5,000**
e. Other & Undifferentiated Production	**9,500**								**9,500**
SOLVENT & OTHER PRODUCT USE				**0.54**	**170**				**170**
AGRICULTURE		**1,200**	**25,000**	**100**	**32,000**				**57,000**
a. Enteric Fermentation		1,100	22,000						22,000
b. Manure Management		150	3,100	15	4,800				7,800
c. Agriculture Soils				88	27,000				27,000
Direct Sources				43	13,000				13,000
Pasture, Range and Paddock Manure				12	3,800				3,800
Indirect Sources				30	10,000				10,000
WASTE	**180**	**920**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		910	19,000		-				19,000
b. Wastewater Handling		11	240	2	600				890
c. Waste Incineration	180	0.05	1	0.1	40				220
Land Use, Land-use Change and Forestry	**65,000**	**580**	**12,000**	**25**	**7,600**				**85,000**
a. Forest Land	54,000	570	12,000	24	7,400				73,000
b. Cropland	190	8	200	0.4	100				460
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-10: 2001 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**555,000**	**4,700**	**99,000**	**150**	**46,000**	**3,500**	**3,500**	**4,400**	**711,000**
ENERGY	**518,000**	**2,600**	**55,000**	**30**	**10,000**				**583,000**
a. Stationary Combustion Sources	**335,000**	**200**	**5,000**	**8**	**3,000**				**342,000**
Electricity and Heat Generation	134,000	5.0	110	3	800				134,000
Fossil Fuel Production and Refining	67,300	100	2,000	1	400				70,000
Petroleum Refining and Upgrading	16,000	-	-	0.3	90				16,000
Fossil Fuel Production	51,700	100	2,000	1	400				55,000
Mining & Oil and Gas Extraction	10,200	0.2	4	0.3	80				10,300
Manufacturing Industries	48,600	3	60	2	500				49,200
Iron and Steel	5,820	0.2	5	0.2	50				5,870
Non Ferrous Metals	3,440	0.08	2	0.05	20				3,460
Chemical	6,760	0.14	2.9	0.1	40				6,800
Pulp and Paper	9,550	2	40	0.8	300				9,850
Cement	4,100	0.07	2	0.04	10				4,120
Other Manufacturing	18,900	0.4	8	0.4	100				19,100
Construction	997	0.02	0.4	0.03	8				1,010
Commercial & Institutional	32,800	0.6	10	0.7	200				33,100
Residential	39,100	90	2,000	2	500				42,000
Agriculture & Forestry	2,170	0.04	0.8	0.06	20				2,190
b. Transport[2]	**168,000**	**30**	**700**	**20**	**8,000**				**176,000**
Civil Aviation (Domestic Aviation)	5,960	0.4	9	0.5	200				6,100
Road Transportation	117,000	10	220	13	4,100				121,000
Light-Duty Gasoline Vehicles	39,800	4.2	88	6.2	1,900				41,800
Light-Duty Gasoline Trucks	35,700	3.1	65	5.7	1,800				37,500
Heavy-Duty Gasoline Vehicles	5,890	0.48	10	0.34	110				6,000
Motorcycles	178	0.13	2.7	0.00	1.1				182
Light-Duty Diesel Vehicles	359	0.01	0.2	0.03	9				368
Light-Duty Diesel Trucks	1,660	0.04	0.9	0.1	40				1,710
Heavy-Duty Diesel Vehicles	32,000	2	30	1	300				32,400
Propane & Natural Gas Vehicles	1,110	0.9	20	0.02	7				1,100
Railways	5,680	0.3	7	2	700				6,000
Navigation (Domestic Marine)	5,140	0.4	8	1	400				5,500
Other Transportation	34,000	20	400	8	2,000				37,000
Off-Road Gasoline	7,200	9	200	0.2	50				7,500
Off-Road Diesel	17,000	0.9	20	7	2,000				19,000
Pipelines	9,950	10	210	0.3	80				10,200
c. Fugitive Sources	**16,000**	**2,400**	**49,000**	**0.1**	**40**				**65,200**
Coal Mining		50	1,000						1,000
Oil and Natural Gas	15,600	2,310	48,500	0.1	40				64,200
Oil	170	265	5,570	0.1	30				5,770
Natural Gas	50.8	933	19,600	-	-				19,700
Venting	10,500	1,110	23,200	0.01	4				33,700
Flaring	4,900	3.4	72	0.01	2				5,000
INDUSTRIAL PROCESSES	**36,000**			**6.74**	**2,090**	**3,500**	**3,500**	**4,400**	**49,800**
a. Mineral Products	**9,000**								**9,000**
Cement Production	6,500								6,500
Lime Production	1,600								1,600
Mineral Product Use[3]	844								844
b. Chemical Industry	**6,100**			**6.74**	**2,090**				**8,200**
Ammonia Production	6,100								6,100
Nitric Acid Production				4.14	1,280				1,280
Adipic Acid Production				2.6	800				800
c. Metal Production	**11,500**						**3,500**	**2,400**	**17,400**
Iron and Steel Production	7,280								7,280
Aluminum Production	4,200						3,500	44.0	7,700
SF_6 Used in Magnesium Smelters and Casters								2,360	2,360
d. Production and Consumption of Halocarbons and SF_6[4]						**3,500**	**30**	**2,000**	**5,500**
e. Other & Undifferentiated Production	**9,600**								**9,600**
SOLVENT & OTHER PRODUCT USE				**0.69**	**210**				**210**
AGRICULTURE		**1,200**	**25,000**	**110**	**33,000**				**58,000**
a. Enteric Fermentation		1,100	22,000						22,000
b. Manure Management		140	3,000	15	4,700				7,700
c. Agriculture Soils				90	28,000				28,000
Direct Sources				45	14,000				14,000
Pasture, Range and Paddock Manure				12	3,800				3,800
Indirect Sources				30	10,000				10,000
WASTE	**200**	**910**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		900	19,000		-				19,000
b. Wastewater Handling		11	240	2	600				880
c. Waste Incineration	200	0.04	0.9	0.2	50				250
Land Use, Land-use Change and Forestry	**-89,000**	**160**	**3,300**	**6.6**	**2,000**				**-84,000**
a. Forest Land	-100,000	150	3,100	6.1	1,900				-96,000
b. Cropland	610	7	200	0.3	100				870
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-11: 2000 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**560,000**	**4,600**	**98,000**	**150**	**48,000**	**3,000**	**4,300**	**4,300**	**717,000**
ENERGY	**522,000**	**2,600**	**54,000**	**30**	**10,000**				**587,000**
a. Stationary Combustion Sources	**337,000**	**200**	**5,000**	**8**	**3,000**				**344,000**
Electricity and Heat Generation	132,000	4.8	100	2	800				132,000
Fossil Fuel Production and Refining	63,600	100	2,000	1	400				66,000
Petroleum Refining and Upgrading	14,000	-	-	0.3	80				14,000
Fossil Fuel Production	49,900	100	2,000	1	300				53,000
Mining & Oil and Gas Extraction	10,300	0.2	4	0.2	80				10,400
Manufacturing Industries	52,800	3	60	2	500				53,400
Iron and Steel	7,090	0.3	5	0.2	60				7,160
Non Ferrous Metals	3,170	0.07	1	0.05	10				3,190
Chemical	7,860	0.16	3.3	0.1	40				7,910
Pulp and Paper	10,700	2	40	0.9	300				11,000
Cement	4,160	0.07	1	0.04	10				4,170
Other Manufacturing	19,800	0.4	8	0.4	100				19,900
Construction	1,060	0.02	0.4	0.03	8				1,070
Commercial & Institutional	32,800	0.6	10	0.7	200				33,100
Residential	42,200	90	2,000	2	500				45,000
Agriculture & Forestry	2,520	0.04	0.9	0.06	20				2,540
b. Transport[2]	**169,000**	**30**	**700**	**30**	**8,000**				**178,000**
Civil Aviation (Domestic Aviation)	6,350	0.4	9	0.6	200				6,500
Road Transportation	114,000	11	230	13	4,200				119,000
Light-Duty Gasoline Vehicles	40,000	4.6	96	6.5	2,000				42,100
Light-Duty Gasoline Trucks	35,000	3.3	69	5.7	1,800				36,800
Heavy-Duty Gasoline Vehicles	5,200	0.50	11	0.26	79				5,290
Motorcycles	155	0.12	2.5	0.00	0.98				158
Light-Duty Diesel Vehicles	345	0.01	0.2	0.03	8				353
Light-Duty Diesel Trucks	1,650	0.04	0.9	0.1	40				1,690
Heavy-Duty Diesel Vehicles	31,000	1	30	1	300				31,300
Propane & Natural Gas Vehicles	1,070	1	20	0.02	7				1,100
Railways	5,780	0.3	7	2	700				7,000
Navigation (Domestic Marine)	4,730	0.3	7	1	400				5,100
Other Transportation	38,000	20	400	9	3,000				41,000
Off-Road Gasoline	7,400	9	200	0.2	50				7,600
Off-Road Diesel	20,000	1	20	8	3,000				22,000
Pipelines	10,900	11	230	0.3	90				11,200
c. Fugitive Sources	**16,000**	**2,300**	**49,000**	**0.1**	**40**				**64,700**
Coal Mining		50	900						900
Oil and Natural Gas	16,000	2,270	47,700	0.1	40				63,700
Oil	130	251	5,270	0.1	30				5,430
Natural Gas	50.7	923	19,400	-	-				19,400
Venting	10,500	1,090	23,000	0.02	5				33,500
Flaring	5,300	3.8	80	0.00	0.7				5,400
INDUSTRIAL PROCESSES	**37,000**			**6.87**	**2,130**	**3,000**	**4,300**	**4,300**	**51,100**
a. Mineral Products	**9,600**								**9,600**
Cement Production	6,700								6,700
Lime Production	1,900								1,900
Mineral Product Use[3]	1,020								1,020
b. Chemical Industry	**6,800**			**6.87**	**2,130**				**8,900**
Ammonia Production	6,800								6,800
Nitric Acid Production				3.97	1,230				1,230
Adipic Acid Production				2.9	900				900
c. Metal Production	**11,800**						**4,300**	**2,830**	**18,900**
Iron and Steel Production	7,900								7,900
Aluminum Production	3,900						4,300	47.3	8,200
SF_6 Used in Magnesium Smelters and Casters								2,780	2,780
d. Production and Consumption of Halocarbons and SF_6[4]						**3,000**	**30**	**1,500**	**4,500**
e. Other & Undifferentiated Production	**9,200**								**9,200**
SOLVENT & OTHER PRODUCT USE				**0.78**	**240**				**240**
AGRICULTURE		**1,200**	**24,000**	**110**	**34,000**				**59,000**
a. Enteric Fermentation		1,000	21,000						21,000
b. Manure Management		140	2,900	15	4,600				7,400
c. Agriculture Soils				96	30,000				30,000
Direct Sources				49	15,000				15,000
Pasture, Range and Paddock Manure				12	3,600				3,600
Indirect Sources				30	10,000				10,000
WASTE	**200**	**920**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		910	19,000		-				19,000
b. Wastewater Handling		11	240	2	600				860
c. Waste Incineration	200	0.04	0.8	0.2	50				250
Land Use, Land-use Change and Forestry	**-83,000**	**77**	**1,600**	**3.2**	**1,000**				**-80,000**
a. Forest Land	-96,000	64	1,400	2.7	840				-93,000
b. Cropland	1,700	8	200	0.4	100				1,900
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-12: 1999 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**537,000**	**4,500**	**95,000**	**160**	**48,000**	**2,500**	**4,600**	**3,800**	**691,000**
ENERGY	**499,000**	**2,500**	**52,000**	**30**	**10,000**				**561,000**
a. Stationary Combustion Sources	**316,000**	**200**	**4,000**	**8**	**2,000**				**322,000**
Electricity and Heat Generation	121,000	3.9	82	2	700				122,000
Fossil Fuel Production and Refining	62,400	100	2,000	1	400				65,000
Petroleum Refining and Upgrading	13,000	-	-	0.2	70				13,000
Fossil Fuel Production	49,200	100	2,000	1	300				52,000
Mining & Oil and Gas Extraction	7,390	0.1	3	0.2	50				7,450
Manufacturing Industries	52,500	3	60	2	500				53,100
Iron and Steel	7,180	0.3	6	0.2	60				7,250
Non Ferrous Metals	3,230	0.06	1	0.05	10				3,250
Chemical	8,470	0.18	3.7	0.1	50				8,510
Pulp and Paper	10,900	2	40	0.9	300				11,200
Cement	4,150	0.07	2	0.04	10				4,160
Other Manufacturing	18,600	0.4	8	0.3	100				18,700
Construction	1,160	0.02	0.4	0.03	10				1,170
Commercial & Institutional	28,600	0.5	10	0.6	200				28,800
Residential	40,100	90	2,000	2	500				43,000
Agriculture & Forestry	2,630	0.04	0.8	0.06	20				2,650
b. Transport[2]	**168,000**	**30**	**700**	**30**	**8,000**				**177,000**
Civil Aviation (Domestic Aviation)	6,360	0.4	9	0.6	200				6,600
Road Transportation	113,000	11	240	14	4,400				118,000
Light-Duty Gasoline Vehicles	40,400	4.9	100	7.0	2,200				42,700
Light-Duty Gasoline Trucks	34,200	3.3	69	5.8	1,800				36,100
Heavy-Duty Gasoline Vehicles	5,180	0.53	11	0.23	72				5,260
Motorcycles	139	0.11	2.3	0.00	0.88				142
Light-Duty Diesel Vehicles	330	0.01	0.2	0.03	8				338
Light-Duty Diesel Trucks	1,530	0.04	0.8	0.1	40				1,570
Heavy-Duty Diesel Vehicles	30,100	1	30	0.9	300				30,400
Propane & Natural Gas Vehicles	1,460	1	20	0.03	9				1,500
Railways	5,640	0.3	7	2	700				6,000
Navigation (Domestic Marine)	4,600	0.3	7	1	400				5,000
Other Transportation	38,000	20	500	8	2,000				41,000
Off-Road Gasoline	7,700	9	200	0.2	50				8,000
Off-Road Diesel	18,000	1	20	8	2,000				20,000
Pipelines	12,200	12	260	0.3	100				12,500
c. Fugitive Sources	**16,000**	**2,200**	**46,000**	**0.1**	**40**				**62,200**
Coal Mining		50	1,000						1,000
Oil and Natural Gas	15,700	2,160	45,400	0.1	40				61,100
Oil	130	249	5,230	0.1	30				5,390
Natural Gas	46.9	887	18,600	-	-				18,700
Venting	10,200	1,020	21,400	0.01	4				31,700
Flaring	5,300	3.5	74	0.00	0.7				5,300
INDUSTRIAL PROCESSES	**37,000**			**9.41**	**2,920**	**2,500**	**4,600**	**3,800**	**51,100**
a. Mineral Products	**9,400**								**9,400**
Cement Production	6,600								6,600
Lime Production	1,900								1,900
Mineral Product Use[3]	883								883
b. Chemical Industry	**6,800**			**9.41**	**2,920**				**9,700**
Ammonia Production	6,800								6,800
Nitric Acid Production				3.76	1,170				1,170
Adipic Acid Production				5.6	1,700				1,700
c. Metal Production	**11,800**						**4,600**	**2,320**	**18,800**
Iron and Steel Production	7,890								7,890
Aluminum Production	3,900						4,600	53.5	8,600
SF_6 Used in Magnesium Smelters and Casters								2,270	2,270
d. Production and Consumption of Halocarbons and SF_6[4]						**2,500**	**20**	**1,500**	**3,900**
e. Other & Undifferentiated Production	**9,300**								**9,300**
SOLVENT & OTHER PRODUCT USE				**0.70**	**220**				**220**
AGRICULTURE		**1,100**	**24,000**	**110**	**34,000**				**58,000**
a. Enteric Fermentation		1,000	21,000						21,000
b. Manure Management		130	2,800	14	4,400				7,200
c. Agriculture Soils				96	30,000				30,000
Direct Sources				50	16,000				16,000
Pasture, Range and Paddock Manure				11	3,500				3,500
Indirect Sources				30	10,000				10,000
WASTE	**200**	**930**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		910	19,000		-				19,000
b. Wastewater Handling		13	270	2	600				890
c. Waste Incineration	200	0.04	0.7	0.1	50				240
Land Use, Land-use Change and Forestry	**6,700**	**330**	**7,000**	**14**	**4,300**				**18,000**
a. Forest Land	-7,300	320	6,700	13	4,200				3,600
b. Cropland	2,400	7	200	0.3	100				2,600
c. Grassland	-	-	-	-	-				-
d. Wetlands	4,000	2	40	0.07	20				4,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-13: 1998 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**521,000**	**4,500**	**95,000**	**160**	**51,000**	**1,900**	**5,600**	**3,700**	**678,000**
ENERGY	**485,000**	**2,500**	**52,000**	**30**	**10,000**				**547,000**
a. Stationary Combustion Sources	**304,000**	**200**	**4,000**	**8**	**2,000**				**310,000**
Electricity and Heat Generation	123,000	3.9	81	2	700				123,000
Fossil Fuel Production and Refining	52,400	90	2,000	1	300				55,000
Petroleum Refining and Upgrading	12,000	-	-	0.2	80				12,000
Fossil Fuel Production	40,100	90	2,000	0.9	300				42,000
Mining & Oil and Gas Extraction	7,860	0.2	3	0.2	60				7,930
Manufacturing Industries	51,900	3	60	2	500				52,400
Iron and Steel	7,070	0.3	5	0.2	60				7,140
Non Ferrous Metals	3,470	0.07	2	0.05	20				3,490
Chemical	8,590	0.18	3.7	0.1	50				8,640
Pulp and Paper	10,800	2	40	0.8	300				11,100
Cement	3,860	0.07	1	0.04	10				3,870
Other Manufacturing	18,100	0.4	8	0.3	100				18,200
Construction	1,100	0.02	0.4	0.03	10				1,110
Commercial & Institutional	27,100	0.5	10	0.6	200				27,200
Residential	38,300	90	2,000	2	500				41,000
Agriculture & Forestry	2,550	0.04	0.8	0.06	20				2,570
b. Transport[2]	**164,000**	**40**	**700**	**30**	**8,000**				**173,000**
Civil Aviation (Domestic Aviation)	6,260	0.4	9	0.6	200				6,400
Road Transportation	111,000	12	250	14	4,500				115,000
Light-Duty Gasoline Vehicles	39,500	5.0	110	7.3	2,300				41,900
Light-Duty Gasoline Trucks	32,100	3.2	67	5.8	1,800				34,000
Heavy-Duty Gasoline Vehicles	5,700	0.66	14	0.22	69				5,780
Motorcycles	142	0.12	2.5	0.00	0.91				146
Light-Duty Diesel Vehicles	317	0.01	0.2	0.02	8				325
Light-Duty Diesel Trucks	1,540	0.04	0.8	0.1	40				1,570
Heavy-Duty Diesel Vehicles	29,500	1	30	0.9	300				29,800
Propane & Natural Gas Vehicles	1,740	1	30	0.03	10				1,800
Railways	5,320	0.3	6	2	700				6,000
Navigation (Domestic Marine)	4,790	0.3	7	1	300				5,100
Other Transportation	37,000	20	500	7	2,000				40,000
Off-Road Gasoline	8,100	10	200	0.2	60				8,300
Off-Road Diesel	17,000	0.9	20	7	2,000				19,000
Pipelines	12,100	12	260	0.3	100				12,400
c. Fugitive Sources	**17,000**	**2,300**	**47,000**	**0.1**	**40**				**64,800**
Coal Mining		60	1,000						1,000
Oil and Natural Gas	17,400	2,190	46,000	0.1	40				63,500
Oil	120	251	5,270	0.1	30				5,430
Natural Gas	52.5	905	19,000	-	-				19,100
Venting	10,300	1,030	21,700	0.02	5				31,900
Flaring	7,000	4.6	96	0.00	1				7,100
INDUSTRIAL PROCESSES	**36,000**			**19.7**	**6,100**	**1,900**	**5,600**	**3,700**	**53,500**
a. Mineral Products	**9,100**								**9,100**
Cement Production	6,400								6,400
Lime Production	1,800								1,800
Mineral Product Use[3]	902								902
b. Chemical Industry	**6,600**			**19.7**	**6,100**				**13,000**
Ammonia Production	6,600								6,600
Nitric Acid Production				3.34	1,040				1,040
Adipic Acid Production				16	5,100				5,100
c. Metal Production	**11,700**						**5,600**	**2,260**	**19,500**
Iron and Steel Production	7,690								7,690
Aluminum Production	4,000						5,600	59.1	9,600
SF_6 Used in Magnesium Smelters and Casters								2,210	2,210
d. Production and Consumption of Halocarbons and SF_6[4]						**1,900**	**20**	**1,500**	**3,400**
e. Other & Undifferentiated Production	**8,800**								**8,800**
SOLVENT & OTHER PRODUCT USE				**0.67**	**210**				**210**
AGRICULTURE		**1,100**	**23,000**	**110**	**34,000**				**57,000**
a. Enteric Fermentation		990	21,000						21,000
b. Manure Management		130	2,800	14	4,400				7,100
c. Agriculture Soils				94	29,000				29,000
Direct Sources				49	15,000				15,000
Pasture, Range and Paddock Manure				11	3,400				3,400
Indirect Sources				30	10,000				10,000
WASTE	**220**	**920**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		900	19,000		-				19,000
b. Wastewater Handling		11	220	2	600				830
c. Waste Incineration	220	0.04	0.8	0.2	50				270
Land Use, Land-use Change and Forestry	**92,000**	**770**	**16,000**	**32**	**10,000**				**120,000**
a. Forest Land	77,000	760	16,000	32	9,800				100,000
b. Cropland	3,600	8	200	0.4	100				3,900
c. Grassland	-	-	-	-	-				-
d. Wetlands	4,000	1	20	0.04	10				4,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-14: 1997 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**513,000**	**4,500**	**94,000**	**180**	**55,000**	**1,400**	**5,500**	**3,000**	**672,000**
ENERGY	**476,000**	**2,400**	**51,000**	**30**	**10,000**				**538,000**
a. Stationary Combustion Sources	**300,000**	**200**	**4,000**	**7**	**2,000**				**306,000**
Electricity and Heat Generation	111,000	3.2	68	2	600				111,000
Fossil Fuel Production and Refining	48,900	70	2,000	1	300				51,000
Petroleum Refining and Upgrading	14,000	-	-	0.2	70				14,000
Fossil Fuel Production	35,200	70	2,000	0.7	200				37,000
Mining & Oil and Gas Extraction	8,880	0.2	4	0.2	60				8,950
Manufacturing Industries	54,300	3	60	2	500				54,900
Iron and Steel	7,210	0.3	5	0.2	60				7,270
Non Ferrous Metals	3,150	0.06	1	0.05	10				3,160
Chemical	8,900	0.18	3.9	0.2	50				8,950
Pulp and Paper	11,800	2	40	0.8	300				12,100
Cement	3,710	0.06	1	0.04	10				3,720
Other Manufacturing	19,600	0.4	8	0.3	100				19,700
Construction	1,240	0.02	0.4	0.03	10				1,250
Commercial & Institutional	29,700	0.5	10	0.6	200				29,900
Residential	43,500	90	2,000	2	500				46,000
Agriculture & Forestry	2,880	0.04	0.9	0.07	20				2,900
b. Transport[2]	**160,000**	**30**	**700**	**30**	**8,000**				**169,000**
Civil Aviation (Domestic Aviation)	6,130	0.4	9	0.6	200				6,300
Road Transportation	107,000	12	260	15	4,600				112,000
Light-Duty Gasoline Vehicles	40,600	5.5	120	7.9	2,400				43,200
Light-Duty Gasoline Trucks	29,700	3.2	66	5.7	1,800				31,500
Heavy-Duty Gasoline Vehicles	5,580	0.71	15	0.18	56				5,650
Motorcycles	121	0.11	2.3	0.00	0.77				124
Light-Duty Diesel Vehicles	306	0.01	0.2	0.02	7				314
Light-Duty Diesel Trucks	1,400	0.04	0.8	0.1	30				1,430
Heavy-Duty Diesel Vehicles	27,700	1	30	0.8	300				28,000
Propane & Natural Gas Vehicles	1,800	1	30	0.04	10				1,800
Railways	5,520	0.3	6	2	700				6,000
Navigation (Domestic Marine)	4,170	0.3	6	1	300				4,500
Other Transportation	37,000	20	500	8	2,000				40,000
Off-Road Gasoline	7,000	8	200	0.2	50				7,300
Off-Road Diesel	18,000	1	20	8	2,000				21,000
Pipelines	12,100	12	260	0.3	100				12,500
c. Fugitive Sources	**16,000**	**2,200**	**47,000**	**0.1**	**40**				**62,600**
Coal Mining		80	2,000						2,000
Oil and Natural Gas	15,800	2,150	45,200	0.1	40				61,000
Oil	120	257	5,400	0.1	30				5,560
Natural Gas	41.3	835	17,500	-	-				17,600
Venting	10,100	1,050	22,100	0.01	4				32,300
Flaring	5,500	3.6	75	0.00	0.7				5,600
INDUSTRIAL PROCESSES	**37,000**			**35.3**	**10,900**	**1,400**	**5,500**	**3,000**	**57,600**
a. Mineral Products	**9,000**								**9,000**
Cement Production	6,200								6,200
Lime Production	1,900								1,900
Mineral Product Use[3]	929								929
b. Chemical Industry	**6,600**			**35.3**	**10,900**				**18,000**
Ammonia Production	6,600								6,600
Nitric Acid Production				3.41	1,060				1,060
Adipic Acid Production				32	9,900				9,900
c. Metal Production	**11,500**						**5,500**	**1,730**	**18,700**
Iron and Steel Production	7,550								7,550
Aluminum Production	3,900						5,500	59.1	9,500
SF_6 Used in Magnesium Smelters and Casters								1,670	1,670
d. Production and Consumption of Halocarbons and SF_6[4]						**1,400**	**20**	**1,300**	**2,700**
e. Other & Undifferentiated Production	**9,600**								**9,600**
SOLVENT & OTHER PRODUCT USE				**0.73**	**230**				**230**
AGRICULTURE		**1,100**	**23,000**	**110**	**33,000**				**56,000**
a. Enteric Fermentation		980	21,000						21,000
b. Manure Management		130	2,700	14	4,300				7,000
c. Agriculture Soils				93	29,000				29,000
Direct Sources				49	15,000				15,000
Pasture, Range and Paddock Manure				11	3,400				3,400
Indirect Sources				30	10,000				10,000
WASTE	**220**	**910**	**19,000**	**2**	**600**				**20,000**
a. Solid Waste Disposal on Land		900	19,000		-				19,000
b. Wastewater Handling		11	220	2	600				820
c. Waste Incineration	220	0.03	0.7	0.2	50				280
Land Use, Land-use Change and Forestry	**-87,000**	**93**	**1,900**	**3.9**	**1,200**				**-84,000**
a. Forest Land	-100,000	80	1,700	3.4	1,000				-100,000
b. Cropland	3,900	7	200	0.3	100				4,200
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0.1	3	0.01	1				3,000
e. Settlements	8,000	5	100	0.2	50				8,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-15: 1996 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**501,000**	**4,400**	**92,000**	**180**	**57,000**	**850**	**5,600**	**2,800**	**659,000**
ENERGY	**465,000**	**2,400**	**50,000**	**30**	**10,000**				**525,000**
a. Stationary Combustion Sources	**295,000**	**200**	**4,000**	**7**	**2,000**				**301,000**
Electricity and Heat Generation	99,000	2.6	55	2	600				99,600
Fossil Fuel Production and Refining	52,700	80	2,000	1	400				55,000
Petroleum Refining and Upgrading	15,000	-	-	0.4	100				15,000
Fossil Fuel Production	37,500	80	2,000	0.8	200				39,000
Mining & Oil and Gas Extraction	8,690	0.2	4	0.2	60				8,750
Manufacturing Industries	54,500	3	60	2	500				55,000
Iron and Steel	7,240	0.3	5	0.2	60				7,310
Non Ferrous Metals	3,460	0.07	1	0.05	20				3,480
Chemical	8,790	0.18	3.8	0.2	50				8,850
Pulp and Paper	11,900	2	40	0.8	300				12,200
Cement	3,810	0.07	1	0.03	10				3,820
Other Manufacturing	19,200	0.4	8	0.3	100				19,400
Construction	1,250	0.02	0.4	0.03	10				1,260
Commercial & Institutional	29,300	0.5	10	0.6	200				29,500
Residential	46,700	90	2,000	2	500				49,000
Agriculture & Forestry	2,890	0.04	0.9	0.07	20				2,910
b. Transport[2]	**155,000**	**40**	**700**	**30**	**8,000**				**163,000**
Civil Aviation (Domestic Aviation)	5,980	0.4	9	0.5	200				6,200
Road Transportation	103,000	12	260	15	4,600				108,000
Light-Duty Gasoline Vehicles	40,600	5.8	120	8.1	2,500				43,300
Light-Duty Gasoline Trucks	27,100	3.1	65	5.5	1,700				28,900
Heavy-Duty Gasoline Vehicles	5,620	0.77	16	0.16	48				5,680
Motorcycles	114	0.11	2.3	0.00	0.74				117
Light-Duty Diesel Vehicles	306	0.01	0.2	0.02	7				313
Light-Duty Diesel Trucks	1,270	0.03	0.7	0.1	30				1,300
Heavy-Duty Diesel Vehicles	25,700	1	30	0.8	200				26,000
Propane & Natural Gas Vehicles	1,940	1	30	0.04	10				2,000
Railways	5,450	0.3	6	2	700				6,000
Navigation (Domestic Marine)	4,110	0.3	6	1	300				4,500
Other Transportation	36,000	20	500	7	2,000				39,000
Off-Road Gasoline	7,800	9	200	0.2	50				8,000
Off-Road Diesel	16,000	0.9	20	7	2,000				19,000
Pipelines	12,100	12	250	0.3	100				12,400
c. Fugitive Sources	**15,000**	**2,200**	**45,000**	**0.1**	**40**				**60,900**
Coal Mining		80	2,000						2,000
Oil and Natural Gas	15,500	2,080	43,600	0.1	40				59,200
Oil	120	247	5,180	0.1	30				5,330
Natural Gas	46.3	857	18,000	-	-				18,100
Venting	10,000	971	20,400	0.01	4				30,400
Flaring	5,300	3.5	73	0.00	0.7				5,400
INDUSTRIAL PROCESSES	**36,000**			**40.6**	**12,600**	**850**	**5,600**	**2,800**	**57,600**
a. Mineral Products	**8,400**								**8,400**
Cement Production	5,800								5,800
Lime Production	1,800								1,800
Mineral Product Use[3]	883								883
b. Chemical Industry	**6,500**			**40.6**	**12,600**				**19,000**
Ammonia Production	6,500								6,500
Nitric Acid Production				3.57	1,110				1,110
Adipic Acid Production				37	11,000				11,000
c. Metal Production	**11,600**						**5,600**	**1,700**	**18,900**
Iron and Steel Production	7,750								7,750
Aluminum Production	3,900						5,600	59.1	9,500
SF_6 Used in Magnesium Smelters and Casters								1,640	1,640
d. Production and Consumption of Halocarbons and SF_6[4]						**850**	**20**	**1,100**	**2,000**
e. Other & Undifferentiated Production	**9,200**								**9,200**
SOLVENT & OTHER PRODUCT USE				**0.68**	**210**				**210**
AGRICULTURE		**1,100**	**23,000**	**110**	**33,000**				**56,000**
a. Enteric Fermentation		980	20,000						20,000
b. Manure Management		130	2,700	14	4,200				6,900
c. Agriculture Soils				93	29,000				29,000
Direct Sources				49	15,000				15,000
Pasture, Range and Paddock Manure				11	3,300				3,300
Indirect Sources				30	10,000				10,000
WASTE	**230**	**900**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		880	19,000		-				19,000
b. Wastewater Handling		12	240	2	600				820
c. Waste Incineration	230	0.3	7	0.3	100				340
Land Use, Land-use Change and Forestry	**-56,000**	**240**	**5,000**	**10**	**3,100**				**-48,000**
a. Forest Land	-73,000	230	4,800	9.6	3,000				-65,000
b. Cropland	5,000	8	200	0.4	100				5,300
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-16: 1995 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**488,000**	**4,200**	**89,000**	**180**	**55,000**	**480**	**5,500**	**3,700**	**641,000**
ENERGY	**453,000**	**2,200**	**47,000**	**30**	**10,000**				**510,000**
a. Stationary Combustion Sources	**287,000**	**200**	**4,000**	**7**	**2,000**				**293,000**
Electricity and Heat Generation	100,000	3.0	63	2	600				101,000
Fossil Fuel Production and Refining	51,900	80	2,000	1	400				54,000
Petroleum Refining and Upgrading	14,000	-	-	0.3	100				14,000
Fossil Fuel Production	37,800	80	2,000	0.8	200				40,000
Mining & Oil and Gas Extraction	7,780	0.2	3	0.2	60				7,840
Manufacturing Industries	52,800	3	60	2	500				53,300
Iron and Steel	6,950	0.3	5	0.2	60				7,020
Non Ferrous Metals	3,070	0.06	1	0.04	10				3,080
Chemical	8,460	0.17	3.6	0.1	50				8,510
Pulp and Paper	11,400	2	40	0.8	300				11,700
Cement	3,980	0.07	1	0.04	10				3,990
Other Manufacturing	18,900	0.4	8	0.3	100				19,000
Construction	1,160	0.02	0.4	0.03	10				1,170
Commercial & Institutional	28,700	0.5	10	0.6	200				28,900
Residential	42,000	100	2,000	2	500				45,000
Agriculture & Forestry	2,720	0.04	0.9	0.07	20				2,750
b. Transport[2]	**151,000**	**30**	**700**	**30**	**8,000**				**159,000**
Civil Aviation (Domestic Aviation)	5,710	0.4	9	0.5	200				5,900
Road Transportation	104,000	13	280	15	4,600				109,000
Light-Duty Gasoline Vehicles	41,700	6.3	130	8.4	2,600				44,400
Light-Duty Gasoline Trucks	26,200	3.2	67	5.5	1,700				27,900
Heavy-Duty Gasoline Vehicles	6,020	0.86	18	0.14	44				6,080
Motorcycles	118	0.12	2.5	0.00	0.77				121
Light-Duty Diesel Vehicles	319	0.01	0.2	0.02	8				327
Light-Duty Diesel Trucks	1,290	0.03	0.7	0.1	30				1,330
Heavy-Duty Diesel Vehicles	26,200	1	30	0.8	200				26,500
Propane & Natural Gas Vehicles	2,060	1	30	0.04	10				2,100
Railways	5,570	0.3	6	2	700				6,000
Navigation (Domestic Marine)	4,020	0.3	6	1	300				4,400
Other Transportation	32,000	20	400	6	2,000				34,000
Off-Road Gasoline	6,300	7	200	0.1	40				6,400
Off-Road Diesel	14,000	0.8	20	6	2,000				16,000
Pipelines	11,600	12	240	0.3	100				11,900
c. Fugitive Sources	**15,000**	**2,000**	**42,000**	**0.1**	**40**				**57,000**
Coal Mining		80	2,000						2,000
Oil and Natural Gas	14,600	1,940	40,700	0.1	40				55,300
Oil	120	238	5,000	0.1	30				5,150
Natural Gas	33.6	783	16,400	-	-				16,500
Venting	9,420	914	19,200	0.01	4				28,600
Flaring	5,000	3.3	69	0.00	0.3				5,100
INDUSTRIAL PROCESSES	**35,000**			**37.8**	**11,700**	**480**	**5,500**	**3,700**	**56,600**
a. Mineral Products	**8,800**								**8,800**
Cement Production	6,100								6,100
Lime Production	1,900								1,900
Mineral Product Use[3]	878								878
b. Chemical Industry	**6,500**			**37.8**	**11,700**				**18,000**
Ammonia Production	6,500								6,500
Nitric Acid Production				3.24	1,000				1,000
Adipic Acid Production				35	11,000				11,000
c. Metal Production	**11,500**						**5,500**	**2,170**	**19,200**
Iron and Steel Production	7,880								7,880
Aluminum Production	3,600						5,500	59.1	9,200
SF_6 Used in Magnesium Smelters and Casters								2,110	2,110
d. Production and Consumption of Halocarbons and SF_6[4]						**480**	**30**	**1,500**	**2,000**
e. Other & Undifferentiated Production	**8,400**								**8,400**
SOLVENT & OTHER PRODUCT USE				**0.67**	**210**				**210**
AGRICULTURE		**1,100**	**23,000**	**100**	**32,000**				**55,000**
a. Enteric Fermentation		950	20,000						20,000
b. Manure Management		130	2,700	14	4,200				6,900
c. Agriculture Soils				89	28,000				28,000
Direct Sources				47	14,000				14,000
Pasture, Range and Paddock Manure				11	3,300				3,300
Indirect Sources				30	10,000				10,000
WASTE	**240**	**900**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		890	19,000		-				19,000
b. Wastewater Handling		10	220	2	600				790
c. Waste Incineration	240	0.3	7	0.3	100				350
Land Use, Land-use Change and Forestry	**160,000**	**990**	**21,000**	**42**	**13,000**				**200,000**
a. Forest Land	150,000	980	21,000	41	13,000				180,000
b. Cropland	5,600	7	200	0.4	100				5,800
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0.01	0.3	0.00	0.2				3,000
e. Settlements	8,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-17: 1994 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**475,000**	**4,000**	**85,000**	**170**	**54,000**	**-**	**6,000**	**3,900**	**624,000**
ENERGY	**441,000**	**2,100**	**44,000**	**30**	**10,000**				**495,000**
a. Stationary Combustion Sources	**280,000**	**200**	**4,000**	**7**	**2,000**				**286,000**
Electricity and Heat Generation	95,900	2.6	54	2	600				96,500
Fossil Fuel Production and Refining	50,500	80	2,000	1	300				52,000
Petroleum Refining and Upgrading	14,000	-	-	0.3	100				14,000
Fossil Fuel Production	36,600	80	2,000	0.8	200				38,000
Mining & Oil and Gas Extraction	7,410	0.2	3	0.2	50				7,470
Manufacturing Industries	52,100	3	60	2	500				52,700
Iron and Steel	7,360	0.3	6	0.2	60				7,430
Non Ferrous Metals	3,270	0.07	2	0.05	20				3,290
Chemical	8,540	0.18	3.7	0.1	50				8,590
Pulp and Paper	11,800	2	40	0.8	300				12,000
Cement	3,900	0.07	1	0.03	10				3,910
Other Manufacturing	17,300	0.4	7	0.3	90				17,400
Construction	1,380	0.02	0.5	0.03	10				1,390
Commercial & Institutional	27,100	0.5	10	0.6	200				27,300
Residential	43,300	100	2,000	2	500				46,000
Agriculture & Forestry	2,510	0.04	0.8	0.06	20				2,530
b. Transport[2]	**147,000**	**30**	**700**	**20**	**8,000**				**155,000**
Civil Aviation (Domestic Aviation)	5,260	0.4	8	0.5	100				5,400
Road Transportation	102,000	14	290	15	4,600				107,000
Light-Duty Gasoline Vehicles	42,300	6.7	140	8.4	2,600				45,100
Light-Duty Gasoline Trucks	25,400	3.3	70	5.3	1,700				27,100
Heavy-Duty Gasoline Vehicles	6,480	0.96	20	0.16	50				6,550
Motorcycles	122	0.12	2.6	0.00	0.79				125
Light-Duty Diesel Vehicles	331	0.01	0.2	0.03	8				339
Light-Duty Diesel Trucks	1,120	0.03	0.6	0.09	30				1,150
Heavy-Duty Diesel Vehicles	24,800	1	30	0.8	200				25,100
Propane & Natural Gas Vehicles	1,880	1	30	0.04	10				1,900
Railways	6,150	0.3	7	3	800				7,000
Navigation (Domestic Marine)	4,310	0.3	6	1	300				4,700
Other Transportation	29,000	20	400	6	2,000				31,000
Off-Road Gasoline	5,800	7	100	0.1	40				6,000
Off-Road Diesel	13,000	0.7	10	5	2,000				14,000
Pipelines	10,400	10	220	0.3	90				10,700
c. Fugitive Sources	**14,000**	**1,900**	**40,000**	**0.1**	**40**				**53,700**
Coal Mining		80	2,000						2,000
Oil and Natural Gas	13,800	1,820	38,200	0.1	40				52,000
Oil	110	220	4,620	0.1	30				4,770
Natural Gas	30.9	753	15,800	-	-				15,800
Venting	8,900	841	17,700	0.01	4				26,600
Flaring	4,700	3.1	66	0.00	1				4,800
INDUSTRIAL PROCESSES	**34,000**			**38.5**	**11,900**	**-**	**6,000**	**3,900**	**55,600**
a. Mineral Products	**8,100**								**8,100**
Cement Production	5,400								5,400
Lime Production	1,800								1,800
Mineral Product Use[3]	842								842
b. Chemical Industry	**5,800**			**38.5**	**11,900**				**18,000**
Ammonia Production	5,800								5,800
Nitric Acid Production				3.08	956				956
Adipic Acid Production				35	11,000				11,000
c. Metal Production	**11,300**						**6,000**	**2,340**	**19,600**
Iron and Steel Production	7,540								7,540
Aluminum Production	3,800						6,000	59.1	9,800
SF_6 Used in Magnesium Smelters and Casters								2,280	2,280
d. Production and Consumption of Halocarbons and SF_6[4]						**-**	**-**	**1,500**	**1,500**
e. Other & Undifferentiated Production	**8,600**								**8,600**
SOLVENT & OTHER PRODUCT USE				**0.55**	**170**				**170**
AGRICULTURE		**1,000**	**22,000**	**100**	**31,000**				**53,000**
a. Enteric Fermentation		910	19,000						19,000
b. Manure Management		120	2,500	13	4,000				6,500
c. Agriculture Soils				88	27,000				27,000
Direct Sources				46	14,000				14,000
Pasture, Range and Paddock Manure				10	3,100				3,100
Indirect Sources				30	10,000				10,000
WASTE	**240**	**900**	**19,000**	**2**	**700**				**20,000**
a. Solid Waste Disposal on Land		890	19,000		-				19,000
b. Wastewater Handling		11	220	2	600				780
c. Waste Incineration	240	0.3	6	0.3	100				350
Land Use, Land-use Change and Forestry	**-16,000**	**320**	**6,800**	**14**	**4,200**				**-5,300**
a. Forest Land	-35,000	310	6,500	13	4,100				-24,000
b. Cropland	7,200	9	200	0.4	100				7,600
c. Grassland	-	-	-	-	-				-
d. Wetlands	3,000	0	-	0	-				3,000
e. Settlements	8,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-18: 1993 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**461,000**	**3,900**	**82,000**	**160**	**50,000**	**-**	**6,500**	**3,800**	**604,000**
ENERGY	**428,000**	**2,000**	**42,000**	**30**	**9,000**				**480,000**
a. Stationary Combustion Sources	**274,000**	**200**	**4,000**	**7**	**2,000**				**280,000**
Electricity and Heat Generation	93,400	2.5	53	2	600				94,000
Fossil Fuel Production and Refining	50,000	70	2,000	1	300				52,000
Petroleum Refining and Upgrading	15,000	-	-	0.3	100				15,000
Fossil Fuel Production	34,900	70	2,000	0.7	200				37,000
Mining & Oil and Gas Extraction	7,350	0.2	3	0.2	50				7,400
Manufacturing Industries	48,900	2	50	1	500				49,400
Iron and Steel	6,580	0.3	5	0.2	60				6,650
Non Ferrous Metals	2,690	0.06	1	0.04	10				2,700
Chemical	7,310	0.15	3.2	0.1	40				7,350
Pulp and Paper	11,900	2	30	0.7	200				12,200
Cement	3,300	0.06	1	0.03	9				3,320
Other Manufacturing	17,100	0.4	7	0.3	100				17,200
Construction	1,370	0.02	0.5	0.03	10				1,380
Commercial & Institutional	27,800	0.5	10	0.6	200				28,000
Residential	42,500	100	2,000	2	500				45,000
Agriculture & Forestry	3,000	0.05	1	0.07	20				3,030
b. Transport[2]	**140,000**	**30**	**700**	**20**	**7,000**				**148,000**
Civil Aviation (Domestic Aviation)	5,080	0.4	8	0.5	100				5,200
Road Transportation	96,900	14	290	14	4,300				101,000
Light-Duty Gasoline Vehicles	42,500	6.9	150	8.1	2,500				45,200
Light-Duty Gasoline Trucks	23,400	3.2	68	4.8	1,500				24,900
Heavy-Duty Gasoline Vehicles	6,390	1.0	21	0.17	52				6,460
Motorcycles	128	0.13	2.7	0.00	0.83				131
Light-Duty Diesel Vehicles	337	0.01	0.2	0.03	8				346
Light-Duty Diesel Trucks	937	0.03	0.5	0.07	20				959
Heavy-Duty Diesel Vehicles	21,200	1	20	0.6	200				21,500
Propane & Natural Gas Vehicles	1,990	1	30	0.04	10				2,000
Railways	5,950	0.3	7	2	800				7,000
Navigation (Domestic Marine)	4,150	0.3	6	1	300				4,500
Other Transportation	28,000	20	400	6	2,000				30,000
Off-Road Gasoline	5,500	6	100	0.1	40				5,600
Off-Road Diesel	13,000	0.7	10	5	2,000				14,000
Pipelines	10,000	10	210	0.3	80				10,300
c. Fugitive Sources	**13,000**	**1,800**	**38,000**	**0.1**	**30**				**51,300**
Coal Mining		90	2,000						2,000
Oil and Natural Gas	13,200	1,720	36,200	0.1	30				49,500
Oil	110	217	4,560	0.1	30				4,700
Natural Gas	28.6	711	14,900	-	-				15,000
Venting	8,460	794	16,700	-	-				25,100
Flaring	4,600	3.0	64	0.00	0.7				4,700
INDUSTRIAL PROCESSES	**33,000**			**32.7**	**10,100**	**-**	**6,500**	**3,800**	**53,300**
a. Mineral Products	**7,200**								**7,200**
Cement Production	4,600								4,600
Lime Production	1,800								1,800
Mineral Product Use[3]	855								855
b. Chemical Industry	**5,700**			**32.7**	**10,100**				**16,000**
Ammonia Production	5,700								5,700
Nitric Acid Production				3.40	1,050				1,050
Adipic Acid Production				29	9,100				9,100
c. Metal Production	**12,100**						**6,500**	**2,270**	**20,800**
Iron and Steel Production	8,180								8,180
Aluminum Production	3,900						6,500	59.1	10,000
SF_6 Used in Magnesium Smelters and Casters								2,210	2,210
d. Production and Consumption of Halocarbons and SF_6[4]						**-**	**-**	**1,500**	**1,500**
e. Other & Undifferentiated Production	**7,900**								**7,900**
SOLVENT & OTHER PRODUCT USE				**0.50**	**160**				**160**
AGRICULTURE		**990**	**21,000**	**97**	**30,000**				**51,000**
a. Enteric Fermentation		870	18,000						18,000
b. Manure Management		120	2,500	12	3,800				6,300
c. Agriculture Soils				84	26,000				26,000
Direct Sources				45	14,000				14,000
Pasture, Range and Paddock Manure				9.6	3,000				3,000
Indirect Sources				30	9,000				9,000
WASTE	**250**	**900**	**19,000**	**2**	**600**				**20,000**
a. Solid Waste Disposal on Land		890	19,000		-				19,000
b. Wastewater Handling		10	220	2	500				760
c. Waste Incineration	250	0.3	7	0.3	100				360
Land Use, Land-use Change and Forestry	**-15,000**	**340**	**7,100**	**14**	**4,400**				**-3,300**
a. Forest Land	-36,000	320	6,800	14	4,200				-25,000
b. Cropland	8,800	10	200	0.5	100				9,200
c. Grassland	-	-	-	-	-				-
d. Wetlands	4,000	0.2	5	0.01	3				4,000
e. Settlements	9,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-19: 1992 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**462,000**	**3,800**	**80,000**	**160**	**49,000**	**660**	**6,600**	**4,000**	**602,000**
ENERGY	**430,000**	**1,900**	**41,000**	**30**	**9,000**				**479,000**
a. Stationary Combustion Sources	**280,000**	**200**	**4,000**	**7**	**2,000**				**286,000**
Electricity and Heat Generation	102,000	2.3	49	2	600				103,000
Fossil Fuel Production and Refining	49,500	70	2,000	1	300				51,000
Petroleum Refining and Upgrading	15,000	-	-	0.3	100				15,000
Fossil Fuel Production	34,700	70	2,000	0.7	200				37,000
Mining & Oil and Gas Extraction	4,850	0.1	2	0.1	30				4,880
Manufacturing Industries	51,300	3	50	2	500				51,800
Iron and Steel	6,640	0.3	5	0.2	60				6,710
Non Ferrous Metals	2,790	0.06	1	0.04	10				2,800
Chemical	7,460	0.15	3.2	0.1	40				7,510
Pulp and Paper	12,000	2	30	0.7	200				12,300
Cement	3,300	0.06	1	0.03	10				3,310
Other Manufacturing	19,100	0.4	8	0.4	100				19,200
Construction	1,730	0.03	0.6	0.06	20				1,750
Commercial & Institutional	26,800	0.5	10	0.5	200				26,900
Residential	40,500	90	2,000	2	500				43,000
Agriculture & Forestry	3,200	0.05	1	0.08	20				3,230
b. Transport[2]	**137,000**	**30**	**700**	**20**	**7,000**				**144,000**
Civil Aviation (Domestic Aviation)	5,330	0.4	9	0.5	200				5,500
Road Transportation	94,500	14	300	12	3,700				98,500
Light-Duty Gasoline Vehicles	42,700	7.3	150	7.0	2,200				45,000
Light-Duty Gasoline Trucks	21,600	3.2	67	4.0	1,200				22,900
Heavy-Duty Gasoline Vehicles	6,570	1.0	22	0.18	55				6,640
Motorcycles	131	0.13	2.8	0.00	0.85				134
Light-Duty Diesel Vehicles	336	0.01	0.2	0.03	8				344
Light-Duty Diesel Trucks	793	0.02	0.5	0.06	20				811
Heavy-Duty Diesel Vehicles	19,800	1	20	0.6	200				20,000
Propane & Natural Gas Vehicles	2,630	2	30	0.05	20				2,700
Railways	5,970	0.3	7	2	800				7,000
Navigation (Domestic Marine)	4,750	0.3	7	1	300				5,100
Other Transportation	27,000	20	300	5	2,000				29,000
Off-Road Gasoline	5,200	6	100	0.1	40				5,400
Off-Road Diesel	12,000	0.7	10	5	2,000				13,000
Pipelines	9,530	9.6	200	0.3	80				9,810
c. Fugitive Sources	**12,000**	**1,700**	**36,000**	**0.1**	**30**				**48,600**
Coal Mining		90	2,000						2,000
Oil and Natural Gas	12,200	1,640	34,500	0.1	30				46,700
Oil	110	216	4,530	0.1	30				4,670
Natural Gas	25.6	678	14,200	-	-				14,300
Venting	7,780	745	15,700	-	-				23,400
Flaring	4,300	2.7	58	0.00	0.7				4,400
INDUSTRIAL PROCESSES	**32,000**			**35.5**	**11,000**	**660**	**6,600**	**4,000**	**54,400**
a. Mineral Products	**7,400**								**7,400**
Cement Production	4,500								4,500
Lime Production	1,800								1,800
Mineral Product Use[3]	1,100								1,100
b. Chemical Industry	**5,100**			**35.5**	**11,000**				**16,000**
Ammonia Production	5,100								5,100
Nitric Acid Production				3.41	1,060				1,060
Adipic Acid Production				32	10,000				10,000
c. Metal Production	**11,800**						**6,600**	**2,460**	**20,800**
Iron and Steel Production	8,500								8,500
Aluminum Production	3,300						6,600	59.1	9,900
SF_6 Used in Magnesium Smelters and Casters								2,400	2,400
d. Production and Consumption of Halocarbons and SF_6[4]						**660**	**-**	**1,500**	**2,200**
e. Other & Undifferentiated Production	**7,900**								**7,900**
SOLVENT & OTHER PRODUCT USE				**0.45**	**140**				**140**
AGRICULTURE		**980**	**21,000**	**93**	**29,000**				**49,000**
a. Enteric Fermentation		860	18,000						18,000
b. Manure Management		120	2,500	12	3,800				6,300
c. Agriculture Soils				81	25,000				25,000
Direct Sources				43	13,000				13,000
Pasture, Range and Paddock Manure				9.3	2,900				2,900
Indirect Sources				30	9,000				9,000
WASTE	**260**	**880**	**19,000**	**2**	**700**				**19,000**
a. Solid Waste Disposal on Land		870	18,000		-				18,000
b. Wastewater Handling		10	220	2	500				750
c. Waste Incineration	260	0.5	10	0.4	100				400
Land Use, Land-use Change and Forestry	**-82,000**	**95**	**2,000**	**4.0**	**1,200**				**-79,000**
a. Forest Land	-100,000	79	1,700	3.3	1,000				-100,000
b. Cropland	9,900	10	200	0.5	200				10,000
c. Grassland	-	-	-	-	-				-
d. Wetlands	4,000	0.8	20	0.03	10				4,000
e. Settlements	8,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-20: 1991 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**447,000**	**3,600**	**76,000**	**160**	**49,000**	**840**	**6,900**	**5,200**	**585,000**
ENERGY	**415,000**	**1,800**	**38,000**	**30**	**8,000**				**461,000**
a. Stationary Combustion Sources	**270,000**	**200**	**4,000**	**7**	**2,000**				**276,000**
Electricity and Heat Generation	96,200	1.7	36	2	500				96,800
Fossil Fuel Production and Refining	47,100	70	1,000	1	300				49,000
Petroleum Refining and Upgrading	15,000	-	-	0.3	100				15,000
Fossil Fuel Production	32,400	70	1,000	0.7	200				34,000
Mining & Oil and Gas Extraction	5,030	0.1	2	0.1	30				5,060
Manufacturing Industries	52,000	3	50	2	500				52,500
Iron and Steel	6,380	0.3	5	0.2	60				6,440
Non Ferrous Metals	2,560	0.06	1	0.04	10				2,580
Chemical	7,490	0.15	3.2	0.1	40				7,540
Pulp and Paper	12,800	2	30	0.7	200				13,000
Cement	3,330	0.06	1	0.03	10				3,340
Other Manufacturing	19,500	0.4	8	0.4	100				19,600
Construction	1,610	0.03	0.6	0.05	20				1,620
Commercial & Institutional	26,200	0.5	10	0.5	200				26,300
Residential	39,400	90	2,000	2	500				42,000
Agriculture & Forestry	2,700	0.04	0.8	0.06	20				2,720
b. Transport[2]	**134,000**	**30**	**600**	**20**	**6,000**				**141,000**
Civil Aviation (Domestic Aviation)	5,480	0.4	9	0.5	200				5,600
Road Transportation	92,600	14	300	11	3,500				96,400
Light-Duty Gasoline Vehicles	42,400	7.3	150	6.7	2,100				44,700
Light-Duty Gasoline Trucks	20,200	3.0	64	3.7	1,100				21,400
Heavy-Duty Gasoline Vehicles	6,840	1.1	24	0.19	59				6,920
Motorcycles	135	0.14	2.9	0.00	0.88				138
Light-Duty Diesel Vehicles	337	0.01	0.2	0.02	8				345
Light-Duty Diesel Trucks	722	0.02	0.4	0.05	20				739
Heavy-Duty Diesel Vehicles	19,700	1	20	0.6	200				19,900
Propane & Natural Gas Vehicles	2,280	1	30	0.04	10				2,300
Railways	5,710	0.3	7	2	700				6,000
Navigation (Domestic Marine)	4,900	0.4	7	1	300				5,200
Other Transportation	25,000	10	300	5	2,000				27,000
Off-Road Gasoline	5,500	6	100	0.1	40				5,700
Off-Road Diesel	12,000	0.7	10	5	2,000				14,000
Pipelines	7,370	7.4	160	0.2	60				7,590
c. Fugitive Sources	**11,000**	**1,600**	**33,000**	**0.1**	**30**				**44,500**
Coal Mining		100	2,000						2,000
Oil and Natural Gas	11,000	1,490	31,300	0.1	30				42,400
Oil	100	200	4,210	0.1	30				4,340
Natural Gas	23.6	636	13,400	-	-				13,400
Venting	6,670	654	13,700	-	-				20,400
Flaring	4,200	2.5	53	0.00	0.4				4,300
INDUSTRIAL PROCESSES	**32,000**			**35.7**	**11,100**	**840**	**6,900**	**5,200**	**56,100**
a. Mineral Products	**7,300**								**7,300**
Cement Production	4,400								4,400
Lime Production	1,800								1,800
Mineral Product Use[3]	1,090								1,090
b. Chemical Industry	**4,900**			**35.7**	**11,100**				**16,000**
Ammonia Production	4,900								4,900
Nitric Acid Production				3.41	1,060				1,060
Adipic Acid Production				32	10,000				10,000
c. Metal Production	**11,500**						**6,900**	**3,650**	**22,100**
Iron and Steel Production	8,320								8,320
Aluminum Production	3,100						6,900	59.1	10,000
SF_6 Used in Magnesium Smelters and Casters								3,590	3,590
d. Production and Consumption of Halocarbons and SF_6[4]						**840**	**-**	**1,500**	**2,400**
e. Other & Undifferentiated Production	**8,400**								**8,400**
SOLVENT & OTHER PRODUCT USE				**0.54**	**170**				**170**
AGRICULTURE		**940**	**20,000**	**92**	**28,000**				**48,000**
a. Enteric Fermentation		820	17,000						17,000
b. Manure Management		120	2,400	12	3,600				6,000
c. Agriculture Soils				80	25,000				25,000
Direct Sources				43	13,000				13,000
Pasture, Range and Paddock Manure				8.6	2,700				2,700
Indirect Sources				30	9,000				9,000
WASTE	**250**	**870**	**18,000**	**2**	**700**				**19,000**
a. Solid Waste Disposal on Land		860	18,000		-				18,000
b. Wastewater Handling		9.8	210	2	500				730
c. Waste Incineration	250	0.5	10	0.4	100				390
Land Use, Land-use Change and Forestry	**-41,000**	**270**	**5,700**	**11**	**3,500**				**-32,000**
a. Forest Land	-66,000	250	5,300	11	3,300				-58,000
b. Cropland	12,000	10	300	0.6	200				12,000
c. Grassland	-	-	-	-	-				-
d. Wetlands	5,000	0.5	10	0.02	7				5,000
e. Settlements	9,000	5	100	0.2	50				9,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Table A12-21: 1990 GHG Emission Summary for Canada

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL[1]	**456,000**	**3,500**	**74,000**	**160**	**50,000**	**770**	**6,500**	**4,700**	**592,000**
ENERGY	**424,000**	**1,700**	**37,000**	**30**	**8,000**				**469,000**
a. Stationary Combustion Sources	**276,000**	**200**	**4,000**	**7**	**2,000**				**281,000**
Electricity and Heat Generation	94,900	1.8	39	2	500				95,500
Fossil Fuel Production and Refining	49,400	80	2,000	1	300				51,000
Petroleum Refining and Upgrading	16,000	-	-	0.3	100				16,000
Fossil Fuel Production	33,800	80	2,000	0.7	200				36,000
Mining & Oil and Gas Extraction	6,150	0.1	3	0.1	40				6,190
Manufacturing Industries	54,500	3	60	2	500				55,000
Iron and Steel	6,420	0.2	5	0.2	60				6,480
Non Ferrous Metals	3,170	0.07	1	0.05	10				3,190
Chemical	7,100	0.15	3.0	0.1	40				7,140
Pulp and Paper	13,500	2	40	0.8	200				13,700
Cement	3,820	0.07	1	0.04	10				3,830
Other Manufacturing	20,500	0.4	9	0.4	100				20,600
Construction	1,850	0.03	0.7	0.05	20				1,870
Commercial & Institutional	25,500	0.5	10	0.5	200				25,700
Residential	40,900	100	2,000	2	500				43,000
Agriculture & Forestry	2,370	0.04	0.8	0.05	20				2,390
b. Transport[2]	**138,000**	**30**	**700**	**20**	**6,000**				**145,000**
Civil Aviation (Domestic Aviation)	6,180	0.5	10	0.6	200				6,400
Road Transportation	94,900	15	310	10	3,200				98,400
Light-Duty Gasoline Vehicles	43,800	7.8	160	6.2	1,900				45,800
Light-Duty Gasoline Trucks	19,600	3.1	66	3.2	1,000				20,700
Heavy-Duty Gasoline Vehicles	7,720	1.3	27	0.22	69				7,810
Motorcycles	143	0.14	3.0	0.00	0.93				146
Light-Duty Diesel Vehicles	347	0.01	0.2	0.03	8				355
Light-Duty Diesel Trucks	691	0.02	0.4	0.05	20				707
Heavy-Duty Diesel Vehicles	20,500	1	20	0.6	200				20,700
Propane & Natural Gas Vehicles	2,170	1	30	0.04	10				2,200
Railways	6,160	0.3	7	3	800				7,000
Navigation (Domestic Marine)	4,690	0.3	7	1	300				5,000
Other Transportation	26,000	20	300	6	2,000				29,000
Off-Road Gasoline	6,500	8	200	0.1	40				6,700
Off-Road Diesel	13,000	0.7	20	6	2,000				15,000
Pipelines	6,650	6.7	140	0.2	60				6,850
c. Fugitive Sources	**11,000**	**1,500**	**32,000**	**0.1**	**30**				**42,700**
Coal Mining		90	2,000						2,000
Oil and Natural Gas	10,600	1,440	30,100	0.1	30				40,700
Oil	95	193	4,060	0.1	30				4,180
Natural Gas	22.6	613	12,900	-	-				12,900
Venting	6,090	627	13,200	-	-				19,300
Flaring	4,400	2.6	54	0.00	0.4				4,400
INDUSTRIAL PROCESSES	**31,000**			**37.8**	**11,700**	**770**	**6,500**	**4,700**	**54,800**
a. Mineral Products	**8,300**								**8,300**
Cement Production	5,400								5,400
Lime Production	1,800								1,800
Mineral Product Use[3]	1,090								1,090
b. Chemical Industry	**5,000**			**37.8**	**11,700**				**17,000**
Ammonia Production	5,000								5,000
Nitric Acid Production				3.27	1,010				1,010
Adipic Acid Production				35	11,000				11,000
c. Metal Production	**9,770**						**6,500**	**3,170**	**19,500**
Iron and Steel Production	7,060								7,060
Aluminum Production	2,700						6,500	59.1	9,300
SF_6 Used in Magnesium Smelters and Casters								3,110	3,110
d. Production and Consumption of Halocarbons and SF_6[4]						**770**	**-**	**1,500**	**2,300**
e. Other & Undifferentiated Production	**8,000**								**8,000**
SOLVENT & OTHER PRODUCT USE				**0.56**	**170**				**170**
AGRICULTURE		**920**	**19,000**	**94**	**29,000**				**48,000**
a. Enteric Fermentation		810	17,000						17,000
b. Manure Management		120	2,400	11	3,500				6,000
c. Agriculture Soils				82	26,000				26,000
Direct Sources				45	14,000				14,000
Pasture, Range and Paddock Manure				8.4	2,600				2,600
Indirect Sources				30	9,000				9,000
WASTE	**270**	**850**	**18,000**	**2**	**600**				**19,000**
a. Solid Waste Disposal on Land		840	18,000		-				18,000
b. Wastewater Handling		11	220	2	500				740
c. Waste Incineration	270	0.4	9	0.4	100				400
Land Use, Land-use Change and Forestry	**-58,000**	**180**	**3,700**	**7.5**	**2,300**				**-52,000**
a. Forest Land	-84,000	160	3,400	6.7	2,100				-79,000
b. Cropland	12,000	10	300	0.6	200				13,000
c. Grassland	-	-	-	-	-				-
d. Wetlands	5,000	0.3	6	0.01	4				5,000
e. Settlements	9,000	5	100	0.2	50				10,000

Notes:

[1] National totals exclude all GHGs from the Land Use, Land-use Change and Forestry sector.

[2] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[3] The category Mineral Product Use includes CO2 emissions coming from the use of limestone & dolomite, soda ash, and magnesite.

[4] Production of HFCs (HCFC-22 exclusively) only occurred in Canada from 1990-1992. HFC consumption began in 1995.

Annex 13 Electricity in Canada: Summary and Intensity Tables

This annex presents detailed greenhouse gas (GHG) information related to the generation of electricity by public utilities on a national and provincial level. The GHG emissions presented in this annex include stationary combustion sources only and are a subcategory of the public electricity and heat production category (CRF Category 1.A.1.a). Additional information on the contribution of non-utility industrial generators of electricity has also been included.

The Canadian electricity generation industry is composed of utility, non-utility and industrial generators that produce electricity by transforming the energy in water, coal, natural gas, refined petroleum products (RPPs), miscellaneous other fuels, biomass, nuclear, wind and solar resources. The process of supplying electricity to the public involves not only power generation at the plant, but also distribution through the electricity grid. Although the efficiency of the transmission system has an impact on the amount of electricity available to consumers, data are not currently available at that level of refinement to discuss the impacts of the distribution infrastructure. GHG emission estimates and electricity generation values are therefore based on activities that occur at the generating plant only and do not include the SF_6 emissions associated with transformer stations.

The analysis in this section relies on a variety of data sources. Fuel consumption and electricity production data are published by Statistics Canada in the *Report on Energy Supply and Demand in Canada* (RESD) (Statistics Canada #57-003-XIB), the *Electric Power Generation, Transmission and Distribution* (EPGTD) publication (Statistics Canada #57-202-XIB) the *Energy Statistics Handbook* (Statistics Canada #57-601-XIE) and online via CANSIM. The *Energy Statistics Handbook* is a broad compilation of various Statistics Canada publications and is updated quarterly. The EPGTD is generally published after the RESD, and the data within the reports may differ slightly due to revisions. The EPGTD has a higher level of data disaggregation and is assumed to contain the most up-to-date data; the data presented in this section, unless otherwise stated, are from the EPGTD. Both publications collect data from major electricity suppliers with station capacities of 500 kW or more and account for more than 95% of electricity generation in Canada. Generation data for 2008 were obtained from CANSIM, as the EPGTD was not available at the time of writing. The regional analysis and discussion is further supported by reviewing and incorporating data published in annual reports prepared by the major power producers in each province or territory.

A13.1 Methodology and Limitations

GHG emissions resulting from the combustion of fuel for electricity generation by public utilities are presented in the tables in this annex. Detailed data on industrial contributions to the electricity grid are available; however, fuel consumption data associated with this specific area of electricity production are not currently available in the EPGTD. Nevertheless, the contribution of industry-generated electricity to the Canadian total is on average less than 9% and is not considered to be a major factor in the trends discussion. See Section A13.6 (Industrial Generation of Electricity) for a review of non-utility contributions to the overall electricity supply mix.

The information presented in this annex also excludes the emissions associated with heat and steam generation. Emissions and trends for the entire Electricity and Heat Generation subsector are covered briefly in Greenhouse Gas Emission Trends, 1990–2008 (Chapter 2) and the Energy Sector (Chapter 3). GHG emissions by gas for the entire sector are presented in Canada's

Greenhouse Gas Emission Tables, 1990–2008 (Annex 12) and the Provincial/Territorial Greenhouse Gas Emission Tables, 1990–2008 (Annex 15).

Electricity intensity values were derived for each fuel type using GHG emission estimates and electricity generation data. The methodology used to develop the GHG emissions is discussed in Chapter 3 and Annex 2 of this report. GHG emissions are based on the total fuel consumed by the utility, as provided in the RESD, while the net electricity generation presented herein is from the EPGTD. For the 1990–1997 period, net electricity generation was calculated from gross electricity generation values provided in the EPGTD.

In some cases, GHG intensities for natural gas-fuelled generators are calculated as being close to those of coal-based generation. This is a limitation of the method, as it relies on electricity data and fuel efficiencies published in the EPGTD.

A13.2 National Trends

Public utility-generated electricity has increased by 32% since 1990, while GHG emissions associated with this sector have increased by 21% over the same period. GHG intensity is down—from 220 g CO_2 eq/kWh in 1990 to 200 g CO_2 eq/kWh in 2008. GHG intensity is at its lowest level since 1995, largely due to increasing hydro and nuclear generation, and fuel switching from RPPs to natural gas. Fluctuations in electricity generation over time (Figure A13-1) primarily depend on changes in demand, since electricity is generated to meet an instantaneous need and, once generated, cannot be stored effectively. Decreasing electrical demand can occur via action by the final consumer (through conservation and outreach programs), new technology (higher-efficiency appliances), weather or through market and/or economic restructuring, plant shutdowns or strike actions.

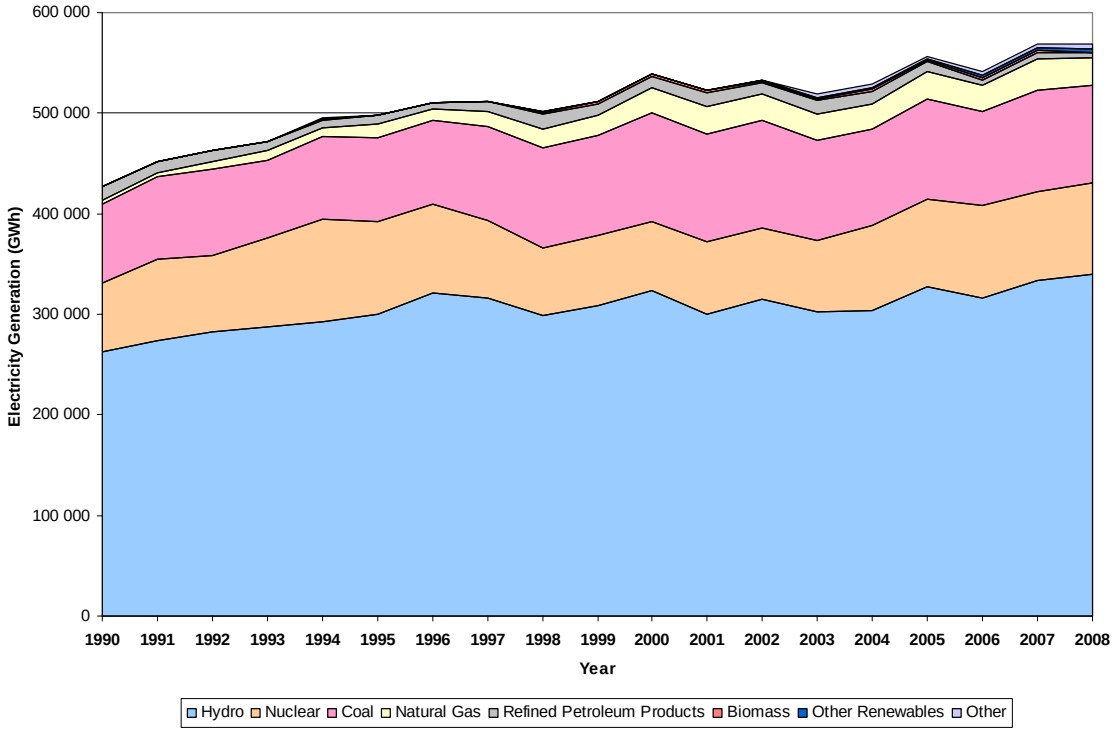

Figure A13-1: Utility-generated Electricity by Source

As shown in Figure A13-1, hydroelectric resources supply the majority of Canada's electricity, contributing 60% of total generation in 2008, down from 62% in 1990. Hydroelectric generation is essentially free of direct GHG emissions except for the CH_4 emissions that result from the flooding of lands to build reservoirs. Hydro resources are primarily concentrated in Labrador, Quebec, British Columbia and Manitoba. Since 1990, the contribution of hydro generation to the total supply mix has been relatively stable, with yearly fluctuations directly related to hydraulic conditions. Canada generated a second consecutive record amount of electricity from hydro sources in 2008, with over 340 000 GWh. Overall generation decreased by 0.9% from 2007 due in part to cooler weather and lower demand in certain areas of the country.

Nuclear power is Canada's second-largest source of emission-free electricity,[1] contributing approximately 16% of total generation in 2008, about even with 1990. Nuclear generation peaked in 1996 with 102 000 GWh and then declined in subsequent years due to reactor maintenance and shutdowns triggered by safety concerns. In 2008, nuclear power stations generated a total of 90 600 GWh, the vast majority (95%) of it in the province of Ontario. Nuclear power plants also operate in Quebec and New Brunswick; and significant efforts have been made to recover nuclear generation capacity in the country since 2003. Overall, nuclear generation was up almost 3% in 2008 compared to 2007, due mainly to strong performance from Ontario's nuclear fleet.

Coal provided approximately 17% of the electricity generated in Canada in 2008, totalling 97 300 GWh, representing an increase of 26% from 1990. Coal-fired generation is responsible for about 83% of the country's electricity-related GHG emissions and is the primary fuel in the provinces of Alberta and Saskatchewan. Coal also contributes significantly to the power supply in Ontario and Nova Scotia (see Figure A13-4 below for generation sources by region). The gradual increase in coal generation is primarily due to increasing demand, while annual variations usually depend on fluctuations in hydro generation; that is, in years with lower water levels, coal use increases to compensate. In Ontario, coal use also increased in years with lower nuclear generation. Coal-based electricity in Canada was responsible for 93 Mt of GHG emissions, a 14-Mt increase over 1990 and a decrease of 3.2 Mt from 2007.

The use of natural gas for electricity generation has increased significantly since 1990, and it now surpasses RPPs in its contribution to total supply. In 2008, its share was 5%—more than five times that in 1990. Natural gas-fired generators are part of the generation mix in most regions of the country, with Ontario and Alberta leading in natural gas-fired generation, followed by British Columbia and Saskatchewan. In Quebec and the Atlantic provinces, gas has been available only since 2000, but it is already being used in several new plants and a few retrofitted oil plants. Because natural gas generators are relatively easy to fire up but cost more than coal, they are generally used to supplement the base load supply (hydro, coal or nuclear) at peak times to meet fluctuations in demand. Since the GHG emissions from natural gas generation per kilowatt-hour are about half those from coal, any displacement of coal by natural gas results in fewer GHG emissions. The use and installation of co-generation units has also been increasing and has had a positive impact on the amount of usable power being captured per unit of fuel combusted. Total GHG emissions from natural gas in 2008 were 12.3 Mt, an increase of 9.7 Mt from 1990 and a decrease of 2.5 Mt from 2007.

RPPs such as heavy fuel oil and diesel were used to generate 5100 GWh of electricity in 2008, a significant 63% decrease from 1990. RPP-fired generation made up less than 1% of Canada's

1. The inventory analysis does not consider emissions related to uranium mining, processing or disposal of waste fuel.

total electricity production for 2008. RPPs are used for electricity generation primarily in Newfoundland and Labrador, Nova Scotia and New Brunswick, where they made up 2.7%, 2.5% and 25% of their respective supply mixes in 2008. These percentages vary from year to year, depending on the price of RPPs relative to the price of coal, overall demand and provincial policies. High oil prices make RPP-fired generation a more expensive option than natural gas to meet demand.

The contribution of biomass sources, in particular of wood and wood wastes, to utility electrical generation was not available for 2008 at the time of publication. Based on data for 2007, these sources contribute less than 1% to the Canadian total, with generation mainly located in the provinces of British Columbia, Alberta and New Brunswick. Biomass combustion plays a greater role in industrial electricity generation. CO_2 emissions from biomass are considered carbon-neutral and are not included in the GHG totals.

Electricity generation from renewable sources like wind and tidal power continue to increase at a significant rate. New large-scale wind farm installations helped increase power generation by 44% from 2007 and 179% from 2005. Wind and tidal generation has nearly equalled RPP-fired generation, and provincial programs for increased renewable content (from wind and other sources) in the electrical supply grid will continue to play a role in 2009 and beyond as more projects come on line. The Canadian Wind Energy Association (CanWEA) reports that Canada's installed capacity grew to 2369 MW in 2008, an increase of 523 MW from 2007.

A13.3 Imports and Exports

Overall electricity (utility and industrial) generation in 2008 has grown to over 618 000 GWh, an increase of 0.2% from the previous high of 617 000 GWh observed in 2007. The interconnectedness of the electricity grid with the United States and varying requirements in different regions of the country allows the easy import of cheap electricity and the export of excess electricity for profit.

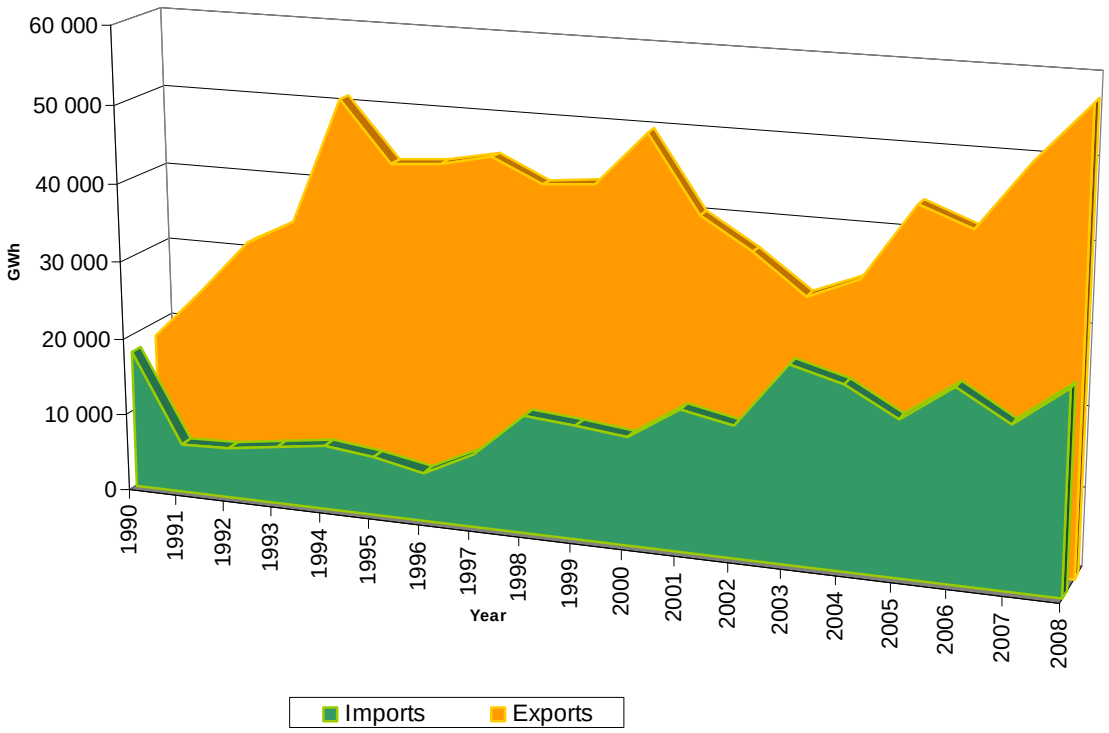

Figure A13-2: Canadian Electricity Imports and Exports from the United States

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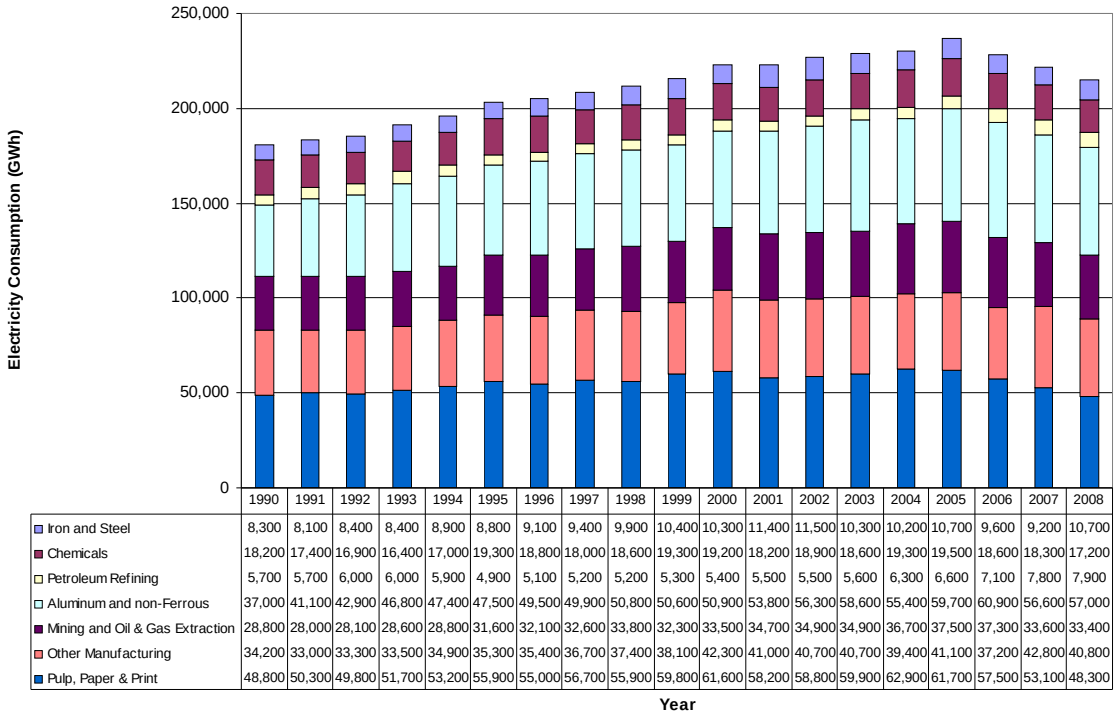
As shown in -----

Figure A13-2, electricity exports grew by 215% between 1990 and 2008, from 18 000 GWh to over 57 000 GWh, respectively. Imports have also increased, although at a much lower rate (43% between 1990 and 2008). In 2008, the provinces exporting the greatest amounts of electricity were Quebec (18 700 GWh), Manitoba (9900 GWh), British Columbia (7900 GWh) and Ontario (4100 GWh). Due to their hydroelectric potential for energy banking, plus key interconnections with U.S. states and Canadian provinces, British Columbia and Quebec imported the most electricity (11 700 GWh and 1400 GWh, respectively) in 2008. Interprovincial trade is also a factor in electricity generation and consumption. Prince Edward Island imports 88% of its electricity due to few local generating options and a well-established link with New Brunswick. Surprisingly, 17% of Quebec's total 2008 electricity supply was obtained from other provinces (mainly Newfoundland and Labrador); this supply is then used both for internal demand and exporting. Thanks to its abundant hydro resources, Canada is largely a net electricity exporter. As such, fluctuations over time have as much to do with economics and international demand as with hydraulic conditions.

A13.4 Sectoral Discussion

The major consumers of electricity in Canada for 2008 are (in order of decreasing consumption) the Manufacturing Industries (including mining and oil & gas extraction), Residential, and Commercial/Institutional & Public Administration (*Energy Statistics Handbook*, #57-601-XIE). Since 1990, all subsectors' overall consumption has increased while their consumption as a percentage of the whole has remained virtually unchanged.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Iron and Steel	8,300	8,100	8,400	8,400	8,900	8,800	9,100	9,400	9,900	10,400	10,300	11,400	11,500	10,300	10,200	10,700	9,600	9,200	10,700
Chemicals	18,200	17,400	16,900	16,400	17,000	19,300	18,800	18,000	18,600	19,300	19,200	18,200	18,900	18,600	19,300	19,500	18,600	18,300	17,200
Petroleum Refining	5,700	5,700	6,000	6,000	5,900	4,900	5,100	5,200	5,200	5,300	5,400	5,500	5,500	5,600	6,300	6,600	7,100	7,800	7,900
Aluminum and non-Ferrous	37,000	41,100	42,900	46,800	47,400	47,500	49,500	49,900	50,800	50,600	50,900	53,800	56,300	58,600	55,400	59,700	60,900	56,600	57,000
Mining and Oil & Gas Extraction	28,800	28,000	28,100	28,600	28,800	31,600	32,100	32,600	33,800	32,300	33,500	34,700	34,900	34,900	36,700	37,500	37,300	33,600	33,400
Other Manufacturing	34,200	33,000	33,300	33,500	34,900	35,300	35,400	36,700	37,400	38,100	42,300	41,000	40,700	40,700	39,400	41,100	37,200	42,800	40,800
Pulp, Paper & Print	48,800	50,300	49,800	51,700	53,200	55,900	55,000	56,700	55,900	59,800	61,600	58,200	58,800	59,900	62,900	61,700	57,500	53,100	48,300

Figure A13-3: Electricity Consumption by Manufacturing Industry

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Manufacturing Industries

Electricity consumption for selected manufacturing sectors is presented in Figure A13-3 (Statistics Canada, #57-601-XIE). Over the long term, consumption increased in 4 of 6 subsectors, with increases not equally distributed as the Canadian economy has changed over time. The shift from a resource-based economy, the rise of the automotive and electronics sector, and the growth of the service/IT industry have all had impacts on electricity consumption. Since 2006, 4 of the 7 subsectors showed a decrease in electrical consumption, likely a response to economic factors. The Pulp, Paper and Print subsector showed the largest decrease in electricity consumption while the “Other Manufacturing” subsector showed the largest increase. The short-term changes can usually be attributed to economic factors rather than to structural changes.

Since 1990, the Iron and Steel subsector has increased electrical energy consumption, mainly due to changes in technology and economic factors. A protracted strike in 1990 reduced production (and subsequently consumption and GHG emissions) and has had the impact of skewing the long-term trend. Regardless, the use of electric arc furnaces (EAFs) has increased electrical consumption while reducing plant-level fossil fuel consumption and GHGs.

Electricity consumption in the chemical industry has remained fairly constant over time. Plant closures, higher efficiency, operational issues and strikes are generally responsible for the interannual changes in consumption.

The Petroleum Refining subsector has seen electrical consumption remain fairly constant over time with an increasing trend noted in the last 4 years. Higher prices and demand for refined petroleum products has meant increased profits for refining operations and an upsurge in

production. Increases in production efficiency have helped reduce power consumption, although advanced technologies to create cleaner fuels and increased capacity at existing facilities have meant a small increase in electrical consumption. Strong demand for gasoline in both domestic and export markets is likely the biggest factor behind the growth in electrical demand experienced in the last 5 years.

The Non-ferrous Metals subsector has shown significant growth since 1990. Increased global demand for these products has been the main reason for the increased consumption. The Aluminium subsector uses significant amounts of electricity in its processes, and demand is closely related to production. Consumption has decreased since 2006 but increased slightly from 2007, likely as a result of economic factors.

The Mining and Oil & Gas Extraction subsector has grown steadily since 1990. This sector includes oil sands mining as well as primary metals (i.e. zinc, bauxite, nickel, copper). The growth of the oil sands, plus surging global demand primarily for metals in the last 5 years on the global market are the key drivers behind the growth in electrical consumption. The short-term changes in demand in this subsector are similar to those identified in the petroleum refining and aluminium subsectors.

The “Other Manufacturing subsector includes many industries, and of particular interest are the automotive and electronics manufacturing categories. Electricity consumption reached a peak in 2000 and has been changing annually as the subsector deals with difficult economic conditions brought about by the effects of the dot-com bust, the 9/11 terrorist attacks and a slowdown in the United States housing market. The subsector has shown tremendous resiliency and the ability to adapt with increases in energy efficiency (particularly in the automotive subsector), and a shift from relying solely on United States markets to taking advantage of other Canadian and global markets for exports.

In recent years, the Pulp, Paper & Print subsector has faced the greatest economic difficulties. Strikes and plant closures reduced electricity demand in 2006 and 2007, partially as a response to softening demand for newsprint as people come to rely more on electronic media. Lower prices and demand for softwood lumber from the United States housing market have both been key factors in the economic downturn faced by this industry, as has increasing competition from other exporting nations.

Residential Subsector

The Residential subsector is a major consumer of electricity, with demand increasing 24% between 1990 and 2008 and 15% since 2001. At the same time, the number of homes in Canada increased by 31% between 1990 and 2007 (the last year for which data are available) and 10% between 2001 and 2007. Electricity consumption by this subsector can be affected by weather but also by economic prosperity. Growth in demand was low to moderate during the recession that appeared in the early 1990s, but consumption increased significantly after 1999. The rise in home computer usage, air conditioners and home electronics purchased due to increases in disposable income has helped to push consumption higher, while energy efficiency gains have been realized in new appliances (via programs like EnergyStar). The trend towards larger homes means more energy used for heating, cooling and lighting, with the average size of a housing unit increasing by about 12 m^2 from 1990.

Electricity consumption by the Residential subsector increased by 5% between 2007 and 2008 while heating degree-days increased by about 1% over the same period. 2004 and 2005 marked

the full-scale implementation of significant and successful efforts in GHG reductions and electricity conservation through campaigns such as the One-Tonne Challenge, Project Porchlight and utility-organized conservation programs. The higher demand observed in 2008 was mainly due to a 14% increase in electricity demand in Ontario.

Commercial/Institutional and Public Administration Subsectors

Electricity consumption by the Commercial/Institutional and Public Administration subsectors increased by 8% (from 144 TWh to 156 TWh) between 2007 and 2008. Over the long term, electricity consumption by these subsectors has grown by 44%, in part due to growth in the service and IT sectors through structural changes in Canada's economy. These subsectors have also meant an increase in the number of commercial buildings and floor space, which has meant larger areas to heat and cool, while computers, printers and other electrical appliances have become commonplace. Commercial and Institutional floor space increased 34% between 1990 and 2007 (the last year for which data are available) and 12% between 2001 and 2007.

A13.5 Regional Discussion

Figure A13-4 provides a breakdown of electricity generation by region and by source for the years 1990 and 2008.[2] Coal-fired sources predominate in Alberta and Saskatchewan, due in no small part to easy and reliable access to abundant coal resources. Hydro provides the majority of electricity generation in the provinces of Quebec, British Columbia, Manitoba, and Newfoundland and Labrador. In Ontario and the Atlantic region, the electricity generation mix is fairly diverse, with nuclear power providing the greatest percentage of the supply in Ontario. In terms of total generation, Quebec and Ontario have by far the highest generation totals—combined, they produced 332 000 GWh (58%) of Canada's electricity supply in 2008. They are followed by Alberta (about 58 900 GWh) and British Columbia (about 52 800 GWh), then by Newfoundland and Labrador (41 400 GWh).

2. Owing to their relatively small contribution to Canadian supply, the Atlantic Provinces have been grouped together, as have the territories.

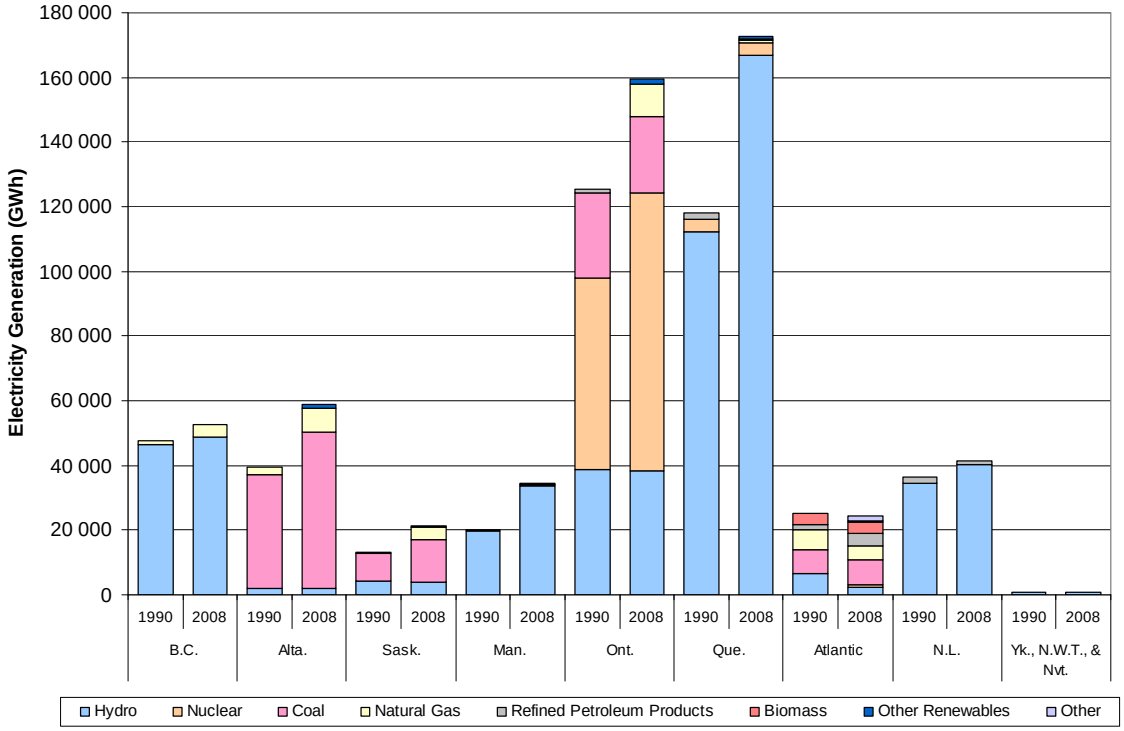

Figure A13-4: Electricity Generation by Region and Source, 1990 and 2008

Overall generation has increased in all provinces. Since 1990, generation in Saskatchewan and Manitoba has grown by over 60%. In Manitoba, this growth was based on new hydro developments while in Saskatchewan, the increase was due to expanded use of coal and natural gas to meet demand. Generation in Alberta, Quebec and the Atlantic region grew between 46% and 49%. In Ontario, a 27% increase in generation was met with increased nuclear power over the period, plus a significant increase in the use of natural gas. In British Columbia and Newfoundland and Labrador, electricity generated from hydro increased by 10% and 14%, respectively.

Overall, zero-GHG-emitting electricity sources (nuclear, hydro, biomass, wind and tidal) continue to provide about three quarters of the electricity in Canada. The contribution of Other Renewables (mostly new wind installations) has increased over 350% in the last five years and will likely increase further in 2009 and 2010 due to federal and provincial incentive programs and increased public acceptance.

Since public utilities are limited in their ability to increase electricity rates for consumers, economic factors can play a major role in fuel consumption. For example, natural gas-fuelled generation increased by about 550% between 1990 and 2000 and remained constant between 2000 and 2005. Natural gas-based generation was lower between 2002 and 2004, due in part to higher natural gas prices, while generation in 2006 was lower due to softer demand. The rapid valuation of the Canadian currency in 2004, however, had the effect of lowering natural gas costs, as these prices are based on international markets and foreign currency. Similar impacts can be inferred for coal, RPPs, and “other fuel” generation. With increasing oil costs, the usage of lower-priced and subsequently lower-grade fuels like coal and those included in the “other fuel”

category have increased while RPP usage has decreased due to the limited ability of public utilities to pass on rising fuel costs.

The main reasons behind the 6.4-Mt decrease in GHG emissions from this sector are mainly due to climactic and economic conditions in 2008. The majority of the decrease between 2007 and 2008 was observed in Ontario (4.5 Mt) and Quebec (1.7 Mt). The overall decrease in emissions is mainly due to record hydroelectric generation and lower peak demand for electricity in Ontario due to milder weather, economic conditions and increased conservation efforts. The natural gas congeneration plant in Bécancour, Quebec, ceased operations at the request of Hydro Quebec in 2008. This was the main reason for the decrease in emissions from the province.

A13.6 Industrial Generation of Electricity

Overall electricity generation in Canada has increased by 32% since 1990, with industrial electricity generation making up 6% of that increase. However, within the industrial electricity industry, generation has increased approximately 23% since 1990, and associated GHG emissions have increased 173% over the same period. The GHG intensity for industrial generation has increased from 54 g CO_2eq/kWh to 120 g CO_2eq/kWh. This is a result of a 72% increase in the use of fossil fuels in the generation mix.

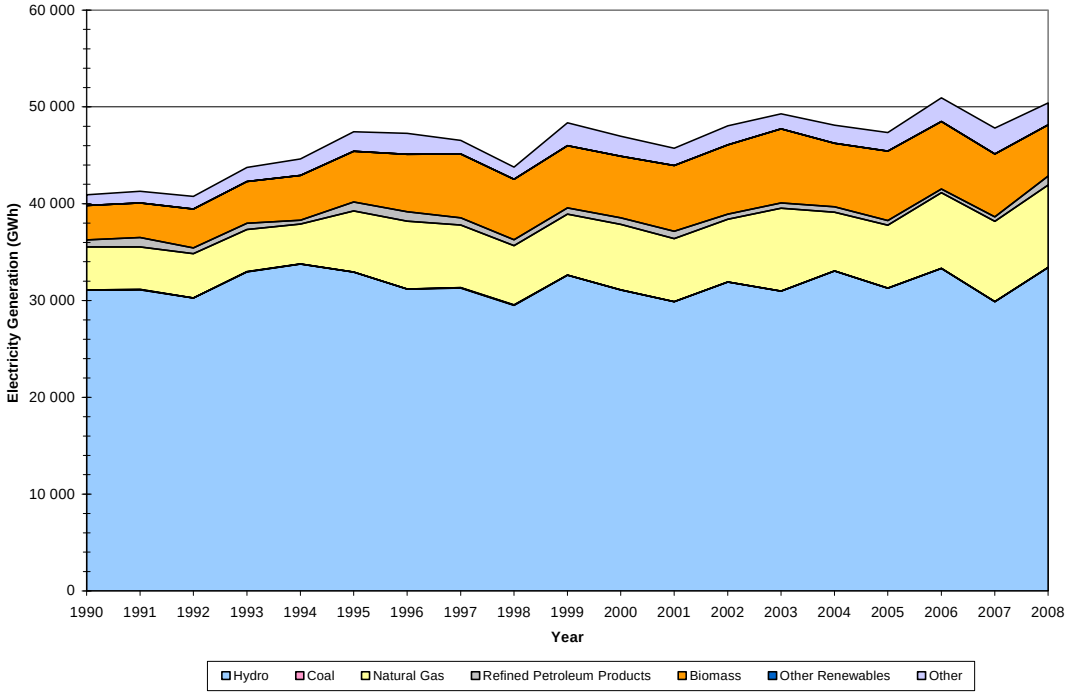

Figure A13-5: Industrial Electricity Generation, 1990 to 2008

Electricity generated by industry consists of three main source types: hydro, renewables such as wind and tidal power, and combustion generation. Combustion generation consists of natural gas, biomass, RPPs and other fuel combustion. In 1990, coal made up a minor fraction of the industrial combustion-generation mix but this has been reduced to zero in 2008. Nuclear power has never been part of the industrial electricity generation mix.

As shown in Figure A13-5: Industrial Electricity Generation, 1990 to 2008, hydro generation remains the largest contributor to the industrial electricity generation mix. The majority occurs in British Columbia and Quebec, with smaller contributions from Labrador and Ontario. This is consistent in both 1990 and 2008. Since 1990, overall industrial hydro generation increased 8%; however, in 1990 it was 76% of the overall generation mix, while in 2008 it decreased to 66%.

Natural gas usage for industrial electricity generation has increased 91% since 1990, when it represented 11% of the generation mix. In 2008, natural gas-based generation increased to 17% of industrial supply. However, natural gas usage fluctuates from year to year, as does RPP usage. The 2008 value for RPPs is 99% higher than the 2007 value; however, it is only 26% higher than 1990. Fluctuations in RPP and natural gas usage are generally a result of changes in the market values of these fuels relative to each other.

Biomass is 50% higher in 2008 than it was in 1990, and is now 11% of the generation mix. Since 2005, biomass generation sources have seen a steady decline and are now 26% lower than they were in 2005. This is most likely due to the plant closures and production decreases that have been observed in the pulp and paper industry over the past several years.

Industrial electricity generation from renewable sources other than hydro was observed for the first time in 2004 and has stayed relatively consistent since that time. In 2008, other renewables made up less than 1% of the supply mix for industrial generation.

A13.7 GHG Emission Intensities

The quantity of GHG emissions per megawatt-hour for a specific fuel (or for a specific fuel and generation type) is known as emission intensity and can be measured in tonnes of carbon dioxide equivalent emissions per gigawatt-hour (t CO_2 eq/GWh). Emission intensities vary according to the specific type of fuel used, the quality of that fuel, the conversion technology used and the efficiency of the combustion unit. Coal-fired electricity generally has the highest emission intensity; its emission intensity varies with the type of coal, although it is usually in the range of 1000 t CO_2 eq/GWh. The intensity of RPPs also varies with fuel type and technology, ranging from 600 to 800 t CO_2 eq/GWh, and reflects the variability of this category. Natural gas generators tend to produce around 500 t CO_2 eq/GWh, although the value could be substantially lower for cogeneration plants.

On a regional basis, GHG intensities give a quick glimpse into the wide variation of supply mixes in each province and region. Alberta, with a generation system that is predominantly coal-based, has the highest GHG intensity in Canada, although its GHG intensity has been decreasing as a result of the increased use of natural gas, biomass and other renewable sources of energy. The Atlantic region, with a mix of RPPs, coal and nuclear has a lower GHG intensity than Alberta, whereas Quebec, Manitoba and British Columbia, where generation is dominated by hydro, have the lowest GHG intensities. With its mix of hydro, nuclear and fossil fuels, Ontario lies between the two and is very close to the Canadian average.

Electricity generation and GHG emissions details for Canada and the provinces and territories are provided in Table A13-1–1 to Table A13-12.

Table A13-1: Electricity Generation and GHG Emission Details for Canada[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**92 500**	**126 300**	**127 900**	**123 300**	**128 600**	**119 300**	**118 800**	**110 200**	**118 000**	**111 600**
					Electricity Generation[6]					
					GWh					
Coal	77 400	107 700	107 800	106 900	100 400	94 900	99 700	93 200	99 900	97 300
Refined Petroleum Products[7]	13 630	10 810	13 250	10 790	12 560	12 800	10 040	5 420	6 470	5 060
Natural Gas	3 900	25 900	27 300	26 400	26 200	25 300	27 300	26 100	31 800	26 700
Nuclear	68 800	68 700	72 400	71 300	70 700	85 200	86 800	92 400	88 200	90 600
Hydro	262 900	323 500	299 600	314 600	302 400	303 600	327 200	316 100	334 200	340 100
Biomass	10	1 910	2 120	2 180	2 140	2 000	1 860	2 010	2 000	N/A
Other Renewables[8]	30	260	370	430	700	970	1 580	2 470	3 100	4,900[9]
Other[10]	80	170	420	490	4 190	4 560	2 600	4 120	3 660	4 350
Overall Total	**426 700**	**538 900**	**523 200**	**533 000**	**519 300**	**529 400**	**557 000**	**542 000**	**569 300**	**568 500**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	216	233	243	230	246	224	212	202	206	195
CH_4 intensity (g / kWh)	0.004	0.009	0.009	0.009	0.009	0.009	0.008	0.008	0.009	0.008
N_2O intensity (g / kWh)	0.004	0.004	0.005	0.004	0.005	0.004	0.004	0.004	0.004	0.004
Overall Intensity (g CO_2 eq / kWh)	**220**	**230**	**240**	**230**	**250**	**230**	**210**	**200**	**210**	**200**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Other Renewables calculated from totalling provincial sources.
10. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
11. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-2: Electricity Generation and GHG Emission Details for Newfoundland and Labrador[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**1 600**	**800**	**1 700**	**1 800**	**1 500**	**1 300**	**1 100**	**600**	**1 100**	**900**
					Electricity Generation[6]					
					GWh					
Coal	0	0	0	0	0	0	0	0	0	0
Refined Petroleum Products[7]	1 960	1 020	2 150	2 430	2 000	1 700	1 360	770	1 290	1 120
Natural Gas	0	0	0	0	0	0	0	0	0	0
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	34 300	41 800	37 400	40 100	38 400	38 100	38 900	40 100	38 500	40 300
Biomass	10	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	0	0	0	0	0	0	0	10
Other[9]	0	0	0	0	0	0	0	0	0	0
Overall Total	**36 300**	**42 800**	**39 600**	**42 500**	**40 400**	**39 800**	**40 300**	**40 800**	**39 800**	**41 400**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	44	19	42	43	38	32	26	15	27	21
CH_4 intensity (g / kWh)	0.0006	0.0002	0.0005	0.0005	0.0004	0.0004	0.0003	0.0002	0.0003	0.0002
N_2O intensity (g / kWh)	0.001	0.0004	0.001	0.001	0.001	0.001	0.001	0.0003	0.0006	0.0004
Overall Intensity (g CO_2 eq / kWh)	**40**	**20**	**40**	**40**	**40**	**30**	**30**	**20**	**30**	**20**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

Table A13-3: Electricity Generation and GHG Emission Details for Prince Edward Island[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**100**	**60**	**50**	**30**	**40**	**20**	**10**	**10**	**N/A**	**N/A**
					Electricity Generation[6]					
					GWh					
Coal	0	0	0	0	0	0	0	0	0	0
Refined Petroleum Products[7]	81	48	44	19	43	13	6	6	5	6
Natural Gas	0	0	0	0	0	0	0	0	0	0
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	0	0	0	0	0	0	0	0	0	0
Biomass	0	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	5	19	20	35	40	33	112[9]	181[9]
Other[10]	0	0	0	0	0	0	0	0	0	0
Overall Total	**80**	**50**	**50**	**40**	**60**	**50**	**50**	**40**	**120**	**190**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	1,250	1,150	1,020	750	670	380	250	200	N/A	N/A
CH_4 intensity (g / kWh)	0.02	0.01	0.01	0.008	0.008	0.004	0.003	0.003	N/A	N/A
N_2O intensity (g / kWh)	0.03	0.02	0.02	0.02	0.01	0.008	0.005	0.004	N/A	N/A
Overall Intensity (g CO_2 eq / kWh)	**1,260**	**1,150**	**1,030**	**750**	**680**	**380**	**260**	**200**	**N/A**	**N/A**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Data for 2007 and 2008 from Prince Edward Island Energy Corporation (PEIEC).
10. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
11. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-4: Electricity Generation and GHG Emission Details for Nova Scotia[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**6 800**	**8 800**	**7 800**	**7 100**	**8 200**	**10 000**	**9 300**	**8 700**	**9 100**	**9 400**
					Electricity Generation[6]					
					GWh					
Coal	7 640	8 960	9 810	8 140	6 880	6 310	6 500	6 450	7 890	7 730
Refined Petroleum Products[7]	300	1 500	1 060	460	2 000	1 890	1 830	870	460	300
Natural Gas	0	0	0	2 310	150	100	220	310	760	970
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	1 120	890	680	1 000	1 050	860	1 040	980	890	1 060
Biomass	0	200	200	180	190	180	170	160	150	N/A
Other Renewables[8]	30	80	30	30	30	30	110	130	180	110
Other[9]	0	0	0	0	2 030	3 160	2 510	2 480	2 000	1 750
Overall Total	**9 100**	**11 600**	**11 800**	**12 100**	**12 300**	**12 500**	**12 400**	**11 400**	**12 300**	**11 900**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	746	754	717	596	674	791	750	758	735	784
CH_4 intensity (g / kWh)	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.03
N_2O intensity (g / kWh)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Overall Intensity (g CO_2 eq / kWh)	**750**	**760**	**660**	**590**	**670**	**790**	**750**	**760**	**740**	**790**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-5: Electricity Generation and GHG Emission Details for New Brunswick[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**5 800**	**8 500**	**9 800**	**8 500**	**8 200**	**9 400**	**9 200**	**6 800**	**6 800**	**6 200**
					Electricity Generation[6]					
					GWh					
Coal	1 010	3 930	3 980	3 660	3 890	3 300	3 090	3 130	3 160	3 460
Refined Petroleum Products[7]	6 150	7 100	8 190	6 370	5 110	6 430	6 420	3 330	3 930	3 390
Natural Gas	0	0	0	590	1 130	1 740	1 430	2 300	1 440	810
Nuclear	5 340	3 960	4 520	3 760	4 740	4 300	4 380	4 370	4 120	1 130
Hydro	3 460	3 220	2 070	2 190	3 160	2 950	3 820	3 710	2 790	3 540
Biomass	0	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	0	0	0	0	0	0	0	0
Other[9]	30	0	0	160	150	900	1 160	660	840	1 270
Overall Total	**16 000**	**18 200**	**18 800**	**16 700**	**18 200**	**19 600**	**20 300**	**17 500**	**16 300**	**13 600**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	366	455	520	496	440	427	409	387	414	455
CH_4 intensity (g / kWh)	0.004	0.005	0.006	0.010	0.013	0.013	0.014	0.018	0.015	0.012
N_2O intensity (g / kWh)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Overall Intensity (g CO_2 eq / kWh)	**370**	**460**	**520**	**510**	**450**	**480**	**460**	**390**	**420**	**460**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

Table A13-6: Electricity Generation and GHG Emission Details for Quebec[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**1 400**	**400**	**400**	**300**	**1 600**	**1 300**	**500**	**700**	**2 100**	**400**
					Electricity Generation[6]					
					GWh					
Coal	0	0	0	0	0	0	0	0	0	0
Refined Petroleum Products[7]	1 800	400	500	400	2 300	2 000	1 000	100	200	300
Natural Gas	0	200	200	200	300	100	200	1 700	4 800	800
Nuclear	4 100	4 900	4 700	4 500	3 500	4 900	4 500	4 600	4 300	3 600
Hydro	112 200	153 400	144 800	150 600	152 200	146 200	154 700	151 800	163 300	167 000
Biomass	0	490	600	660	540	450	210	320	360	N/A
Other Renewables[8]	0	170	190	170	170	190	420	420	620	810[9]
Other[10]	0	0	0	0	0	0	0	0	0	0
Overall Total	**118 100**	**159 600**	**151 100**	**156 500**	**159 000**	**153 800**	**161 000**	**159 000**	**173 700**	**172 500**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	12	2	2	2	10	9	3	4	12	2
CH_4 intensity (g / kWh)	0.0003	0.0001	0.0001	0.0001	0.0002	0.0002	0.0004	0.0008	0.0028	0.0003
N_2O intensity (g / kWh)	0.0003	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0003	0.0001
Overall Intensity (g CO_2 eq / kWh)	**12**	**2**	**3**	**2**	**10**	**9**	**3**	**4**	**12**	**2**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Other Renewables data from Hydro Quebec (2008).
10. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
11. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-7: Electricity Generation and GHG Emission Details for Ontario[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**25 900**	**41 100**	**39 200**	**38 900**	**39 600**	**30 100**	**32 900**	**27 500**	**34 000**	**34 000**
					Electricity Generation[6]					
					GWh					
Coal	26 100	38 800	34 000	32 200	30 600	22 800	27 300	26 100	28 600	23 600
Refined Petroleum Products[7]	1 320	500	850	730	1 640	950	60	40	310	130
Natural Gas	0	12 700	14 000	15 900	15 200	13 400	14 800	9 400	10 800	10 000
Nuclear	59 400	59 800	63 100	63 000	62 400	76 100	78 000	83 500	79 800	85 800
Hydro	38 700	36 600	35 800	37 100	34 700	38 100	34 600	35 000	33 400	38 300
Biomass	0	380	610	760	670	690	660	470	530	N/A
Other Renewables[8]	0	0	0	0	0	25	26	144	494	1,400[9]
Other[10]	0	0	0	0	0	0	0	0	0	0
Overall Total	**125 500**	**148 700**	**148 500**	**149 700**	**145 200**	**152 000**	**155 300**	**154 700**	**153 800**	**159 400**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	210	270	260	260	270	200	210	180	200	160
CH_4 intensity (g / kWh)	0.002	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
N_2O intensity (g / kWh)	0.003	0.004	0.004	0.004	0.005	0.003	0.004	0.003	0.004	0.003
Overall Intensity (g CO_2 eq / kWh)	**210**	**280**	**260**	**260**	**270**	**200**	**210**	**180**	**200**	**170**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Other Renewables data from Ontario Independent Electricity System Operator (IESO).
10. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
11. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-8: Electricity Generation and GHG Emission Details for Manitoba[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**500**	**1 000**	**500**	**500**	**800**	**400**	**500**	**400**	**500**	**400**
					Electricity Generation[6]					
					GWh					
Coal	300	870	450	380	570	270	420	340	400	400
Refined Petroleum Products[7]	40	10	20	20	20	10	10	10	30	20
Natural Gas	0	0	0	120	220	80	10	40	50	40
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	19 800	31 500	32 900	28 800	20 200	27 200	36 400	33 700	33 500	34 600
Biomass	0	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	0	0	0	0	0	330	330	410
Other[9]	0	0	0	0	0	0	0	0	0	0
Overall Total	**20 200**	**32 400**	**33 400**	**29 300**	**21 100**	**27 600**	**36 900**	**34 400**	**34 300**	**35 500**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	25	30	14	16	36	14	14	11	13	12
CH_4 intensity (g / kWh)	0.0004	0.0004	0.0002	0.0009	0.002	0.0007	0.0002	0.0003	0.0004	0.0003
N_2O intensity (g / kWh)	0.001	0.001	0.0003	0.0004	0.001	0.0003	0.0003	0.0002	0.0003	0.0003
Overall Intensity (g CO_2 eq / kWh)	**30**	**30**	**10**	**20**	**40**	**10**	**10**	**10**	**10**	**10**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-9: Electricity Generation and GHG Emission Details for Saskatchewan[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**10 300**	**14 500**	**15 000**	**15 100**	**16 100**	**16 600**	**15 400**	**14 700**	**15 600**	**15 200**
					Electricity Generation[6]					
					GWh					
Coal	8 700	11 600	11 500	11 700	11 600	12 100	11 400	11 500	11 800	12 900
Refined Petroleum Products[7]	10	20	20	20	30	20	40	40	50	60
Natural Gas	240	2 440	2 670	2 720	4 120	3 870	3 320	3 180	3 490	3 920
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	4 200	3 000	2 400	2 800	3 400	2 700	4 600	4 000	4 400	4 000
Biomass	0	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	0	40	60	70	90	570	580	570
Other[9]	0	0	0	0	0	0	0	0	0	0
Overall Total	**13 100**	**17 100**	**16 600**	**17 300**	**19 200**	**18 800**	**19 500**	**19 400**	**20 300**	**21 500**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	780	840	900	860	830	870	780	750	760	700
CH_4 intensity (g / kWh)	0.02	0.03	0.04	0.03	0.04	0.04	0.04	0.03	0.04	0.03
N_2O intensity (g / kWh)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Overall Intensity (g CO_2 eq / kWh)	**780**	**850**	**900**	**870**	**840**	**880**	**790**	**760**	**770**	**710**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

Table A13-10: Electricity Generation and GHG Emission Details for Alberta[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**39 000**	**49 400**	**50 400**	**50 300**	**51 900**	**50 400**	**49 700**	**49 900**	**51 100**	**51 900**
					Electricity Generation[6]					
					GWh					
Coal	35 300	41 600	44 600	46 000	42 400	45 500	46 700	46 000	47 900	48 400
Refined Petroleum Products[7]	10	30	30	30	30	50	40	40	20	20
Natural Gas	2 320	9 350	9 090	7 620	6 770	6 910	7 020	7 690	7 960	7 360
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	2 060	1 760	1 430	1 720	1 740	1 880	2 240	1 870	2 130	2 010
Biomass	0	290	410	490	460	300	330	450	390	0
Other Renewables[8]	0	90	130	160	420	620	840	840	820	1 000
Other[9]	0	90	300	310	1 980	1 180	130	80	110	130
Overall Total	**39 600**	**53 200**	**56 000**	**56 300**	**53 800**	**56 400**	**57 300**	**57 000**	**59 300**	**58 900**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	980	920	890	890	960	890	860	870	860	880
CH_4 intensity (g / kWh)	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
N_2O intensity (g / kWh)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Overall Intensity (g CO_2 eq / kWh)	**980**	**930**	**900**	**890**	**960**	**890**	**870**	**880**	**860**	**880**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-11: Electricity Generation and GHG Emission Details for British Columbia[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**800**	**1 800**	**2 400**	**700**	**700**	**800**	**900**	**800**	**900**	**800**
					Electricity Generation[6]					
					GWh					
Coal	0	0	0	0	0	0	0	0	0	0
Refined Petroleum Products[7]	100	40	50	50	50	40	30	30	60	90
Natural Gas	1 260	3 350	4 800	1 660	1 800	2 230	2 370	2 070	2 990	4 070
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	46 400	50 800	41 500	49 600	47 000	45 000	50 300	44 500	54 700	48 600
Biomass	0	550	590	560	600	720	650	620	850	N/A
Other Renewables[8]	0	0	0	0	0	0	0	0	0	0
Other[9]	0	0	0	0	0	0	0	0	0	0
Overall Total	**47 800**	**54 700**	**47 000**	**51 900**	**49 500**	**48 000**	**53 400**	**47 200**	**58 600**	**52 800**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	17	33	50	13	14	17	16	18	14	15
CH_4 intensity (g / kWh)	0.004	0.008	0.01	0.003	0.004	0.004	0.004	0.004	0.004	0.004
N_2O intensity (g / kWh)	0.001	0.001	0.001	0.0004	0.0004	0.0005	0.0004	0.0005	0.0004	0.0004
Overall Intensity (g CO_2 eq / kWh)	**20**	**30**	**50**	**10**	**10**	**20**	**20**	**20**	**10**	**20**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Table A13-12: Electricity Generation and GHG Emission Details for Yukon, the Northwest Territories and Nunavut[1]

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008[2]
					Greenhouse Gas Emissions[3]					
					kt CO_2 eq					
Overall Total[4,5]	**260**	**110**	**130**	**80**	**80**	**90**	**70**	**70**	**60**	**60**
					Electricity Generation[6]					
					GWh					
Coal	0	0	0	0	0	0	0	0	0	0
Refined Petroleum Products[7]	290	230	260	240	280	270	240	240	260	290
Natural Gas	0	0	0	0	0	0	0	0	0	0
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydro	650	510	510	510	500	560	580	590	580	590
Biomass	0	0	0	0	0	0	0	0	0	0
Other Renewables[8]	0	0	1	1	1	0	1	1	0	0
Other[9]	0	0	0	0	0	0	0	0	0	0
Overall Total	**940**	**740**	**770**	**750**	**780**	**830**	**820**	**830**	**840**	**890**
					Greenhouse Gas Generation Intensity[3]					
					g GHG / kWh electricity generated					
CO_2 intensity (g/ kWh)	260	140	160	100	100	110	80	76	63	60
CH_4 intensity (g / kWh)	0.01	0.01	0.01	0.01	0.01	0.01	0.004	0.004	0.003	0.003
N_2O intensity (g / kWh)	0.04	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Overall Intensity (g CO_2 eq / kWh)	**270**	**150**	**160**	**110**	**110**	**110**	**80**	**80**	**70**	**60**

Notes:
1. Data presented include emissions, generation and intensity for public utilities.
2. Data for 2008 are preliminary.
3. Data taken from *Report on Energy Supply and Demand in Canada* , Catalogue No. 57-003-XIB, Statistics Canada.
4. Emissions from the flooding of land for hydro dams are not included.
5. Emissions related to the use of biomass for electric power generation are not included.
6. Data taken from *Electric Power Generation, Transmission and Distribution* (EPGTD), Catalogue No. 57-202-XIB, Statistics Canada with the exception of data for 2007 and 2008, which are taken from CANSIM Table 127-0007.
7. Includes electricity generated by combustion of light fuel oil, heavy fuel oil and diesel fuel oil.
8. Other Renewables - includes electricity generation by wind and tidal.
9. Others - includes electricity generation by fuels not easily categorized (i.e. waste).
10. Overall Intensity values are rounded to incorporate uncertainty in the estimates.

N/A - Not Available.

Annex 14 Provincial/Territorial Analysis

The following discussion describes long-term (1990–2008) and short-term (2004–2008) changes in GHG emissions for each of the provinces and territories in Canada. Owing to data limitations there are a number of caveats associated with the data and analysis. While the national inventory of GHG emissions is developed utilizing national, provincial, and territorial information and data, the information used to develop it relies on survey and sampling data[3] that, while statistically valid and nationally representative, may not represent every discrete and small source within a province or territory. Therefore the following provincial analysis may differ slightly from a more bottom-up, precise regional inventory. Note also that the sum of emissions from all provinces do not add up to the national total because the emissions from some sources are estimated at the national level only. Nevertheless, the trends in emissions from each region are considered representative of the actual emission trends in each region.

The discussion for each province and territory includes a general overview of its economy and emission trends, with emphasis on population, GDP, energy supply/demand, and general economic structure, all of which affect the trends in GHG emissions. Categorizations utilized in Annex 14 are not the same as those used in the rest of this document, in that activities are not organized strictly by the standard six UNFCCC Sectors (Energy; Industrial Processes, Solvents and Other Product Use; Agriculture; Land Use, Land Use Change and Forestry; and Waste). Rather, this discussion utilizes different, more economic-oriented sectors for industrial categories. Long-term and recent changes in GHG emissions are identified on the basis of the 12 sectors shown in Table A14-1. Sectors 1 to 6 include only Energy activities (and emissions), sectors 7 to 10 include activities (and emissions) related to both Energy and Industrial Processes and sectors 11 and 12 include Agriculture and Waste activities, respectively. As Land Use, Land Use Change and Forestry emissions and removals are not inventoried at the provincial level (nor, for that matter, are they included in national totals) these activities are not discussed in this Annex. The table also identifies how the more discrete subsectors from the Energy, Industrial Processes, Waste and Agriculture Sectors are combined to arrive at the 12 sectors. Of the 12 sectors, only those that have contributed a significant amount to the overall long- or short-term change within the province or territory are discussed. As such, the figures are not meant to explicitly show the greatest contributors to provincial and territorial GHG emissions, although in some cases the categories with largest absolute changes may also contribute most to the total.

All emission references are from the 1990–2008 national GHG inventory and are given in units of CO_2 equivalent unless otherwise stated. GDP data are provided by Statistics Canada (2010) which also provided all energy quantities (Statistics Canada 2009a). Heating degree-day (HDD) values were compiled by Environment Canada.[4] All values provided within these graphs are presented in kilotonnes CO_2 equivalent.

Figure A14-1 and Figure A14-2 present provincial and territorial contributions to total Canadian GHG emissions in 1990 and 2008, respectively. On a per capita basis, the average GHG emissions for Canada increased by 3.2% from 21.4 t/person in 1990 to 22.0 t/person in 2008.

3. Another potential source of discrepancy is also the application at the provincial level of parameter values, which, while again representative as a whole of national circumstances, do not always accurately reflect regional conditions.

4. The meteorological data required to develop the HDD indicators are provided by the Meteorological Service of Canada, a branch of Environment Canada (EC), to the GHG Division of EC for compilation. Annual HDDs are common indicators used to determine the necessity for space heating in a region. Annual HDDs are the annual sum of the days when the average daily temperature is below 18º C multiplied by the number of degrees that the temperature is below 18º C on each of those days. Refer to Chapter 2 for national trend in HDDs and relation to residential emissions.

Table A14-1: Twelve Sector Groupings for Long-term and Short-term Trends

1. Electricity and Heat Generation
2. Mining and Fossil Fuel Industries
Fossil Fuel Industries
Mining & Oil and Gas Extraction
Fugitive Sources
Coal Mining
Oil and Natural Gas
Other Transportation - Pipelines
3. Residential/Commercial/Institutional
Residential
Commercial & Institutional
4. Other Manufacturing, Construction, Agriculture & Forestry (energy only)
Other Manufacturing
Pulp and Paper
Construction
Agriculture and Forestry
5. Road Transportation
Light-Duty Gasoline Vehicles
Light-Duty Gasoline Trucks
Heavy-Duty Gasoline Vehicles
Motorcycles
Light-Duty Diesel Vehicles
Light-Duty Diesel Trucks
Heavy-Duty Diesel Vehicles
Propane & Natural Gas Vehicles
6. Other Transportation
Civil Aviation (Domestic Aviation)
Railways
Navigation (Domestic Marine)
Other Transportation
Off-Road Gasoline
Off-Road Diesel

7. Mineral Products
IP - Cement Production
IP - Lime Production
ENERGY - Stationary Combustion - Cement
8. Chemical Industry
IP - Nitric Acid Production
IP - Adipic Acid Production
ENERGY - Stationary Combustion - Chemical
9. Metal Production
IP - Iron and Steel Production
IP - Aluminum Production
IP - SF_6 Used in Mg Smelters&Casters
ENERGY - Stationary Combustion - Iron and Steel
ENERGY - Stationary Combustion - Non Ferrous Metals
10. Other & Undifferentiated Production
IP - Consumption of Halocarbons and SF_6
IP - Other & Undifferentiated Production
IP - Solvent & Other Product Use
11. Agriculture (non-energy)
Enteric Fermentation
Manure Management
Agriculture Soils
Direct Sources
Pasture, Range and Paddock Manure
Indirect Sources
12. Waste
Solid Waste Disposal on Land
Wastewater Handling
Waste Incineration

Note: IP = Industrial Processes

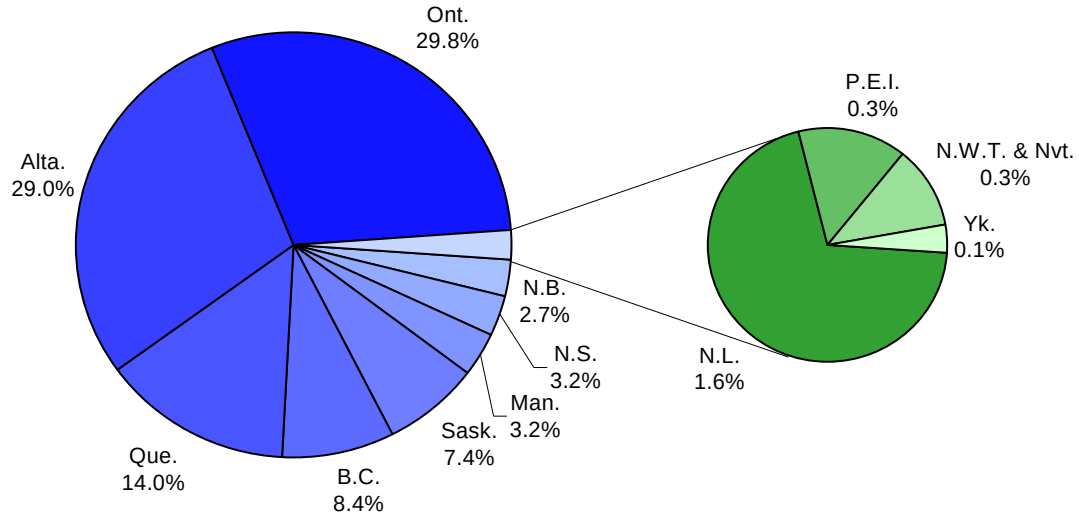

Figure A14-1: Provincial GHG Contributions to Total – 1990 (592 Mt)

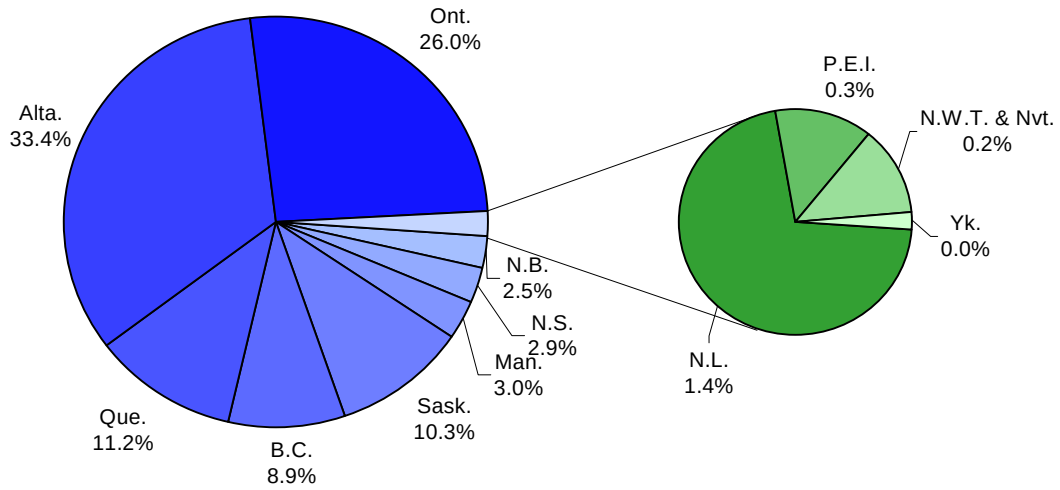

Figure A14-2: Provincial GHG Contributions to Total – 2008 (734 Mt)

A14.1 Newfoundland and Labrador

Table A14-2: Emissions, Economy, Energy, and Climate, Newfoundland and Labrador

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**9.450**	**10.100**	**10.100**	**9.530**	**10.700**	**10.100**
Change Since 1990 (%)	*NA*	*7.4*	*6.8*	*0.8*	*13.1*	*6.9*
Annual Change (%)	*NA*	*NA*	*-0.5%*	*-5.6%*	*12.1%*	*-5.4%*
GDP (millions)	**11 662**	**17 209**	**17 531**	**18 201**	**19 856**	**19 953**
Change Since 1990 (%)	*NA*	*47.6*	*50.3*	*56.1*	*70.3*	*71.1*
GHG Intensity (Mt/$B GDP)	**0.81**	**0.59**	**0.58**	**0.52**	**0.54**	**0.51**
GHG Efficiency ($B GDP/ Mt)	**1.23**	**1.70**	**1.74**	**1.91**	**1.86**	**1.98**
Population (000s)	**577**	**517**	**514**	**510**	**506**	**508**
Change Since 1990 (%)	*NA*	*-10.4*	*-10.9*	*-11.6*	*-12.3*	*-12.0*
GHG Per Capita (tonnes/person)	**16.4**	**19.6**	**19.6**	**18.7**	**21.1**	**19.9**
Energy Production (Primary only) (TJ)	**124 875**	**880 384**	**849 698**	**851 694**	**991 073**	**938 160**
Change Since 1990 (%)	*NA*	*605.0*	*580.4*	*582.0*	*693.7*	*651.3*
Net Supply (Primary & Secondary) (TJ)	**143 873**	**160 787**	**165 852**	**158 373**	**170 754**	**165 878**
Change Since 1990 (%)	*NA*	*11.8*	*15.3*	*10.1*	*18.7*	*15.3*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**123 163**	**122 868**	**124 672**	**113 407**	**125 428**	**126 481**
Change Since 1990 (%)	*NA*	*-0.2*	*1.2*	*-7.9*	*1.8*	*2.7*
Climate						
Heating Degree-Days	**5 058**	**4 826**	**4 698**	**4 419**	**5 017**	**4 819**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

Newfoundland and Labrador is home to 1.5% of the Canadian population and generated approximately 1.5% ($20 billion) of Canada's total GDP. In 2008, provincial GHG emissions were approximately 10.1 Mt CO_2 eq, or 19.9 tonnes per person (Table A14-2). Newfoundland and Labrador was the sixth highest per-capita GHG emitter in Canada, reflecting its resource-based economy.

Mining, oil and gas, forestry, and fisheries are the major resource-based economic activities in the province. Over time, the economy has shifted from a forestry and fisheries basis to an oil and gas basis. The Oil and Gas Sector has been an important part of the provincial economy since 1997, when the Hibernia oil field first became operational. Since that time, additional offshore oil projects have been developed in the White Rose and Terra Nova fields.

Mining has always been an integral part of the economy, with extractions focused on iron ore, and most recently nickel, copper and cobalt from the Voisey's Bay project, which began production in 2005. In the recent past, high raw metal prices have meant a significant increase in mineral exploration in the province. Offshore oil and gas projects and mining operations have also resulted in the growth in manufacturing, construction and labour markets that respond to the demand created by these Sectors. However, the combined forestry and fisheries industries have been negatively affected by higher fuel costs and unfavourable exchange rates. (Newfoundland and Labrador Department of Finance 2009). The province of Newfoundland and Labrador has significant hydroelectric resources. Newfoundland and Labrador Hydro has an installed generating capacity of 7307 MW, which is the fourth largest installed capacity of all utility

companies in Canada (Nalcor Energy 2009a). The majority of the electricity generated (73% in 2008) was exported out of the province (Statistics Canada 2009a).

A14.1.1 Long-Term Trends (1990–2008)

Over the long term (1990–2008), Newfoundland and Labrador's GHG emissions have risen by approximately 6.9% (0.7 Mt), while GHG intensity decreased from 0.81 to 0.51 Mt CO_2 per billion dollars GDP. The growth of emissions largely came from the Mining and Fossil Fuel Industries (1.0 Mt), and was offset by the decrease from the Other Manufacturing, Construction, Agriculture and Forestry Sector (0.3 Mt).

Long-term emission trends in Newfoundland and Labrador are illustrated in Figure A14-3.

A14.1.1.1 Electricity and Heat Generation (36% decrease)

Decreases in long-term emissions in the Electricity and Heat Generation Sector are mainly due to fuel switching, increased hydroelectric capacity and lower industrial demand (Nalcor Energy, 2009b). The long-term population decrease of 12.0% also played a role in reducing demand. In addition, heating degree-days (HDDs) were lower by 4% compared to 1990, leading to a drop in demand for heating in the Residential subsector.

A14.1.1.2 Mining and Fossil Fuel Industries (49% increase)

The 651% increase in primary energy production since 1990 is the major driver behind the emissions increase in the Mining and Fossil Fuel Industries Sector. Until 1997, all emissions in this Sector were from petroleum refining and conventional mining, with 1997 marking the start of offshore petroleum operations in Newfoundland and Labrador. Light/medium crude oil production rose from 202×10^3 m^3 in 1997 to 3784×10^3 m^3 in 1998 (Statistics Canada 2009b). Production spiked again from 2001–2002 with a 92% increase following the ramping up of production from the Hibernia oil field. As of 2008, 39% of Canada's light/medium crude oil and 12.5% of Canada's total crude oil was produced in Newfoundland and Labrador (Statistics Canada, 2009b). The offshore boom has also been an important contributor to provincial GDP.

A14.1.1.3 Other Manufacturing, Construction, Agriculture and Forestry (67% decrease)

The main factor causing the decrease in GHG emissions from the Other Manufacturing, Construction, Agriculture and Forestry Sector is the economic difficulties being felt by the Pulp and Paper subsector. With United States newsprint consumption declining by 43% since 2000, producers have responded with mill closures and idled paper machines. Export-dependent industries have also been challenged by a number of factors including the Canadian dollar maintaining parity with the U.S. dollar for the first half of 2008 as well as increased competition from low-cost producers in other countries (Newfoundland and Labrador Department of Finance 2009).

A14.1.1.4 Road Transportation (28% increase)

The long-term emission growth observed in the Road Transportation Sector can be attributed to the 28% overall increase in the provincial vehicle fleet. Moreover, the general shift from gasoline automobiles (light duty gasoline vehicles, or LDGVs) to sports utility vehicles, vans and pickups (light-duty gasoline trucks, or LDGTs) has also contributed to this long-term trend.

In 1990, LDGVs accounted for 66% of the provincial on-road vehicle population, decreasing to 52% in 2008. In comparison, the provincial share of LDGTs experienced significant growth, increasing from 25% in 1990 to 41% in 2008. Since, on average, LDGTs emit approximately 40% more GHGs per kilometre than LDGVs, the increase in road transportation emissions reflects the increasing preference towards LDGTs for passenger transportation. For more details on this nationally occurring trend, please refer to Chapter 2, Section 2.3.1.1 or to the Executive Summary.

A14.1.1.5 Agriculture (41% increase)

The increase in the long-term trend in emissions from the Agriculture Sector is due mainly to an expansion of the dairy (45%) and beef (57%) cattle industry. The Dairy Farmers of Newfoundland and Labrador group was only established in 1983, and is still growing. The swine population has decreased by 91% since 1990 because feed prices have increased significantly, due partly to the elimination of the Feed Freight Assistance subsidy.

A14.1.2 Short-Term Changes (2004–2008)

Over the short term, provincial GHG emissions have remained relatively stable (decreased by 0.4%). Increases in emissions from the Mining and Fossil Fuel Industries and Road Transportation sectors were offset by decreases in the Electricity and Heat Generation Sector and the Other Manufacturing, Construction, Agriculture and Forestry Sector.

Short-term emission changes in Newfoundland and Labrador are illustrated in Figure A14-4.

A14.1.2.1 Electricity and Heat Generation (28% decrease)

Decreases in GHG emissions from the Electricity and Heat Generation Sector are mainly due to lower industrial demand that is typically met by thermal generation and increased hydro production. Thermal generation decreased by 34% (580 GWh) between 2004 and 2008 while hydro production increased by 6% (2 200 GWh) over the same period.

A14.1.2.2 Mining and Fossil Fuel Industries (4.3% increase)

From 2004 to 2008, emissions from the Mining and Fossil Fuel Industries Sector increased by 4.3% due to increased activity in the offshore petroleum industry, as evidenced by a 7.9% growth in light and medium crude oil production in Newfoundland and Labrador (Statistics Canada, 2009b). There was an 11.3% decrease in fugitive emissions attributable to decreases in the amount of solution gas flared.

A14.1.2.3 Other Manufacturing, Construction, Agriculture and Forestry (49% decrease)

Economic conditions in the Pulp and Paper subsector were the main driver behind the short-term decrease in GHG emissions, much the same as with the long-term trends. Emissions from this Manufacturing Sector decreased by 175 kt, offsetting a small increase in emissions in the Other Manufacturing subsector.

A14.1.2.4 Road Transportation (20% increase)

The short-term emission growth observed in the Road Transportation Sector can be attributed to the 7% increase in the provincial vehicle fleet from 2004 to 2008. On a lesser scale, the general

shift from LDGVs to LDGTs also contributed to the growth in emissions. For more details on this nationally occurring trend, please refer to the Chapter 2, Section 2.3.1.1 or to the Executive Summary.

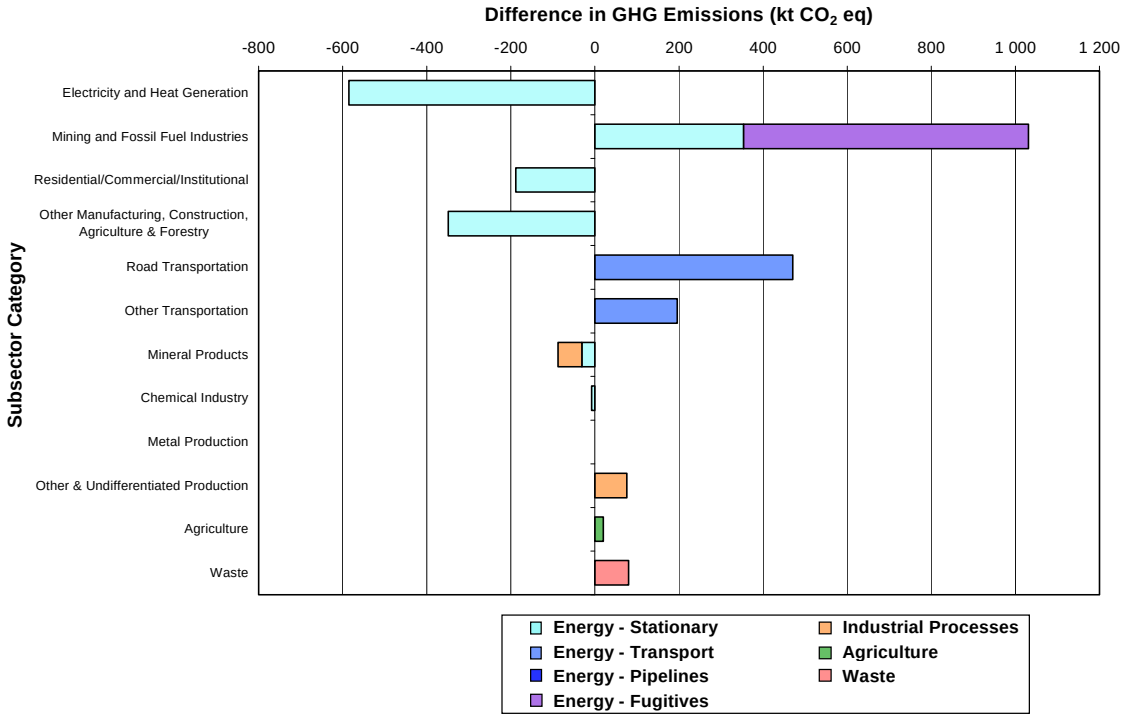

Figure A14-3: Newfoundland and Labrador Long-Term Emission Changes, 1990–2008

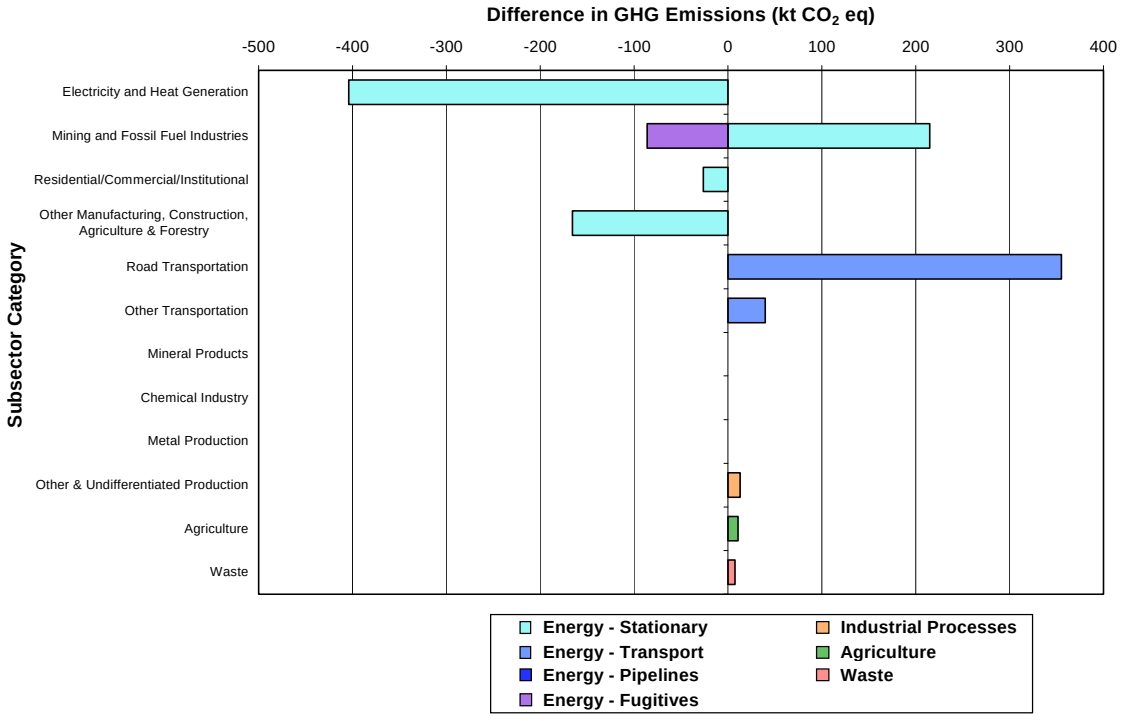

Figure A14-4: Newfoundland and Labrador Short-Term Emission Changes, 2004–2008

A14.2 Prince Edward Island

Table A14-3: Emissions, Economy, Energy, and Climate, Prince Edward Island

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**1.980**	**2.290**	**2.230**	**2.110**	**2.070**	**1.970**
Change Since 1990 (%)	*NA*	*15.9*	*12.5*	*6.6*	*4.5*	*-0.7*
Annual Change (%)	*NA*	*NA*	*-2.9*	*-5.3*	*-1.9*	*-5.0*
GDP (millions)	**2 687**	**3 877**	**3 955**	**4 026**	**4 126**	**4 148**
Change Since 1990 (%)	*NA*	*44.3*	*47.2*	*49.8*	*53.6*	*54.4*
GHG Intensity (Mt/$B GDP)	**0.74**	**0.59**	**0.56**	**0.52**	**0.50**	**0.47**
GHG Efficiency ($B GDP/ Mt)	**1.36**	**1.69**	**1.77**	**1.91**	**1.99**	**2.11**
Population (000s)	**130**	**138**	**138**	**138**	**138**	**140**
Change Since 1990 (%)	*NA*	*5.6*	*5.9*	*5.8*	*5.9*	*7.2*
GHG Per Capita (tonnes/person)	**15.2**	**16.7**	**16.1**	**15.3**	**15.0**	**14.1**
Energy Production (Primary only) (TJ)	**0**	**125**	**144**	**130**	**143**	**510**
Change Since 1990 (%)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Net Supply (Primary & Secondary) (TJ)	**21 541**	**26 066**	**26 137**	**25 342**	**25 278**	**23 796**
Change Since 1990 (%)	*NA*	*21.0*	*21.3*	*17.6*	*17.3*	*10.5*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**20 598**	**25 526**	**25 060**	**24 492**	**24 652**	**23 283**
Change Since 1990 (%)	*NA*	*23.9*	*21.7*	*18.9*	*19.7*	*13.0*
Climate						
Heating Degree-Days	**4 583**	**4 650**	**4 407**	**3 949**	**4 647**	**4 427**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

Geographically, Prince Edward Island (P.E.I.) is Canada's smallest province. In 2008, P.E.I. was home to 0.4% of the population while contributing 0.3% to Canada's total GDP. The provincial GHG emissions were estimated at 2.0 Mt CO_2 eq, or 14.1 tonnes per person (Table A14-3). P.E.I. ranked the second lowest in terms of per capita emissions for 2008, reflecting its service-based economy and external electricity sources. The key contributors in 2008 to the provincial emissions were the Road Transportation (0.6 Mt) Sector, Commercial/Institutional/Residential (0.4 Mt) Sector, and Agriculture (0.5 Mt) Sector.

The provincial economy has important service and manufacturing activities with the highest job count appearing under Sales and Service with 17 000 jobs in 2008, down slightly from 17 500 jobs reported in 2007. The service providing industries contribute nearly 74% of the provinces GDP with good producing industries making up the final 26% (Prince Edward Island Department of the Provincial Treasury 2009).

The majority of the electricity consumed in P.E.I. is provided by New Brunswick via underwater transmission cables. There are two thermal generating stations on the island; however, these are kept in standby mode in case of transmission problems from the mainland and to supply electricity during peak times. The Atlantic Wind Test Site was established on the island in the 1980s, and a 13.56-MW wind farm was established by the P.E.I. Energy Corporation (PEIEC) between 2001 and 2004.

In 2008, the province increased its proportion of wind energy use to 15%, up from 3% in 2006 (Maritime Electric 2010). This is echoed in the Residential subsector as heating degree days

(HDD) were up 12% over 2006 levels; however, emissions increased by only 7%, reflecting the shift in clean energy consumption. Since there were no new wind farms installed in 2008, the province's wind capacity remains at 72 MW (CanWEA 2010).

A14.1.1 Long-Term Trends (1990–2008)

Provincial emissions decreased by 14 kt (0.7%) between 1990 and 2008. The increase was due to an overall increase in transport-related emissions, specifically a 106 kt (20%) increase in the Road Transportation Sector and a 46 kt (29%) increase from the Other Transportation Sector (civil aviation, railways, etc). Most of these increases were offset by decreases in the Residential/Commercial/Institutional (124 kt or 23%) and the Electricity and Heat Generation sectors (103 kt or 100%).

Long-term emission trends in Prince Edward Island are illustrated in Figure A14-5

A14.1.1.1 Electricity and Heat Generation (100% decrease)

The installation and operation of wind farms on the island, combined with enhanced interconnections with the New Brunswick power grid, have helped to reduce GHGs from the province's Electricity and Heat Generation Sector. Lower usage of the generating stations on the island has been the main reason for lower GHG emissions over the long term. The impact of new wind farm installations has made a noticeable impact on generation statistics.

A14.1.1.2 Residential/Commercial/Institutional (23% decrease)

The long-term decrease in GHG emissions was mainly reflected in residential emissions. Between 1990 and 2008, residential emissions decreased by 34%, while HDDs only decreased by 3.4%. This may be a result of increased efficiency and a change in consumer behaviour as heating oil is the dominant fuel source in the province and average home heating oil prices increased by 29% from 2007 to 2008 (Prince Edward Island Department of Provincial Treasury 2009).

A14.1.1.3 Road Transportation (20% increase)

The long-term emission growth observed in the Road Transportation Sector can be attributed to the 32% overall increase in the provincial vehicle fleet. Moreover, the general shift from LDGVs to LDGTs has also contributed to this long-term trend.

In 1990, LDGVs accounted for 67% of the provincial on-road vehicle population, decreasing to 52% in 2008. In comparison, LDGTs experienced significant growth, increasing from 22% of the total provincial population in 1990 to 36% in 2008. Since, on average, LDGTs emit approximately 40% more GHGs per kilometre than LDGVs, the increase in road transportation emissions reflects the increasing preference towards LDGTs for passenger transportation. For more details on this nationally occurring trend, please refer to Chapter 2, Section 2.3.1.1 or to the Executive Summary.

A14.1.1.4 Other Transportation (29% increase)

The long-term increase is attributable to the rise in off-road gasoline and diesel consumption, which is most likely related to heightened use of recreational vehicles and equipment in construction/manufacturing.

A14.1.2 Short-Term Changes (2004–2008)

Overall, GHG emissions in P.E.I. decreased by 14% between 2004 and 2008. This decrease was primarily due to the decreases in the Agriculture (124 kt), and Residential/Commerical/Institutional (99 kt) and Other Manufacturing Construction, Agriculture and Forestry (63 kt) Sectors.

Short-term emission changes in Prince Edward Island are illustrated in Figure A14-6.

A14.1.2.1 Residential/Commercial/Institutional (19% decrease)

The overall 19% (99 kt) short-term decrease is due to a significant 69 kt decrease (29%) in emissions from the Commercial and Institutional subsector, and a 30 kt decrease (10%) in emissions from the Residential subsector.

A14.1.2.2 Other Manufacturing, Construction, Agriculture and Forestry (38% decrease)

Between 2004 and 2008, emissions from the Other Manufacturing subsector decreased by 55 kt, making up the majority of the decrease from this Sector.

A14.1.2.3 Other Transportation (15% decrease)

The short-term decrease in GHG emissions results from a fall in agricultural activity due to reduced crop acreage and poor harvesting conditions, particularly in 2007 and 2008 (Statistics Canada 2009c). Consequently, off-road gasoline and diesel consumption also declined.

A14.1.2.4 Agriculture (21% decrease)

Lower emissions from agricultural soils are attributed to a lower consumption of synthetic N fertilizers (36%), which was due to a lower seeded area of potatoes as a result of low market prices. Furthermore, virtually all categories of livestock populations have decreased, the largest of which being a 52% decrease in swine populations, and this has also contributed to the decrease in GHG emissions.

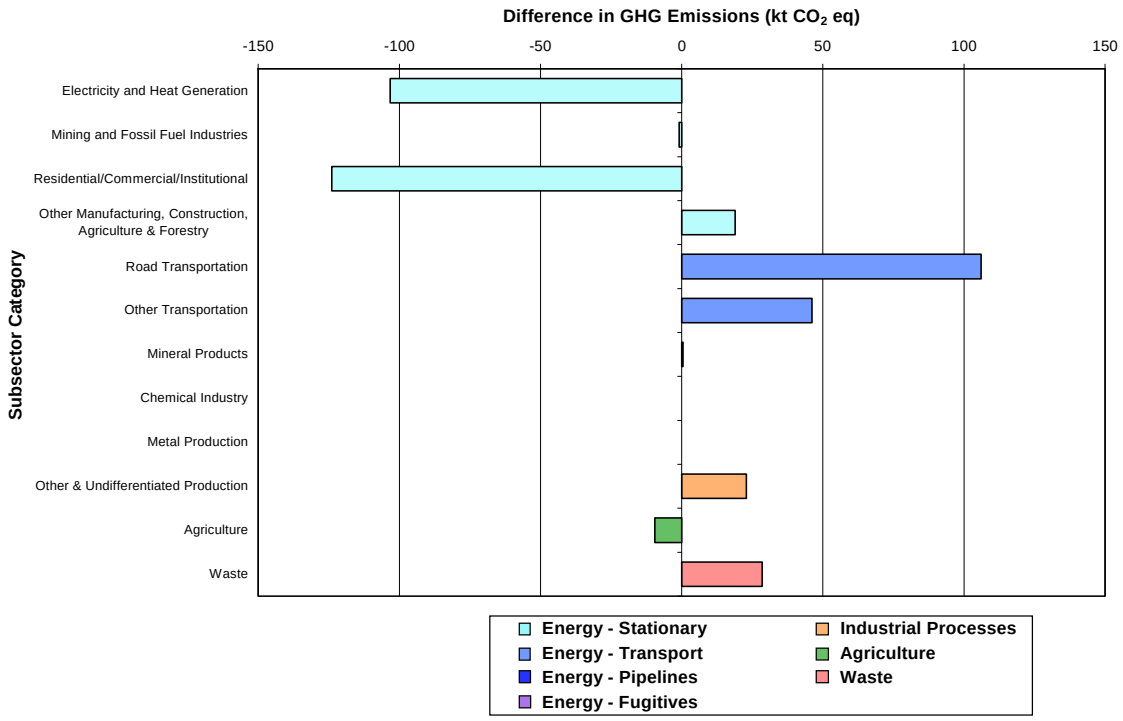

Figure A14-5: Prince Edward Island Long-Term Emission Changes, 1990–2008

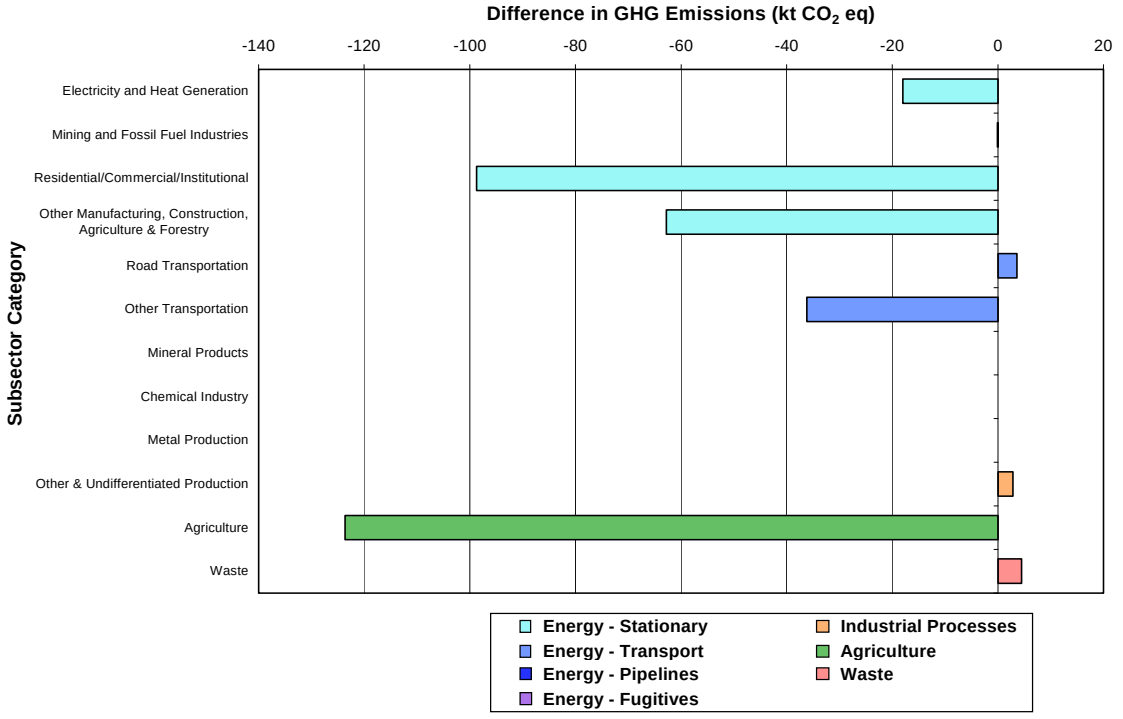

Figure A14-6: Prince Edward Island Short-Term Emission Changes, 2004–2008

A14.3 Nova Scotia

Table A14-4: Emissions, Economy, Energy, and Climate, Nova Scotia

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**19.000**	**22.800**	**21.800**	**20.100**	**20.700**	**20.900**
Change Since 1990 (%)	*NA*	*20.1*	*14.8*	*5.8*	*9.1*	*9.9*
Annual Change (%)	*NA*	*NA*	*-4.5*	*-7.8*	*3.1*	*0.8*
GDP (millions)	**20 576**	**27 710**	**28 069**	**28 254**	**28 598**	**29 215**
Change Since 1990 (%)	*NA*	*34.7*	*36.4*	*37.3*	*39.0*	*42.0*
GHG Intensity (Mt/$B GDP)	**0.92**	**0.82**	**0.78**	**0.71**	**0.72**	**0.72**
GHG Efficiency ($B GDP/ Mt)	**1.08**	**1.21**	**1.29**	**1.40**	**1.38**	**1.40**
Population (000s)	**910**	**939**	**938**	**938**	**936**	**938**
Change Since 1990 (%)	*NA*	*3.2*	*3.0*	*3.0*	*2.8*	*3.1*
GHG Per Capita (tonnes/person)	**20.9**	**24.3**	**23.3**	**21.4**	**22.1**	**22.3**
Energy Production (Primary only) (TJ)	**124 032**	**198 006**	**200 962**	**180 378**	**200 603**	**213 475**
Change Since 1990 (%)	*NA*	*59.6*	*62.0*	*45.4*	*61.7*	*72.1*
Net Supply (Primary & Secondary) (TJ)	**189 393**	**214 613**	**212 898**	**196 696**	**201 723**	**201 253**
Change Since 1990 (%)	*NA*	*13.3*	*12.4*	*3.9*	*6.5*	*6.3*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**161 655**	**187 761**	**186 303**	**169 456**	**176 280**	**171 403**
Change Since 1990 (%)	*NA*	*16.1*	*15.2*	*4.8*	*9.0*	*6.0*
Climate						
Heating Degree-Days	**4 136**	**4 455**	**4 148**	**3 774**	**4 389**	**4 108**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

Nova Scotians represent 2.8% of the population and contributed 2.2% to the national GDP. In 2008, Nova Scotia generated 20.9 Mt (2.8 %) of Canada's total GHG emissions (Table A14-4). Provincial GHG emissions were estimated at 0.72 Mt CO_2 eq per billion dollar GDP, or 22.3 tonnes per person, ranking fourth highest in terms of per capita emissions. The Electricity and Heat Generation Sector is the largest contributor to the provincial emissions, with the Road Transportation, Residential/Commercial/Institutional, and Mining and Fossil Fuel Industries Sectors also contributing significantly to the total. These Sectors together accounted for 84% of provincial emissions.

The provincial economy has slowly been moving away from resource-based industries such as fishing, mining and industry to the service sectors. Now the Other Manufacturing and Construction subsectors have been the main contributors to goods-producing industries, while the Mining and Oil and Gas Extraction subsector is also growing in importance. Coal mining has a long history in Nova Scotia, although the majority of the province's coal mines were shut down by 2001 (Nova Scotia Department of Finance 2006, 2007). Offshore oil and gas extraction has been a part of the provincial economy since the early 1990s with the Cohasset-Panuke Project, Canada's first offshore production project in 1992. Production from this project ceased in 1999 but was followed by the Sable Offshore Energy Project (SOEP), which first began producing gas in 1999. The scope and scale of the SOEP had a significant impact on the province's economy as complementary industries supported the project through goods and services. Production from the SOEP continues while development of the Deep Panuke project is also underway (CNSOPB 2008).

Electricity for the province is supplied by wind, hydroelectricity, coal, natural gas, oil and tidal power. In fact, Nova Scotia is the site of the Western Hemisphere's only tidal power plant. The Annapolis power plant has been operational since 1984 and continues to provide power due to the tidal action of the Bay of Fundy (Nova Scotia Power undated).

A14.1.3 Long-Term Trends (1990–2008)

Overall, GHG emissions increased by 1.9 Mt (10%) between 1990 and 2008. The greatest contributors to this increase were the Electricity and Heat Generation (2.6 Mt) and Road Transportation (0.6 Mt) Sectors. The increase was offset by decreases in the Mining and Fossil Fuel Industries (0.5 Mt) and Waste sectors (0.3 Mt).

Long-term emission trends in Nova Scotia are illustrated in Figure A14-7.

A14.1.3.1 Electricity and Heat Generation (38% increase)

Electricity consumption is affected by general economic conditions, population and weather. Solid fuels (like coal and petroleum coke) are the dominant fuel source of provincial utilities. In 1990, thermal generation (mostly coal-fired) made up 87% while hydroelectricity generated 12% of provincial electricity (Statistics Canada 2009d). In 2008, hydroelectric sources contributed about 6% less than in 1990 while thermal sources (coal, petroleum coke, oil and natural gas) increased by more than 35%. Overall provincial generation increased by over 31% from 1990, leading to higher GHG emissions over the long term (Statistics Canada 2009d).

A14.1.3.2 Mining and Fossil Fuel Industries (25% decrease)

The declines in emissions from the Mining and Fossil Fuel Industries Sector have been driven by reductions in coal production and coal mine closures. The closure of the Prince mine in 2001 marked the end of large-scale underground coal mining in Nova Scotia and, since 2003 the last six productive surface coal mines have also closed.

A14.1.3.3 Road Transportation (20% increase)

The long-term emission growth observed in the Road Transportation Sector can be attributed in part to the 29% overall increase in the provincial vehicle fleet. Of particular importance is the 46% increase in the heavy duty diesel vehicle (HDDV) population. Growth in HDDV emissions can be linked to the expansion of the fossil fuel and manufacturing industries, as these vehicles are generally used in operations, as well as in the movement of both finished goods and raw materials.

The general shift from LDGVs to LDGTs has also contributed to this long-term trend. In 1990, LDGVs accounted for 69% of the provincial on-road vehicle population, decreasing to 55% in 2008. In contrast with the decline in LDGVs, LDGTs grew from 21% of the total provincial population in 1990 to 36% in 2008. Since, on average, LDGTs emit approximately 40% more GHGs per kilometre than LDGVs, the increase in road transportation emissions reflects the increasing preference for LDGTs for passenger transportation. For more details on this nationally occurring trend, please refer to Chapter 2, Section 2.3.1.1 or to the Executive Summary.

A14.1.3.4 Waste (40% decrease)

The significant decrease in emissions from this Sector results from a 47% reduction in the solid waste disposed of in landfills due to waste diversion initiatives by the province. This was

reflected in a 41% reduction in emissions from the Solid Waste Disposal on Land subsector. A significant driver for this trend was initiated when Nova Scotia released a Solid Waste-Resource Management Strategy in 1995, which included a November 1998 ban on landfilling and incineration of organic waste types. An additional factor was a lower population growth rate (3%), as compared with the national rate of 20%.

A14.1.4 Short-Term Changes (2004–2008)

Between 2004 and 2008, total GHG emissions in Nova Scotia decreased by 1.9 Mt (or 8.5%), primarily as a result of decreased emissions from the Other Transportation (0.9 Mt), Electricity and Heat Generation (0.6 Mt) and Commercial/Institutional/Residential (0.3 Mt) Sectors.

Short-term emission changes in Nova Scotia are illustrated in Figure A14-8.

A14.1.4.1 Electricity and Heat Generation (5.6% decrease)

Electricity generation over the short term has decreased slightly, from 12.6 TWh in 2004 to 12.2 TWh in 2008 (Statistics Canada 2009b). The short-term decrease in emissions from the Electricity and Heat Generation Sector are the result of a combination of factors, the most notable being a shift from high GHG-intense fuels. In 2004, utility coal sources generated 6.3 TWh, while natural gas sources generated 0.2 TWh and oil generated 1.9 TWh. In 2008, however, coal-fired generation increased slightly to 7.7 TWh while oil decreased to 0.3 TWh and natural gas increased to 1.0 TWh (Statistics Canada, 2009d). Since electricity generated from natural gas is lower in GHG emissions as compared to oil or coal, this was the key factor in the short-term decrease in emissions.

A14.1.4.2 Residential/Commercial/Institutional (8.0% decrease)

The overall 8.0% (0.3 Mt) short-term decrease is due to a decrease of 0.12 Mt (6.2%) in emissions from the Commercial and Institutional subsector, and a 0.13 kt decrease (11%) in emissions from the Residential subsector. Since both subsectors generally track HDDs, this decrease can likely be attributed to a 7.8% decrease in the HDDs.

A14.1.4.3 Other Transportation (38% decrease)

Decreased domestic marine, domestic aviation and off-road transportation may be the result of a decrease in activity. In particular, a decline in forestry product demand triggered a fall in production rates, which could help explain the observed decrease in off-road emissions (Statistics Canada 2008a). The final decommissioning of the Cohasset Offshore Oil Project was completed in 2005, which may have further contributed to a decline in off-road activity in 2006, as compared with 2005.

A14.1.4.4 Waste (25% decrease)

Waste emissions decreased significantly. A 26.6% reduction in emissions from the Solid Waste Disposal on Land subsector was chiefly responsible for this trend. The waste diversion rate was the highest in Canada: 37.5% and 40.7% in 2004 and 2006, respectively (Statistics Canada 2008b). In 2006, Nova Scotia was the province with the lowest per capita disposal at 430 kilograms. In contrast, the Canadian average for the same year was 835 kilograms per capita of waste disposed (Statistics Canada 2008b). In addition, the CH_4 capture increased by 171% from 2004 to 2007.

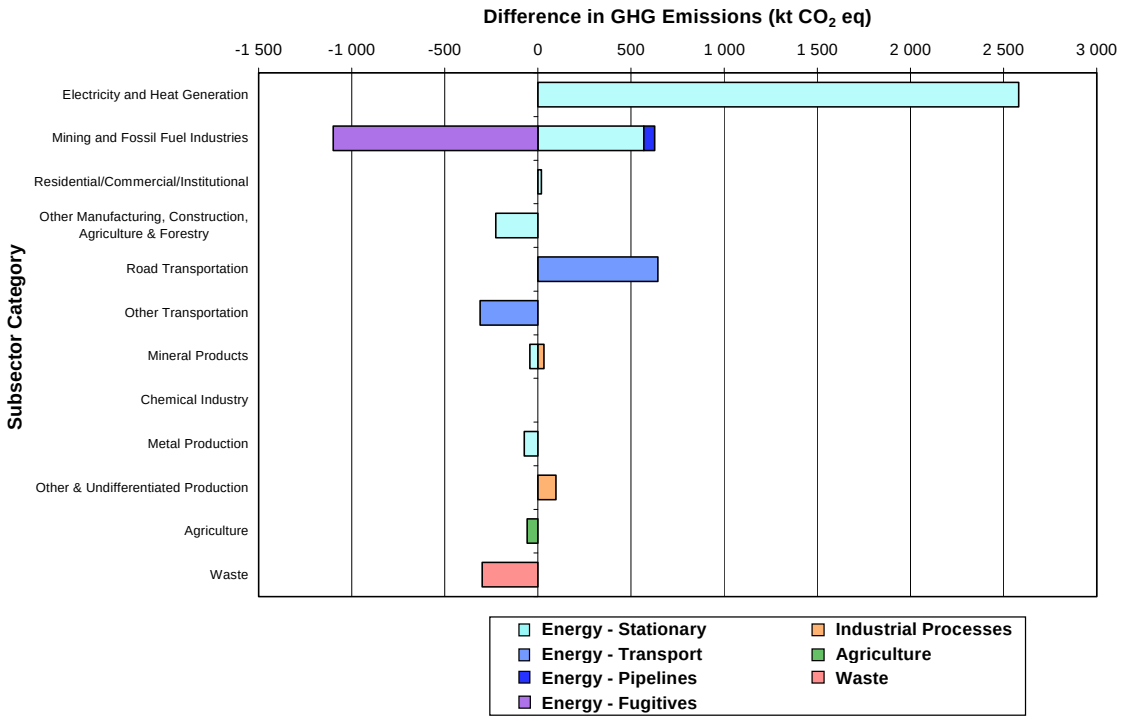

Figure A14-7: Nova Scotia Long-Term Emission Changes, 1990–2008

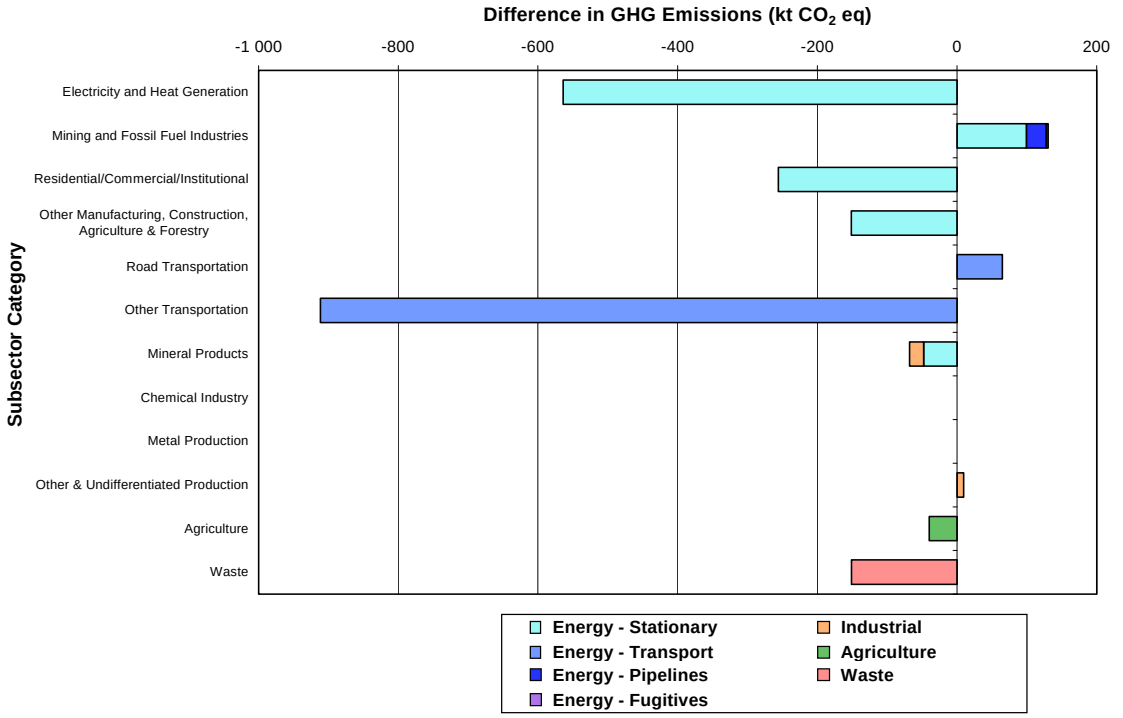

Figure A14-8: Nova Scotia Short-Term Emission Changes, 2004–2008

A14.4 New Brunswick

Table A14-5: Emissions, Economy, Energy, and Climate, New Brunswick

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**15.900**	**21.300**	**21.000**	**18.700**	**19.100**	**18.000**
Change Since 1990 (%)	*NA*	*33.6*	*31.9*	*17.6*	*19.8*	*12.8*
Annual Change (%)	*NA*	*NA*	*-1.3*	*-10.8*	*1.9*	*-5.8*
GDP (millions)	**15 772**	**22 366**	**22 727**	**23 254**	**23 356**	**23 351**
Change Since 1990 (%)	*NA*	*41.8*	*44.1*	*47.4*	*48.1*	*48.1*
GHG Intensity (Mt/$B GDP)	**1.01**	**0.95**	**0.92**	**0.81**	**0.82**	**0.77**
GHG Efficiency ($B GDP/ Mt)	**0.99**	**1.05**	**1.08**	**1.24**	**1.22**	**1.30**
Population (000s)	**740**	**749**	**748**	**746**	**745**	**747**
Change Since 1990 (%)	*NA*	*1.2*	*1.1*	*0.7*	*0.7*	*1.0*
GHG Per Capita (tonnes/person)	**21.5**	**28.4**	**28.1**	**25.1**	**25.6**	**24.0**
Energy Production (Primary only) (TJ)	**46 720**	**28 737**	**34 573**	**32 031**	**34 240**	**28 347**
Change Since 1990 (%)	*NA*	*-38.5*	*-26.0*	*-31.4*	*-26.7*	*-39.3*
Net Supply (Primary & Secondary) (TJ)	**183 713**	**225 436**	**235 581**	**222 289**	**229 283**	**219 215**
Change Since 1990 (%)	*NA*	*22.7*	*28.2*	*21.0*	*24.8*	*19.3*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**149 043**	**183 234**	**177 118**	**166 197**	**174 719**	**163 580**
Change Since 1990 (%)	*NA*	*22.9*	*18.8*	*11.5*	*17.2*	*9.8*
Climate						
Heating Degree-Days	**4 673**	**4 908**	**4 609**	**4 219**	**4 860**	**4 722**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 2008, New Brunswick contributed 18 Mt (2.4%) to Canada's total GHG emissions (Table A14-5), which represented an increase of 12.8 % since 1990. New Brunswick's GDP has increased 48.1% between 1990 and 2008, representing 1.8% of the national total in 2008. In 2008, the provincial emissions were estimated at 0.7 Mt per billion dollar GDP or 24.0 t per person. New Brunswick ranked third highest in terms of per capita emissions for 2008, with combined emissions from the Electricity and Heat Generation subsector, the Road Transportation subsector and the Fossil Fuel Industries sub-sector accounting for more than 70% of total provincial GHG emissions.

New Brunswick is the second largest of Canada's four maritime provinces with about 85% of the land categorized as productive forest (Government of New Brunswich, 2010.). As such, the forestry industry is a major part of the provincial economy and is one of the key components of the province's resource-based industries. In 2008, wood product manufacturers experienced a sales decline of 14.1%, which is apparent in the Manufacturing Industries subsector as GHG emissions declined by 16% from 2007 to 2008 (New Brunswick Department of Finance 2009). Additionally, 2008 brought about the lowest zinc prices since 2004, forcing Blue Note Mining to stop production at its Caribou and Restigouche mines and thus contributing to the 9% decrease in GHG emissions in the Mining and Oil and Gas Extraction subsector (New Brunswick Department of Finance 2009).

Due to limited natural hydroelectric resources, New Brunswick has developed one of the most diverse electricity generation systems in North America, with hydro, coal, and oil combustion turbines, and is the site of the only nuclear power plant in Atlantic Canada. The nuclear reactor at

Point Lepreau Generating Station, which provides approximately 25% of the province's power needs, will undergo refurbishment in 2008–2009 and this will likely have an impact on GHG emissions (New Brunswick Power Group 2008). In 2008, New Brunswick became a producer of wind energy when the Kent Hills Wind Farm came online and there are plans for three other wind projects in Aulac, Lamèque and Caribou Mountain. These are also likely to affect future GHG emissions (New Brunswick Department of Finance 2009).

A14.1.5 Long-Term Trends (1990–2008)

Emissions in New Brunswick grew by 2.0 Mt (13%) between 1990 and 2008, with the Mining and Fossil Fuel Industries Sector contributing 1.3 Mt to the increase. The Road Transportation Sector was also responsible for 0.9 Mt growth while emissions from the Other Manufacturing, Construction, Agriculture and Forestry Sector decreased by 0.9 Mt.

Long-term emission trends in New Brunswick are illustrated in Figure A14-9.

A14.1.5.1 Electricity and Heat Generation (11% increase)

Emissions from the Electricity and Heat Generation Sector have increased by 11% over the long term while electricity generation decreased from 16.7 TWh in 1990 to 14.2 TWh in 2008. In 1990, with no natural gas sources, the province relied on relatively GHG-intense refined petroleum products (RPPs) to meet about one third of their electricity needs while hydroelectric and nuclear generation supplied 55% of the province's needs (Statistics Canada 2009d). In 2008, however, natural gas and higher coal-fired generation sources replaced RPP-fired generation while overall nuclear and hydroelectric generation decreased. In 2008, nuclear generation took place for only a part of the year before being shut down due to planned refurbishment. This resulted in nuclear and hydroelectric generation contributing only about 34% to provincial supply in 2008 (Statistics Canada 2009d). The increase in electricity generation from higher GHG intensity fuels (mainly coal) and the lower output from non-GHG emitting sources were the key factors behind the long-term increase in GHGs from this subsector.

A14.1.5.2 Mining and Fossil Fuel Industries (104% increase)

Saint John is home to Canada's largest oil refinery. Long-term growth in demand for refined petroleum products is one of the major drivers in emissions growth in the mining and fossil fuel industries subsector. A significant amount of refined fuels are exported from the region, with New Brunswick accounting for over 46% of Canada's total petroleum refinery exports in 2008 (Statistics Canada, 2009a). Increased interest in natural gas exploration, with the development of the McCully field, also play a role in long-term emissions growth.

A14.1.5.3 Other Manufacturing, Construction, Agriculture and Forestry (59% decrease)

The long-term decrease in emissions in manufacturing industries is mostly due to difficulties encountered by the Pulp and Paper subsector. Significantly decreased emissions from the Pulp and Paper subsector offset increases in emissions from the Other Manufacturing subsector. Reduced demand and low prices for wood and paper products resulted in mill closures, decreasing fuel consumption and GHG emissions (New Brunswick Department of Finance 2009).

A14.1.5.4 Road Transportation (29% increase)

The long-term emission growth observed in the Road Transportation Sector can be attributed to the 38% overall increase in the provincial vehicle fleet. Notably, the heavy duty diesel vehicle (HDDV) population increased 71% over 1990 levels, potentially caused by increased demand for delivery of manufactured goods and primary metal products (Statistics Canada 2008a).

In addition, the nationally observed trend of increasing preference for light trucks, SUVs and vans (LDGTs) over gasoline cars (LDGVs) for passenger transportation is also prevalent in New Brunswick. In 1990, LDGVs accounted for 67% of the provincial on-road vehicle population, decreasing to 51% in 2008. In comparison, LDGTs experienced significant growth, increasing from 23% of the on-road provincial population in 1990 to 38% in 2008. The growing number of LDGTs in the provincial fleet and their comparatively higher emissions over LDGVs help explain the increase in road transportation emissions.

A14.1.6 Short-Term Changes (2004–2008)

Over the short term, provincial emissions decreased by 3.3 Mt (16 %). The biggest contributor to the decrease was the Electricity and Heat Generation Sector (1.9 Mt), followed by the Other Transportation (0.6 Mt) and Other Manufacturing, Construction, Agriculture and Forestry (0.6 Mt) Sectors.

Short-term emission trends in New Brunswick are illustrated in Figure A14-10.

A14.1.6.1 Electricity and Heat Generation (21% decrease)

Electricity and heat generation emissions decreased significantly between 2004 and 2008, mainly due to lower generation. Provincial generation in 2004 (20.8 TWh) was slightly lower than the peak set in 2003 (20.9 TWh). Conversely, in 2008, generation (14.2 TWh) decreased to the lowest level since 1995 (12.7 TWh) (Statistics Canada 2009b). RPP-fired generation was down significantly due to the high cost of heavy fuel oil (HFO) for the utility. Exports of electricity to the United States were also down by 40%, reflecting the high costs of generation (Statistics Canada 2009b).

A14.1.6.2 Other Manufacturing, Construction, Agriculture and Forestry (50% decrease)

As in the case of the long term trends, the short-term decrease in GHG emissions from the Other Manufacturing, Construction, Agriculture and Forestry Sector is primarily due to economic difficulties experienced by the Pulp and Paper subsector. Emissions from this subsector alone decreased by 0.6 Mt, offsetting a small increase in the Construction subsector.

A14.1.6.3 Other Transportation (40% decrease)

The short-term decline in emissions may be attributable to decreased demand for wood and paper products from 2005 to 2008, reflecting the slump in the U.S. housing market (Statistics Canada 2008a). In turn, the forestry industry, which is dependent on off-road equipment, experienced a significant downturn in economic activity, explaining the decline in emissions in this Sector.

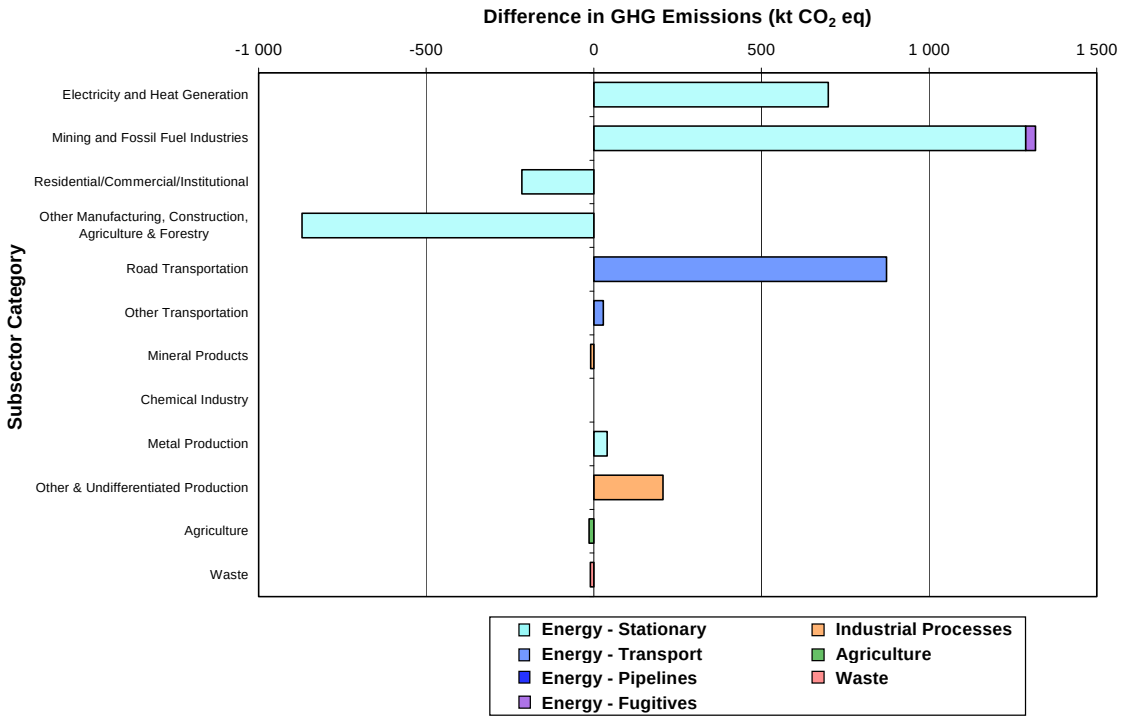

Figure A14-9: New Brunswick Long-Term Emission Changes, 1990–2008

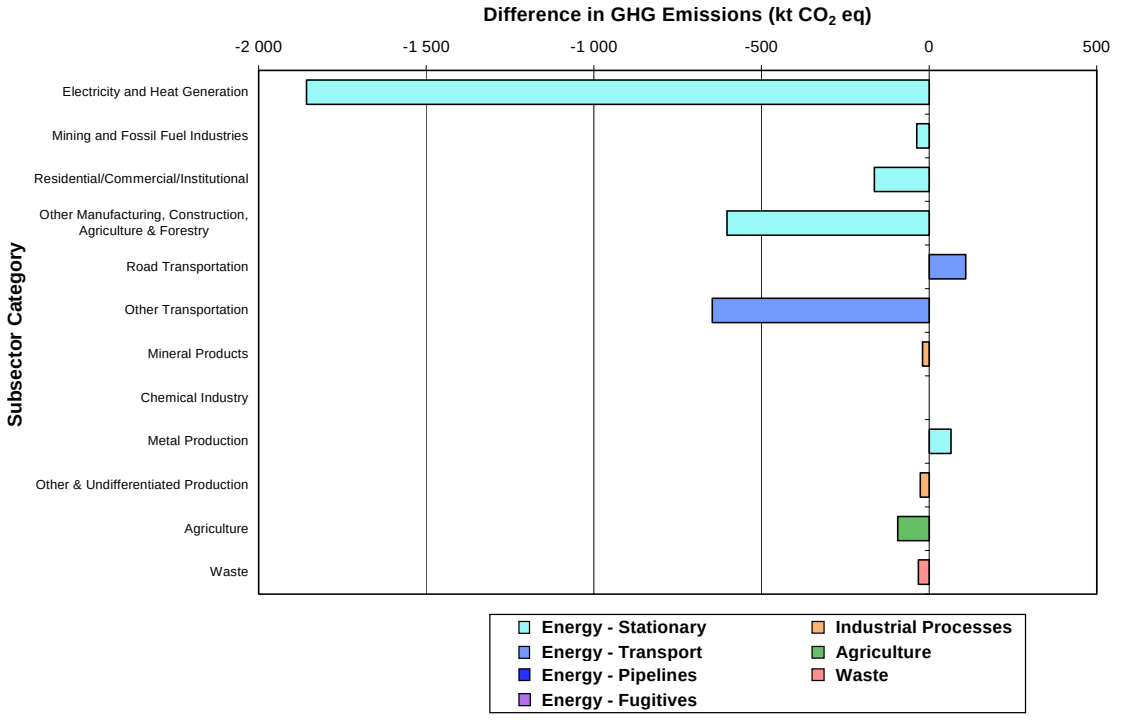

Figure A14-10: New Brunswick Short-Term Emission Changes, 2004–2008

A14.5 Quebec

Table A14-6: Emissions, Economy, Energy, and Climate, Quebec

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**82.800**	**89.100**	**85.400**	**83.800**	**86.800**	**82.000**
Change Since 1990 (%)	*NA*	*7.6*	*3.2*	*1.3*	*4.9*	*-0.9*
Annual Change (%)	*NA*	*NA*	*-4.1*	*-1.9*	*3.6*	*-5.5*
GDP (millions)	**184 297**	**251 028**	**254 708**	**259 853**	**267 033**	**269 665**
Change Since 1990 (%)	*NA*	*36.2*	*38.2*	*41.0*	*44.9*	*46.3*
GHG Intensity (Mt/$B GDP)	**0.45**	**0.35**	**0.34**	**0.32**	**0.33**	**0.30**
GHG Efficiency ($B GDP/ Mt)	**2.23**	**2.82**	**2.98**	**3.10**	**3.08**	**3.29**
Population (000s)	**6 997**	**7 536**	**7 582**	**7 632**	**7 686**	**7 751**
Change Since 1990 (%)	*NA*	*7.7*	*8.4*	*9.1*	*9.8*	*10.8%*
GHG Per Capita (tonnes/person)	**11.8**	**11.8**	**11.3**	**11.0**	**11.3**	**10.6**
Energy Production (Primary only) (TJ)	**482 431**	**617 892**	**641 720**	**639 378**	**669 739**	**691 265**
Change Since 1990 (%)	*NA*	*28.1*	*33.0*	*32.5*	*38.8*	*43.3*
Net Supply (Primary & Secondary) (TJ)	**1 538 111**	**1 835 474**	**1 828 977**	**1 813 992**	**1 849 026**	**1 744 920**
Change Since 1990 (%)	*NA*	*19.3*	*18.9*	*17.9*	*20.2*	*13.4*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**1 355 855**	**1 628 344**	**1 592 302**	**1 562 649**	**1 595 378**	**1 524 222**
Change Since 1990 (%)	*NA*	*20.1*	*17.4*	*15.3*	*17.7*	*12.4*
Climate						
Heating Degree-Days	**4 658**	**4 904**	**4 623**	**4 207**	**4 736**	**4 669**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

Quebec contributed 82.0 Mt (11.2%) to Canada's total GHG emissions in 2008 (Table A14-6). The province's emissions have decreased slightly (by 0.9%) since 1990, while GDP grew by 46.3% over the same period. Quebec's GDP represented 20.4 % of the national total in 2008. As Canada's second most populous province (23.3% of the population), Quebec was the country's lowest per capita GHG emitter at 10.6 t CO_2 eq per person, and the lowest per GDP emitter at 0.30 Mt/ B GDP. Abundant hydroelectric capacity, which helps to power the province's mining and manufacturing sectors, results in the low GHG emissions intensity. In contrast to the other provinces, in 2008, the majority of Quebec's GHG emissions came from the Road Transportation (27.8 Mt), Manufacturing (7.6 Mt), Agriculture (7.8 Mt), Metal Production (6.3 Mt), and the Commercial/Institutional (6.0 Mt) sectors.

The amount of hydroelectricity generated in Quebec in 2008 accounted for 49% of the total hydroelectricity generated in the country, and 32% of the total electricity generated overall (Statistics Canada 2009b, 2009d). This generating potential, along with nuclear facilities and recent developments in wind power, has meant that emissions from the Electricity and Heat Generation subsector are low, ranging from a low of 0.3 Mt to a high of 2.1 Mt.

The accessibility to low-cost hydroelectric power explains why the majority of the Canadian aluminium plants are found in this province. To satisfy domestic and international demands, the industry has increased its production capacity that relies on more modern technology (i.e.

prebaked technology) over the years. According to the data provided by the aluminium industry,[5] production of aluminium in Quebec increased by 120% (1.6 Mt) between 1990 and 2008.

With almost half of the province covered by forest, the forestry industry, which ranks second in Canada behind British Columbia, is also an important contributor to the provincial economy. However, over the last 10 years, the provincial economy has diversified from energy, forestry, mining, metallurgy and agriculture to include aerospace and aeronautics, and a growing chemical product industry (Finances Québec 2008).

A14.1.7 Long-Term Trends (1990–2008)

Over the long term, Quebec's GHG emissions decreased by 0.8 Mt (0.9%). The decrease was led by lower emissions from the Other Manufacturing, Construction, Agriculture and Forestry (4.5 Mt) and Metal Production (3.7 Mt) sectors, which were offset by an emissions increase from the Road Transportation sector (6.9 Mt).

Long-term emission trends in Quebec are illustrated in Figure A14-11.

A14.1.7.1 Electricity and Heat Generation (69% decrease)

GHG emissions decreased from 1.5 Mt in 1990 to 0.5 Mt in 2008. Emissions in 1990 were mainly related to RPP-fired-generation and were largely reduced by 2008. The decrease in emissions over the long term is also the result of the suspension of generation from a cogeneration facility in 2008 (TransCanada 2008).

A14.1.7.2 Other Manufacturing, Construction, Agriculture and Forestry (51% decrease)

Canada's newsprint market has dropped by half since 2001, due to lower demand and competition in the export market. In 2009, several large U.S. newspaper chains went bankrupt, while others reduced their output (Cross 2009). The softwood lumber dispute, rising costs and a stronger Canadian dollar compared to the U.S. contributed to the decline of this industry in the province and was the major reason for the decrease in long-term GHG emissions from the manufacturing industries.

A14.1.7.3 Road Transportation (33% increase)

The long-term increase in emissions related to road transportation is observed throughout the country, and Quebec is no exception. The 41% overall increase in the provincial vehicle fleet is an important contributing factor, as is the increasing preference for LDGTs over LDGVs for passenger transportation. LDGVs accounted for 77% of the provincial on-road vehicle population, decreasing to 61% in 2008. During the same period, the popularity of LDGTs grew substantially, increasing from 17% of the on-road provincial population in 1990 to 29% in 2008.

It is also important to highlight the significant long-term increase in the provincial HDDV population. The 2008 HDDV fleet is over three times the size of 1990 levels, potentially the result of increased demand for delivery of manufactured goods and primary metal products (Statistics Canada 2008a), which in part helps to explain the rise in long-term road transportation emissions..

[5]. Dubois C, Gaboury, S and Ouellet, N. 2009. Personal communication (emails dated October 21, 2009, Sept 25, 2009 and October 26, 2009). Members of the Aluminum Association of Canada (Alcoa, RioTintoAlcan and Alouette).

A14.1.7.4 Metal Production (29% decrease)

The aluminium industry showed a net long-term decrease in process-related emissions of 1.5 Mt CO_2 eq, despite the production growth mentioned above. The industry has succeeded in bringing down its PFC emissions by incorporating computerized sensors and automated alumina feeders in new aluminium production processes, which helped to reduce the occurrence of anode effects (a process event during which significant PFCs are emitted).

Over the years, the magnesium industry had invested in projects with an objective of finding alternatives to the use of SF_6 as a cover gas. The research and use of substitute gas mixtures had contributed to significant SF_6 emission reductions between the early 1990s and mid-2000s. For the years 2005–2007, Norsk Hydro's SF_6 emissions were significantly reduced as a result of gradual production reduction and the plant's closure (in 2007) due to strong international competition, particularly from China. .

A14.1.8 Short-Term Changes (2004–2008)

In the short term, emissions decreased by 7.0 Mt (7.9%), largely due to the lower emissions from the Other Manufacturing, Construction, Agriculture and Forestry (3.5 Mt), Residential/Commercial/Institutional (2.1 Mt) and Other and Undifferentiated Production (1.3 Mt) Sectors. A portion of these decreases were offset by short-term increases in emissions from the Other Transportation Sector (0.9 Mt).

Short-term emission changes in Quebec are illustrated in Figure A14-12.

A14.1.8.1 Electricity and Heat Generation (72% decrease)

The 1.2 Mt short-term decrease in emissions from the Electricity and Heat Generation Sector is mostly the result of the replacement of RPP-fired generation by new hydro generation (Statistics Canada 2009d).

A14.1.8.2 Residential/Commercial/Institutional (17% decrease)

Approximately two thirds (or 1.4 Mt) of the 2.2 Mt decrease in GHGs between 2004 and 2008 occurred in the Residential subsector. Emissions generally track HDDs and the decrease can be partially attributable to the 4.8% decrease in HDDs between 2004 and 2008; combined with fuel switching and switching to higher efficiency heating systems. For instance, between 2004 and 2007 (2008 data not available), the use of normal-efficiency heating oil heating systems decreased by 9000 homes while the use of mid-efficiency heating oil systems increased by 8000 homes (NRCan 2009).

A14.1.8.3 Other Manufacturing, Construction, Agriculture and Forestry (45% decrease)

As observed in the long-term trends, the Pulp and Paper subsector has been under pressure for at least the last 5 years due to lower demand and competition in the export market (Cross 2009). The Pulp and Paper subsector accounted for 1.8 Mt of the 3.5 Mt decrease in GHG emissions, likely due to economic factors. The other manufacturing subsector accounts for 1.6 Mt of the remaining decrease.

A14.1.8.4 *Other Transportation (14% increase)*

The increase in short-term emissions is attributed to a rise in off-road activity. Specifically, the construction industry in Quebec experienced continued growth due to investment in non-residential structures (Statistics Canada 2009c).

A14.1.8.5 *Other and Undifferentiated Production (42% decrease)*

The decrease in non-energy use of coal partly explained the drop in emissions from the Other and Undifferentiated Production Sector. Another factor that contributed to the decrease in emissions was the reduction in non-energy use of petroleum coke in 2008 (compared to that in 2004). Previously, the level of CO_2 emissions from aluminium production was about the same as that of non-energy use of petroleum coke. Thus, they would cancel out each other in the calculations (i.e., the CO_2 from aluminium production should be subtracted from overall CO_2 resulting from the use of petroleum coke as non-energy fuel). However, this was not the case in 2008 when there were far fewer emissions from non-energy use of petroleum coke than from aluminium production. This seems to be a data anomaly that the GHG Division needs to resolve with Statistics Canada.

A14.1.8.6 *Waste (6.6% increase)*

From 2004 to 2008, Quebec increased its organic waste diversion (paper, cardboard and organic wastes including food and wood) for composting by 21% (Recycle-Québec 2009).

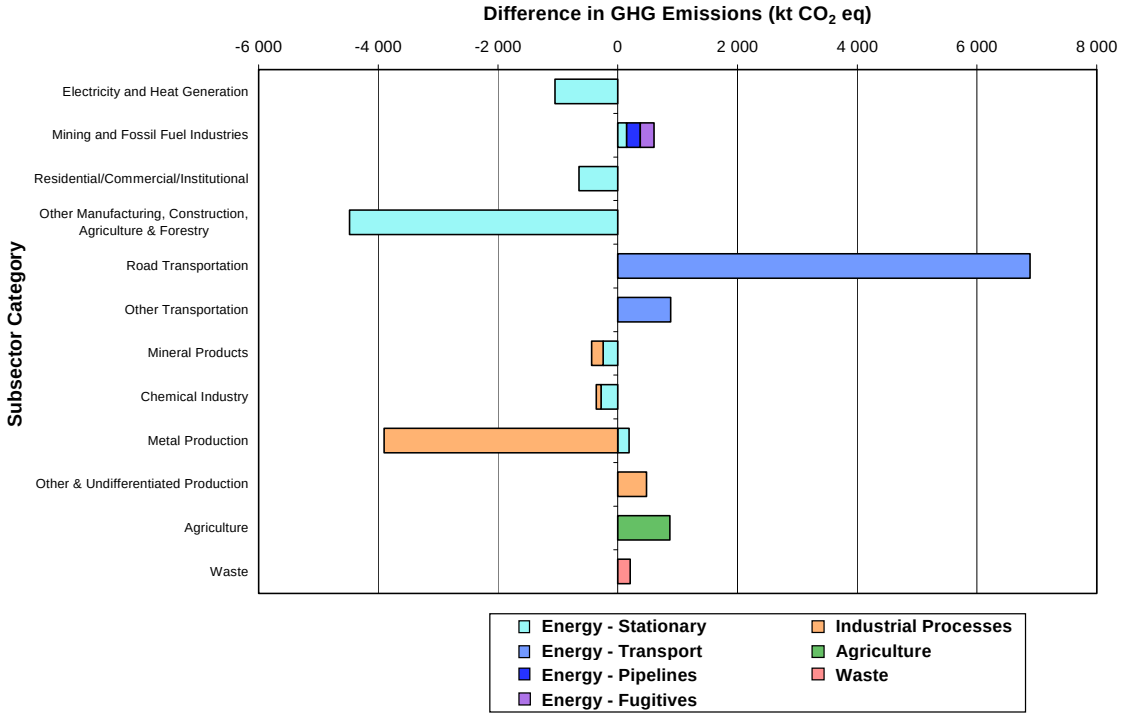

Figure A14-11: Quebec Long-Term Emission Changes, 1990–2008

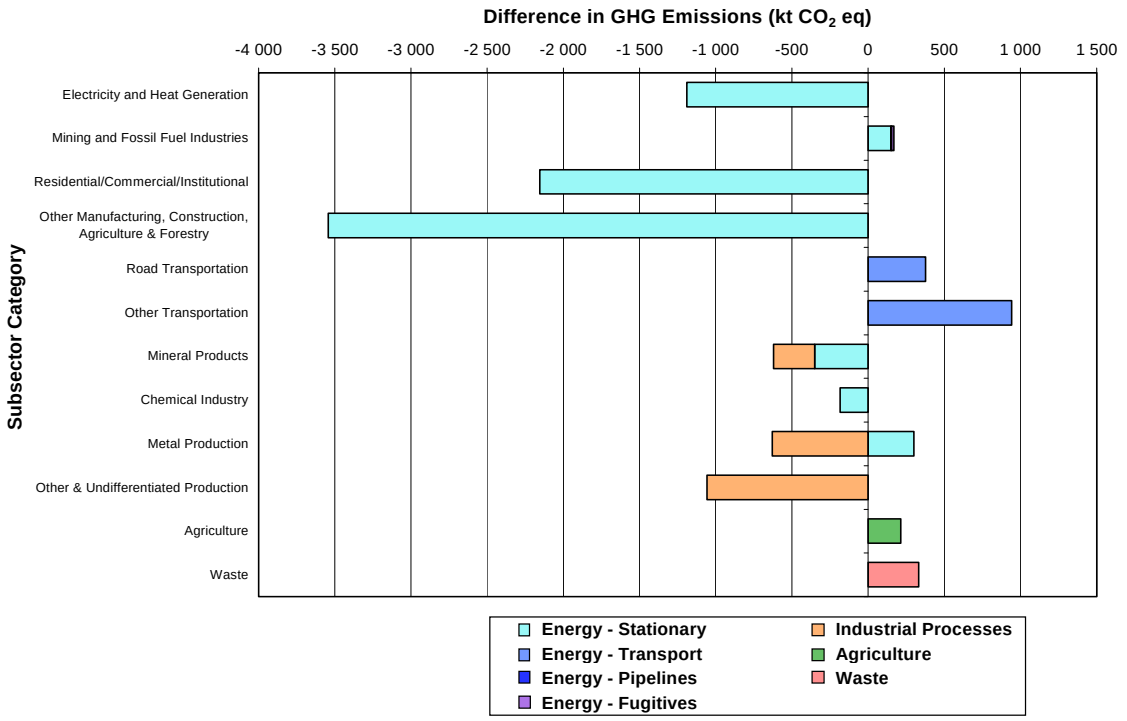

Figure A14-12: Quebec Short-Term Emission Changes, 2004–2008

A14.6 Ontario

Table A14-7: Emissions, Economy, Energy, and Climate, Ontario

Emissions, Economy and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**176.000**	**199.000**	**200.000**	**192.000**	**200.000**	**190.000**
Change Since 1990 (%)	*NA*	*13.1*	*13.8*	*9.1*	*13.5*	*8.1*
Annual Change (%)	*NA*	*NA*	*0.6*	*-4.2*	*4.1*	*-4.7*
GDP (millions)	**336 227**	**496 780**	**510 626**	**522 845**	**534 880**	**532 209**
Change Since 1990 (%)	*NA*	*47.8*	*51.9*	*55.5*	*59.1*	*58.3*
GHG Intensity (Mt/$B GDP)	**0.52**	**0.40**	**0.39**	**0.37**	**0.37**	**0.36**
GHG Efficiency ($B GDP/ Mt)	**1.91**	**2.50**	**2.55**	**2.72**	**2.68**	**2.80**
Population (000s)	**10 296**	**12 391**	**12 528**	**12 665**	**12 794**	**12 929**
Change Since 1990 (%)	*NA*	*20.3*	*21.7*	*23.0*	*24.3*	*25.6*
GHG Per Capita (tonnes/person)	**17.1**	**16.1**	**16.0**	**15.2**	**15.6**	**14.7**
Energy Production (Primary only) (TJ)	**385 391**	**432 638**	**423 611**	**445 377**	**424 760**	**464 656**
Change Since 1990 (%)	*NA*	*12.3*	*9.9*	*15.6*	*10.2*	*20.6*
Net Supply (Primary & Secondary) (TJ)	**2 603 620**	**3 010 144**	**3 052 972**	**3 025 362**	**3 153 667**	**3 034 658**
Change Since 1990 (%)	*NA*	*15.6*	*17.3*	*16.2*	*21.1*	*16.6*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**2 238 689**	**2 614 144**	**2 656 480**	**2 575 752**	**2 644 025**	**2 588 367**
Change Since 1990 (%)	*NA*	*16.8*	*18.7*	*15.1*	*18.1*	*15.6*
Climate						
Heating Degree-Days	**3 776**	**4 094**	**4 034**	**3 627**	**3 972**	**4 085**

Notes:

GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 2008, Ontario was the second largest contributor to Canada's GHG emissions, with 25.9% of the total emissions (or 190.3 Mt). Provincial emissions grew by 8.1% (14.3 Mt) between 1990 and 2008, while GDP grew by 58.3% over the same period (Table A14-7), about the national average GDP growth. However, as the most populous province in Canada and one that contributes 40.3% of national GDP, in 2008 Ontario ranked the third lowest GHG emitter, both per person and per GDP. This could be explained by the fact that low-energy-intensive manufacturing industries dominated the provincial economy. Driven by the large population, emissions from the Road Transportation and Other Transportation Sectors combined made up the largest portion (32%) of the provincial emissions in 2008, followed by the Residential/Commercial/Institutional Sector (17.3 %).

As a province with a significant manufacturing sector, it is no surprise that the continuing slump in this sector for 2008 contributed substantially to the 0.4% contraction of the Ontario economy (Statistics Canada 2009c.). A driver of the contracted economy was decreased demand from the U.S. due to its depressed financial situation and the strong Canadian dollar. Ontario merchandise exports to the U.S. over the past five years have fallen by 12.2% (Duncan 2008) which is nearly echoed by the 11.9% decrease in GHG emissions for 2008 in the Manufacturing Sector. Transportation Equipment Manufacturers is the largest subgroup in Ontario's manufacturing industry with a 4% contribution to the overall GDP in 2008. However, it experienced a 21% decrease in output (Statistics Canada 2009c.). On the positive side, as a result of these events, Ontario's export base has significantly diversified in proportion with other parts of the world versus the United States (Duncan 2008).

Other important subsectors of the manufacturing economy include Chemical & Petroleum Products, Primary Metal & Fabricated Metal Products, Food, Beverages & Tobacco, and Electrical & Electronic Products which combined contributed 7% to the province's overall GDP (Ontario Ministry of Finance 2008a). The structure of the provincial economy has changed since 1990, due in part to fluctuations in global markets that have affected the export market. In response to lower manufacturing costs abroad for some goods and primary materials, the economy adapted with an increase in service-based industries that now represent 67.7% of the overall GDP for the province (Ontario Ministry of Finance 2008b).

Electrical demand in Ontario is met through various generation media. The largest contribution is from nuclear plants that can produce nearly 14 000 megawatts. There are also twenty-five fossil fuel plants (five coal-fired and twenty oil- and/or natural-gas-fired) accounting for 12 000 megawatts and hydro-electric power generation that can reach 7000 megawatts (Government of Ontario, 2010). Ontario is the home to most of Canada's nuclear capacity and the provincial government pledged in 2003 to shut down all coal-fired generation by the end of the decade. The first of the province's four coal-fired power plants was shut down in 2005. As a result of this policy, investment in wind power and other renewable energy resources has grown substantially. In 2008, the total of installed wind power capacity in Canada stood at 2246 MW; Ontario has the greatest generating capacity in Canada at 781 MW (Kucera 2008).

A14.1.9 Long-Term Trends (1990–2008)

Between 1990 and 2008, emissions increased by 14 Mt (8.1%), due primarily to the growth in the Road Transportation (12 Mt), Residential/Commercial/Institutional (6.7 Mt) and Other Transportation (3.5 Mt) sectors. The long-term increase was offset by decreases from the Chemical Industry Sector (9.2 Mt).

Long-term emission trends in Ontario are illustrated in Figure A14-13.

A14.1.9.1 *Residential/Commercial/Institutional (25% increase)*

Long-term increases in this sector are due to economic changes and population growth. The increase in commercial and institutional emissions (4.1 Mt or 45%) is related to the shift in the provincial economy from a mainly manufacturing base to a diversified service industry, including finance, insurance and real estate (FIRE) (Ontario Economic Development 2008). Residential emissions increased by 2.6 Mt (15%) while the population increased by 26%. HDDs in 2008 were 8.2% higher than in 1990 and also contributed to the increase in emissions.

A14.1.9.2 *Road Transportation (34% increase)*

Ontario's long-term road transportation emissions increase can be directly related to the 38% growth in the on-road vehicle population, and the increasing consumer preference for SUVs, vans and pickups (LDGTs) over gasoline vehicles (LDGVs).While 74% of the entire on-road provincial fleet was made up of LDGVs in 1990, this proportion decreased to 57% in 2008. At the same time, the proportion of increasingly popular LDGTs rose from 21% of the on-road provincial fleet in 1990 to 29% in 2008.

The provincial HDDV population also grew significantly, more than doubling 1990 levels by 2008. Long-term emissions from HDDVs increased by 32%, reflecting the increasing national trend of just-in-time delivery.

A14.1.9.3 *Other Transportation (38% increase)*

The increase in this sector is reflected in domestic aviation and off-road diesel use. Regarding aviation, since Ontario has two major airports, with the Toronto Pearson International Airport being a central hub for flights across Canada, increased volume through Toronto may be responsible for the increase in aviation fuel use. Off-road diesel emissions could be attributable to the long-term increase in construction activity (Statistics Canada 2005, 2009c).

A14.1.9.4 *Chemical Industry (72% decrease)*

Ontario is home to the country's only adipic acid production plant (used for the production of nylon). The substantial reductions in process emissions at this facility between 1990 and 2008 are the result of the installation of a catalytic emission abatement system in 1997. It should be noted though that the plant became indefinitely idled starting in the spring of 2009.

A14.1.9.5 *Other and Undifferentiated Production (44% increase)*

Increases in the non-energy use of coal, natural gas liquids, petroleum feedstocks, lubricating oils and other products (e.g., paraffin and wax) contributed to the long-term growth in emissions from Other and Undifferentiated Production in Ontario.

A14.1.9.6 *Waste (28% increase)*

The main contributor to the Waste Sector emissions was the Solid Waste Disposal on Land subsector, which increased by 29.6%. The increase in emissions was mainly due to a 5% increase in waste placed in landfills; in 1990, Ontario had landfilled 38% of the wastes placed in landfills nationally. Over this period, Ontario had a population growth of 26% and a waste diversion rate (18.7% in 2006) that was below the national average (22.0% in 2006) (Statistics Canada 2008b).

From 1990 to 2008, there was a 27% increase in CH_4 capture for flaring and/or utilization that mitigated the emissions.

A14.1.10 Short-Term Changes (2004–2008)

Provincial emissions decreased by 8.8 Mt (4.4%) between 2004 and 2008. The decrease of emissions was seen in the Electricity and Heat Generation (4.9 Mt), Mining and Fossil Fuel Industries (1.8 Mt), and Other Manufacturing, Construction, Agriculture and Forestry (1.6 Mt) sectors. These decreases were offset by increases in Road Transportation (1.2 Mt) and Waste (0.5 Mt) emissions.

Short-term emission changes in Ontario are illustrated in Figure A14-14.

A14.1.10.1 Electricity and Heat Generation (15% decrease)

Emissions from the Electricity and Heat Generation Sector decreased by 4.9 Mt between 2004 and 2008. The main reason for this decrease in emissions is the lower consumption of coal and RPP fuels for electricity generation. A mild, wet summer also contributed to lower demand and higher water flows (IESO 2009).

A14.1.10.2 Mining and Fossil Fuel Industries (16% decrease)

Short-term emission declines in the Mining and Fossil Fuel Industries Sector in Ontario are largely due to decreased production at refineries from a peak year in 2004 (Statistics Canada, 2009a)..

A14.1.10.3 Other Manufacturing, Construction, Agriculture and Forestry (12% decrease)

As observed in other provinces, the Pulp and Paper subsector has been under pressure for at least the last 5 years due to lower demand and competition in the export market (Cross 2009). The Pulp and Paper subsector accounted for 1.0 Mt of the 1.6 Mt decrease in GHG emissions, likely due to economic factors. The Other Manufacturing subsector accounted for 0.8 Mt of the remaining decrease, which is partially offset by an increase in the Agriculture/Forestry/Fisheries subsector. The decline in the Other Manufacturing subsector is likely a result of declines in automotive exports to the United States (Ontario Minister of Finance 2008).

A14.1.10.4 Mineral Products (13% decrease)

The clinker production capacity in Ontario has reduced by 3.5% (0.27 Mt) between 2004 and 2008, partly explaining the emission decrease for mineral products. The drop in lime production and in mineral product use also, to a lesser extent, caused the emission decrease seen.

A14.1.10.5 Chemical Industry (13% decrease)

The category of adipic acid production played a major role in the overall emission reduction seen in the chemical industry during the 2004–2008 period. The short-term emission levels varied for a few reasons. Due to operational difficulties with the abatement system, there were significantly more emissions in 2004–2005 than other years (since 2000). The level of emissions in 2005 was also affected by a strike at the adipic acid plant. In 2006, emissions began to decrease again as a result of better abator operation. Increases in production and variations in the abatement unit's performance led to an emission increase in 2007. The off-line period of the abatement system

(due to a mechanical failure of a major component of the system) in 2008 was responsible for the considerable emission increase between 2007 and 2008, even though there was a production drop at the same time.

A14.1.10.6 Metal Production (6.7% decrease)

There was a downward trend in SF_6 emissions from magnesium production between 2004 and 2008. This was the result of gradual operation reductions, which commenced in 2005, at one of the two Ontario magnesium manufacturing facilities. (The operation reductions preceded this plant's closure in 2008).

A14.1.10.7 Waste (7.3% increase)

In 2006, an agreement was signed between the state of Michigan and the province of Ontario calling for a reduction in municipally managed exported waste of 20% by the end of 2007, 40% by the end of 2008 and 100% by the end of 2010. These reductions are based on an estimated figure of 1.34 million tonnes of municipally managed waste for 2005. As a result, more residential and institutional solid wastes were being landfilled in Ontario rather than being exported in 2007. Other factors that stimulated this trend were a 5% increase in waste placed in landfills and a 6% decrease in the amount of CH_4 captured. A mitigating influence was the quantity of total municipal solid waste (MSW)organics (paper, yard, food wastes and wood) diverted from landfills, which increased by 40% from 2004 to 2008 (Waste Diversion Ontario undated).

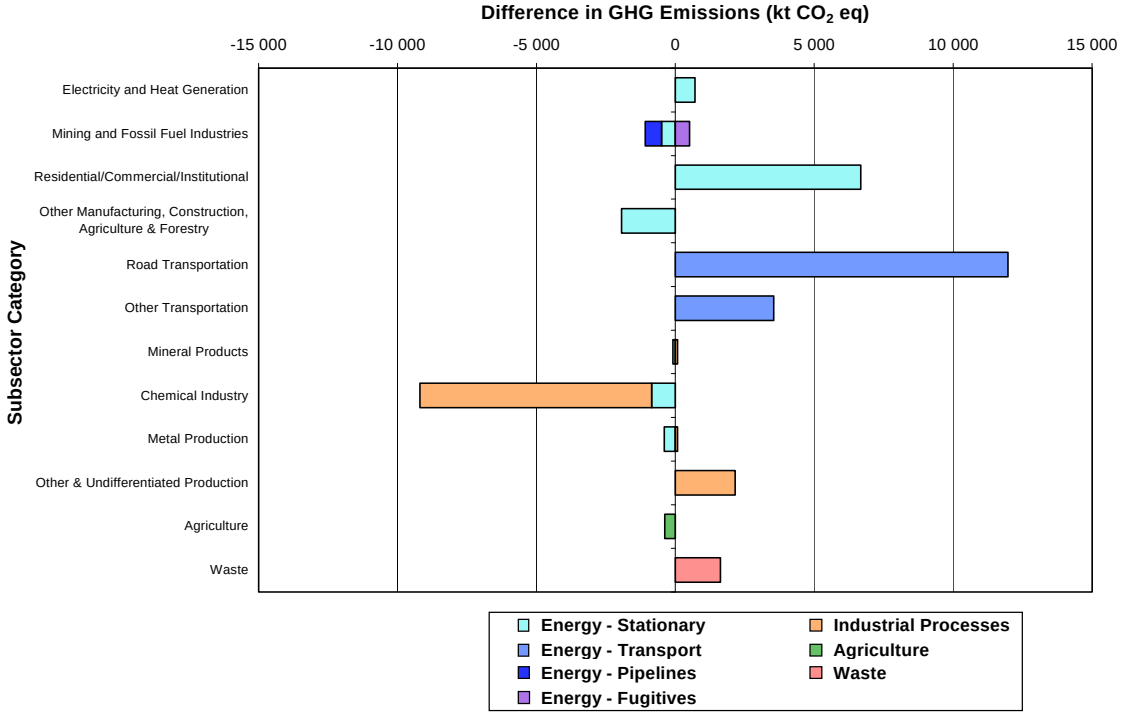

Figure A14-13: Ontario Long-Term Emission Changes, 1990–2008

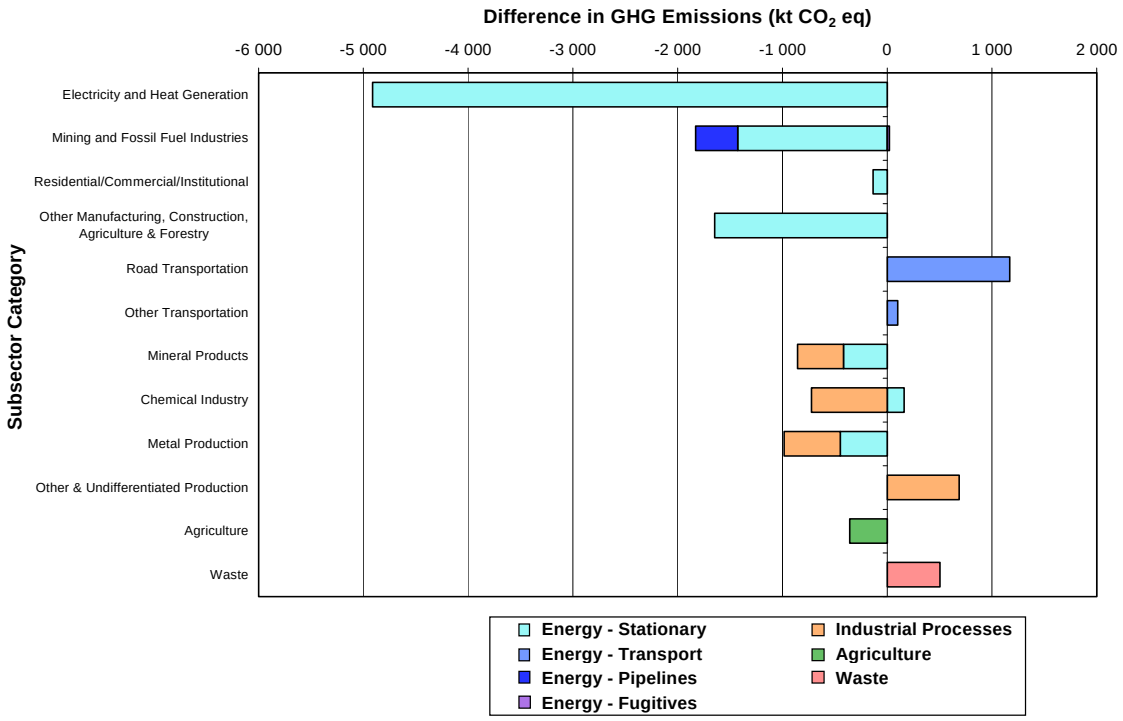

Figure A14-14: Ontario Short-Term Emission Changes, 2004–2008

A14.7 Manitoba

Table A14-8: Emissions, Economy, Energy, and Climate, Manitoba

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**18.600**	**21.400**	**21.000**	**21.100**	**21.700**	**21.900**
Change Since 1990 (%)	*NA*	*14.7%*	*12.7%*	*13.4%*	*16.6%*	*17.6%*
Annual Change (%)	*NA*	*NA*	*-1.8%*	*0.6%*	*2.8%*	*0.9%*
GDP (millions)	**29 629**	**37 861**	**38 783**	**40 158**	**41 593**	**42 407**
Change Since 1990 (%)	*NA*	*27.8%*	*30.9%*	*35.5%*	*40.4%*	*43.1%*
GHG Intensity (Mt/$B GDP)	**0.63**	**0.56**	**0.54**	**0.53**	**0.52**	**0.52**
GHG Efficiency ($B GDP/ Mt)	**1.59**	**1.77**	**1.85**	**1.90**	**1.92**	**1.94**
Population (000s)	**1 105**	**1 174**	**1 178**	**1 184**	**1 194**	**1 208**
Change Since 1990 (%)	*NA*	*6.2%*	*6.6%*	*7.1%*	*8.0%*	*9.3%*
GHG Per Capita (tonnes/person)	**16.8**	**18.2**	**17.8**	**17.8**	**18.2**	**18.1**
Energy Production (Primary only) (TJ)	**97 184**	**123 007**	**162 650**	**169 852**	**171 216**	**178 308**
Change Since 1990 (%)	*NA*	*26.6%*	*67.4%*	*74.8%*	*76.2%*	*83.5%*
Net Supply (Primary & Secondary) (TJ)	**257 404**	**269 140**	**280 361**	**271 853**	**287 756**	**294 630**
Change Since 1990 (%)	*NA*	*4.6%*	*8.9%*	*5.6%*	*11.8%*	*14.5%*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**239 964**	**256 613**	**259 988**	**249 912**	**264 834**	**267 655**
Change Since 1990 (%)	*NA*	*6.9%*	*8.3%*	*4.1%*	*10.4%*	*11.5%*
Climate						
Heating Degree-Days	**5 706**	**5 744**	**5 293**	**4 938**	**5 465**	**5 889**

Notes:

GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 2008, Manitoba's GHG emissions were 21.9 Mt, a 17.6% increase since 1990 (Table A14-8). With 3.6% of Canada's population, the province contributed about 3.0% to the national total emissions in 2008. Manitoba's economic structure results in its GHG emissions having the lowest percentage of emissions from the Energy Sector (58.4%) and the highest percentage from the Agriculture Sector (34.7%) among provinces in Canada. The province's agricultural base suggests that the main contributor to the GHG emissions in 2008 was from this Sector, which contributed 7.6 Mt to the provincial total. The second largest emitter was the Road Transportation Sector, responsible for 5.1 Mt of the provincial total. Between 1990 and 2008, the province's annual GDP and population increased by 43.1% and 9.3% respectively, resulting in 0.52 Mt of GHG per billion dollars GDP in 2008.

The Manitoba economy is one of Canada's most diverse. The province is home to a large agricultural and manufacturing sector, as well as a natural resources sector that includes hydroelectric power exports and mining. With such a diverse economy, the financial picture can change rapidly. In 2008, the Manitoba economy grew by 2.4% due in large part to the construction activity associated with the investment in non-residential structures such as the Winnipeg Airport and the Red River Floodway (Statistics Canada 2009c)..

Manitoba has an abundance of hydroelectric power resources, with 98% of the province's electricity generated by 14 stations primarily located on the Winnipeg, Saskatchewan and Nelson rivers (Manitoba Hydro 2009). The province is also committed to other sources of renewable energy, specifically wind power. In 2005 and 2006 St. Leon, a small farming community 150 kilometres southwest of Winnipeg, became the home of the province's first large-scale wind farm. At the time, the 99-MW facility was Canada's largest, but it has since been surpassed by farms in other provinces (CanWEA 2010). However, in 2008, negotiations commenced to develop a 300 MW wind farm at St. Joseph, Manitoba (Manitoba Hydro 2009). With the St. Joseph Wind Farm, Manitoba would once again have the largest wind farm in Canada, surpassing the Wolf Islands EcoPower Centre in Ontario which has a generating capacity of 198 MW (CanWEA 2010).

A14.1.11 Long-Term Trends (1990–2008)

Over the long term (1990–2008), emissions increased by 18% (3.3 Mt), with the growth in emissions from the Agriculture (2.3 Mt) and Road Transportation (1.2 Mt) sectors. Decreases in emissions from the Residential/Commercial/Institutional (0.4 Mt), Other Transportation (0.3 Mt) and the Mineral Products (0.2 Mt) sectors helped to offset the increases from the Agriculture Sector.

Long-term emission trends in Manitoba are illustrated in Figure A14-15.

A14.1.11.1 Residential/Commercial/Institutional (13% decrease)

Emissions from the Residential subsector decreased by 0.5 Mt between 1990 and 2008 which was offset by a slight increase in the Commercial and Institutional subsector. Paradoxically, HDDs were slightly higher (3.2%) and the population increased by 9.3% in 2008 compared to 1990. The decrease in emissions is attributable in part to fuel switching, as well as switches to higher efficiency heating systems. In 1990, normal-efficiency heating oil systems made up approximately 5% of the total heating system stock, while in 2007 that dropped to zero (data not

available for 2008). On the other hand, high efficiency natural gas heating systems made up 3.9% of the mix in 1990 and 21% of the mix in 2007 (NRCan 2009).

A14.1.11.2 Road Transportation (31% increase)

Manitoba's long-term increase in road transportation emissions is potentially related to the 45% growth in the on-road vehicle fleet over 1990 levels. In addition, the nationally observed trend of driver preference for LDGTs over LDGVs is prevalent on a provincial scale as well. Of the entire on-road provincial fleet, 65% were LDGVs in 1990, decreasing to 47% in 2008. Conversely, the popularity of LDGTs rose from 23% of the on-road provincial population in 1990 to 41% in 2008.

The long-term increase in emissions from HDDVs is reflected in the decrease in emissions from railways. The switch from rail to transport trucks for transporting raw materials and finished goods for the manufacturing industry is observed by an increase in HDDV emissions.

A14.1.11.3 Agriculture (44% increase)

Agricultural emissions from all sources increased significantly by 2.3 Mt CO_2 eq between 1990 and 2008. CH_4 emissions from enteric fermentation and manure management increased by 56% and 71%, respectively, while N_2O emissions from manure management increased by 5%, due mainly to increases in beef cattle (51%) and swine (117%) populations. The expansion of the beef cattle industry is due mainly to growing demand by the United States market. The growth in market hog production was steady through the 1990s, but levelled off after 2002. The marked increase in overall pig production that began in the late 1990s was driven by the demand for Canadian-born weanlings to fill finisher barns in the American Midwest. Emissions of N_2O from agricultural soils have increased by 36% due mainly to the increase in synthetic N fertilizer consumption because of reductions in summer-fallow and intensification of cropping systems (51%).

A14.1.12 Short-Term Changes (2004–2008)

From 2004 to 2008, overall provincial emissions increased by 0.5 Mt (2.5%). The change resulted mainly from the growth in the Road Transportation (0.4 Mt) Sector and the reduction in the Residential/Commercial/Institutional (0.2 Mt) Sector.

Short-term emission changes in Manitoba are illustrated in Figure A14-16

A14.1.12.1 Residential/Commercial/Institutional (6.8% decrease)

The 192 kt decrease in GHGs between 2004 and 2008 was divided; with 110 kt attributed to the Residential subsector and 82 kt attributed to the Commercial and Institutional subsector. However, HDDs actually increased by 2.5%. The decrease can be partially attributed to switches to higher efficiency heating systems; as well as replacing natural gas with electricity as a fuel source, which in a low-intensity hydro-rich province has minimal GHG impacts. In 2004, in the Commercial and Institutional subsector, natural gas made up 61.5% of the energy mix while electricity made up 33.6%. In 2007, natural gas made up only 54.4% of the mix while electricity had increased to 40.1% (NRCan 2009).

A14.1.12.2 *Other Manufacturing, Construction, Agriculture and Forestry (19% increase)*

The 19% increase in this sector is largely a result of a decline in the Pulp and Paper subsector offset by a 222 kt increase in the Other Manufacturing subsector. This increase is likely due to the strength of the manufacturing subsector. The food, machinery and electrical equipment manufacturing industries all posted increased sales in 2008 (Manitoba Minister of Finance 2009).

A14.1.12.3 *Road Transportation (7.2% increase)*

The short-term increase in road transportation GHG emissions is partially related to the 6.5% overall growth in the on-road provincial vehicle population. In addition, manufacturing activity was particularly strong from 2005 to 2007 (Statistics Canada 2008a). A 13% increase in the provincial HDDV fleet suggests that the increased manufacturing activity also contributed to the observed rise in short-term road transportation emissions.

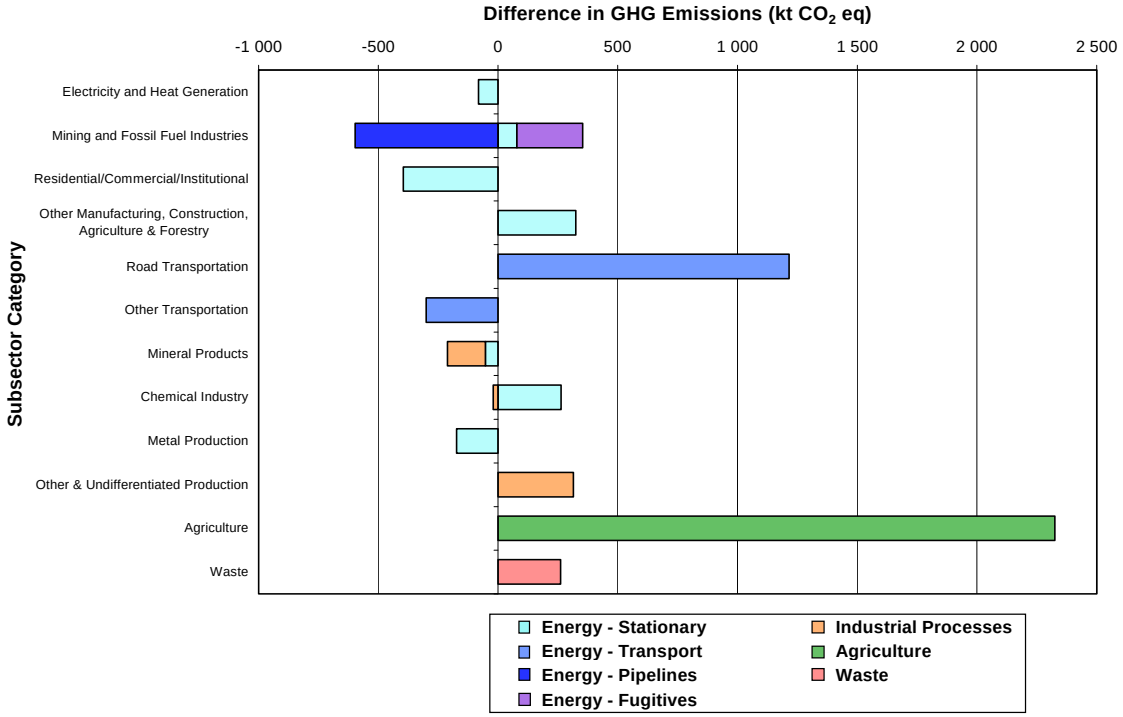

Figure A14-15: Manitoba Long-Term Emission Changes, 1990–2008

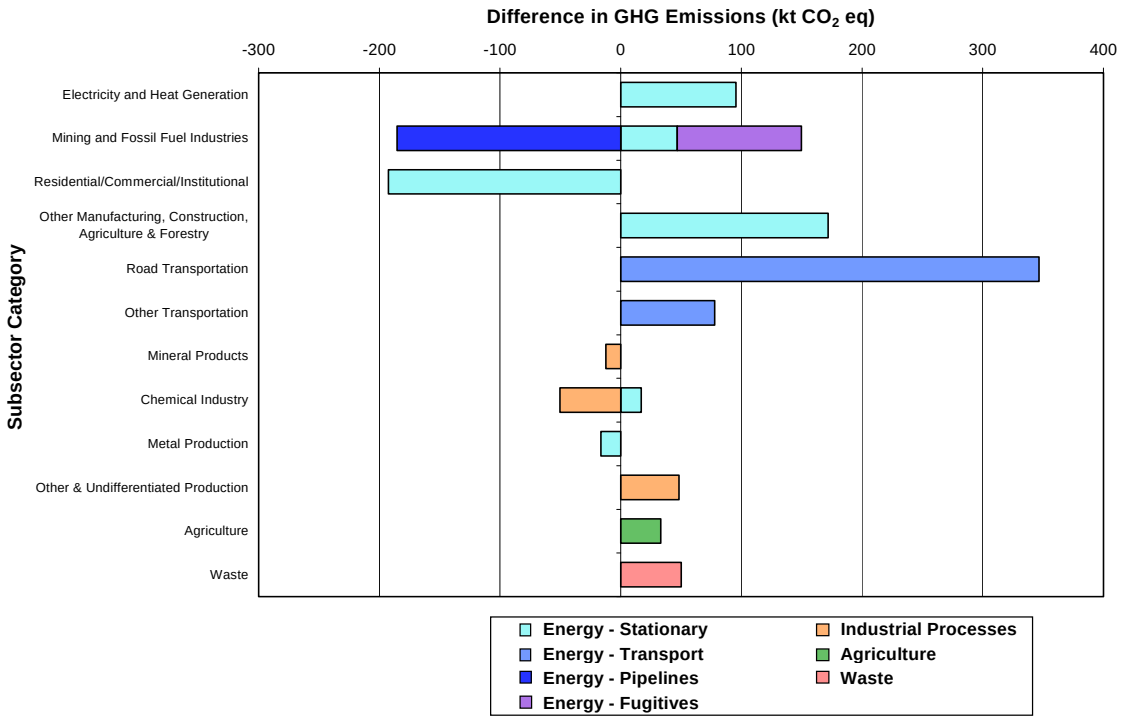

Figure A14-16: Manitoba Short-Term Emission Changes, 2004–2008

A14.8 Saskatchewan

Table A14-9: Emissions, Economy, Energy, and Climate, Saskatchewan

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**43.400**	**71.700**	**72.300**	**71.300**	**74.000**	**75.000**
Change Since 1990 (%)	*NA*	*65.0%*	*66.4%*	*64.3%*	*70.5%*	*72.8%*
Annual Change (%)	*NA*	*NA*	*0.8%*	*-1.3%*	*3.8%*	*1.4%*
GDP (millions)	**27 793**	**37 741**	**38 970**	**38 520**	**39 896**	**41 583**
Change Since 1990 (%)	*NA*	*35.8%*	*40.2%*	*38.6%*	*43.5%*	*49.6%*
GHG Intensity (Mt/$B GDP)	**1.56**	**1.90**	**1.85**	**1.85**	**1.86**	**1.80**
GHG Efficiency ($B GDP/ Mt)	**0.64**	**0.53**	**0.54**	**0.54**	**0.54**	**0.55**
Population (000s)	**1 008**	**997**	**994**	**992**	**1 000**	**1 016**
Change Since 1990 (%)	*NA*	*-1.0%*	*-1.4%*	*-1.5%*	*-0.8%*	*0.8%*
GHG Per Capita (tonnes/person)	**43.1**	**71.9**	**72.7**	**71.9**	**74.0**	**73.8**
Energy Production (Primary only) (TJ)	**941 825**	**1 509 386**	**1 481 666**	**1 490 997**	**1 449 827**	**1 460 045**
Change Since 1990 (%)	*NA*	*60.3%*	*57.3%*	*58.3%*	*53.9%*	*55.0%*
Net Supply (Primary & Secondary) (TJ)	**381 411**	**484 348**	**530 003**	**532 617**	**570 137**	**590 854**
Change Since 1990 (%)	*NA*	*27.0%*	*39.0%*	*39.6%*	*49.5%*	*54.9%*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**289 911**	**349 191**	**375 457**	**379 785**	**420 075**	**429 742**
Change Since 1990 (%)	*NA*	*20.4%*	*29.5%*	*31.0%*	*44.9%*	*48.2%*
Climate						
Heating Degree-Days	**5 750**	**5 913**	**5 548**	**5 334**	**5 700**	**5 981**

Notes:

GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable

Saskatchewan generated 75 Mt of GHGs in 2008 (10.2% of Canada's total), a 72.8% increase over 1990 (Table A14-9). Saskatchewan ranked as the highest GHG emitter in Canada, per GDP and per person, 37% and 8.4% respectively higher than the next province, Alberta. The relatively low provincial population of just over 1 million and a resource-based economy involving the oil, gas and mining industries both contribute to Saskatchewan's high per capita GHG emissions. GDP output increased 49.6% between 1990 and 2008, while population increased by 0.8%. Saskatchewan's GHG emission contribution per sector reflects the transition from Canada's central to western provinces—an increasing portion of energy-related emissions that account for approximately 80% of the province's emission sources.

The production and export of natural resources is the true backbone of the Saskatchewan economy. About 95% of all goods produced in the province directly depend on resources like grains, livestock, potash, uranium, oil and gas and wood (Government of Saskatchewan 2010a). The relative ease with which the abundant underground natural resources can be extracted in the province has had a tremendous impact on the development of the economy. It is estimated that the province produces about one-third of the world's supply of both potash and uranium (Government of Saskatchewan 2010b). The province is second in Canada, behind Alberta, in oil and gas production, and third in coal production (Statistics Canada 2009a).

Over 60% of electricity generation in the province is from coal-fired power plants, although hydroelectric power can also provide anywhere between 14% to 32% of the total generation, depending on hydraulic conditions (Statistics Canada 2009d). Saskatchewan has also invested significantly in renewable energy. In early 2006, the 149.4-MW Centennial Wind Power Facility was commissioned, making Saskatchewan the home to one of the largest wind farms in Canada. Over 500 GWh of electricity was generated in the province from wind energy in 2008—about 13% of Canada's total wind energy (CanWEA 2010, Statistics Canada 2009b).

Agriculture has always been an important part of the provincial economy, although mining, forestry and the oil and gas industry have been growing in importance. With a land area of more than 650 000 km^2 and almost one third devoted to agricultural crops, Saskatchewan produces more than half of the wheat grown in western Canada. Other important agricultural products include barley, canola, cattle and, more recently, hogs.

A14.1.13 Long-Term Trends (1990–2008)

Provincial emissions grew by 73% (31.6 Mt) between 1990 and 2008, much higher than the country average of 24.1%. The Energy Sector was the major contributor to the long-term growth, with the Mining and Fossil Fuel Industries Sector increasing by 15.7 Mt (127%), Electricity and Heat Generation (5.0 Mt), and Road Transportation by 3.1 Mt (75%). A large growth in emissions from the Agriculture Sector (5.1 Mt) also contributed to the increase.

Long-term emission trends in Saskatchewan are illustrated in Figure A14-17.

A14.1.13.1 Electricity and Heat Generation (49% increase)

Coal-generated capacity is and remains the dominant source of electricity for the province, accounting for over 60% of provincial electricity generation in 2008, down from 64% in 1990 (Statistics Canada 2009d). Between 1990 and 2008, electricity generation increased by 36%, with the majority of the increase occurring in coal and natural gas fuelled generation. Generation from

hydroelectric and wind resources continues to increase although the growth in demand has played a larger role than changes in electricity generation in the long-term GHG emissions increase.

A14.1.13.2 Mining and Fossil Fuel Industries (127% increase)

Saskatchewan is Canada's second largest oil producer, accounting for 17% of Canadian production (Statistics Canada 2009b). Since 1990, oil production in the province has more than doubled, with natural gas production expanding by almost 18% over the same period. In 2008, 4037 natural gas and oil wells were drilled in the province, significantly higher than the 1315 wells drilled in 1990 (CAPP 2009). Due to the high drilling activity over the long term, the number of producing wells has also steadily increased. This significant growth is behind the large increases observed in fugitive and fossil fuel production emissions.

Strong global demand for natural resources like potash and uranium has helped increase emissions from the provincial mining sector over the long term. Provincial potash production reached 10.2 million tonnes in 2008 with sales reaching a record $7.5 billion for the year (Saskatchewan Bureau of Statistics 2009).

A14.1.13.3 Road Transportation (75% increase)

Long-term road transportation emissions increased in Saskatchewan due to a growing on-road vehicle population, which was 51% greater in 2008 than in 1990. Another major factor is the increased driver preference for SUVs, vans and pickups (LDGTs) over gasoline automobiles (LDGVs) for passenger transportation.

In 1990, LDGVs made up 57% of the entire on-road provincial fleet, which declined to 41% in 2008. In contrast with this decline, LDGTs rose from 27% of the on-road provincial population in 1990 to 42% in 2008. The 2008 provincial population of LDGTs is essentially equivalent to that of LDGVs and is a substantial factor in the observed long-term emissions growth due to the greater GHG emissions of LDGTs on a per kilometre basis.

The increase in emissions from HDDVs can also be related to increased usage, although in this case it relates to their role in the mining and fossil fuel industries.

A14.1.13.4 Agriculture (63% increase)

Agricultural emissions rose significantly by 5.1 Mt CO_2 eq between 1990 and 2008. The main driver is a 60% increase in cattle population due mainly to the expansion of the beef cattle industry because of growing demand by the United States market. Increases in synthetic nitrogen fertilizer consumption (157%) and hog population (20%) also contributed. Intensification of crop rotations (i.e. reducing area of summerfallow) and growing demand for nutrients are responsible for an increase in synthetic nitrogen fertilizer use.

A14.1.14 Short-Term Changes (2004–2008)

Between 2004 and 2008, Saskatchewan's GHG emissions increased by 3.4 Mt (4.7%). The increase was led by the growth in the Other Transportation (1.5 Mt) and Road Transportation (1.3 Mt) sectors, which were offset by a decrease in the Electricity and Heat Generation (1.4 Mt) Sector.

Short-term emission changes in Saskatchewan are illustrated in Figure A14-18.

A14.1.14.1 *Electricity and Heat Generation (8.4% decrease)*

Electricity generation decreased by 8% between 2004 and 2008. While coal-fired and natural-gas-fired generation remained fairly constant, hydroelectric generation increased by 47%. The increase in electricity generation from non-GHG-emitting electricity sources (including wind) was a major factor in the short term reduction in GHG emissions.

A14.1.14.2 *Mining and Fossil Fuel Industries (3.5% increase)*

In the short term, strong global demand for potash has fuelled increased stationary combustion emissions from the provincial mining sector. Since 2004, provincial potash production has increased by 2% (Saskatchewan Bureau of Statistics 2009).

In contrast, decreased production of heavy crude and conventional light crude oil has resulted in decreased fugitive emissions from process gas venting.

A14.1.14.3 *Road Transportation (23% increase)*

The short-term increase in road transportation emissions can be related to the 10% overall growth in the on-road provincial vehicle population, the majority of which are higher GHG-emitting LDGTs. An increase in the use of HDDVs can be attributed to their role in the transportation of freight in support of the mining and fossil fuel industries.

A14.1.14.4 *Other Transportation (52% increase)*

The increased activity in off-road diesel and gasoline vehicles as well as railway use are responsible for the short-term increase in this sector and is largely attributable to gains in the Mining and Fossil Fuel Industries Sector. In particular, historically high commodity prices encouraged production and exploration activities (Statistics Canada 2005). The Agricultural Sector also benefitted from plentiful crop harvests in 2008 (Statistics Canada 2009c).

A14.1.14.5 *Agriculture (6.7% increase)*

The short-term agricultural emissions rose by 0.8 Mt CO_2 eq between 2004 and 2008. The main drivers were a 26% increase in synthetic nitrogen fertilizer use (0.5 Mt CO_2 eq) and greater emissions from crop residue decomposition (0.3 Mt CO_2 eq). Favourable weather conditions along with good commodity prices resulted in record production for canola and dry peas along with record consumption of synthetic nitrogen fertilizers.

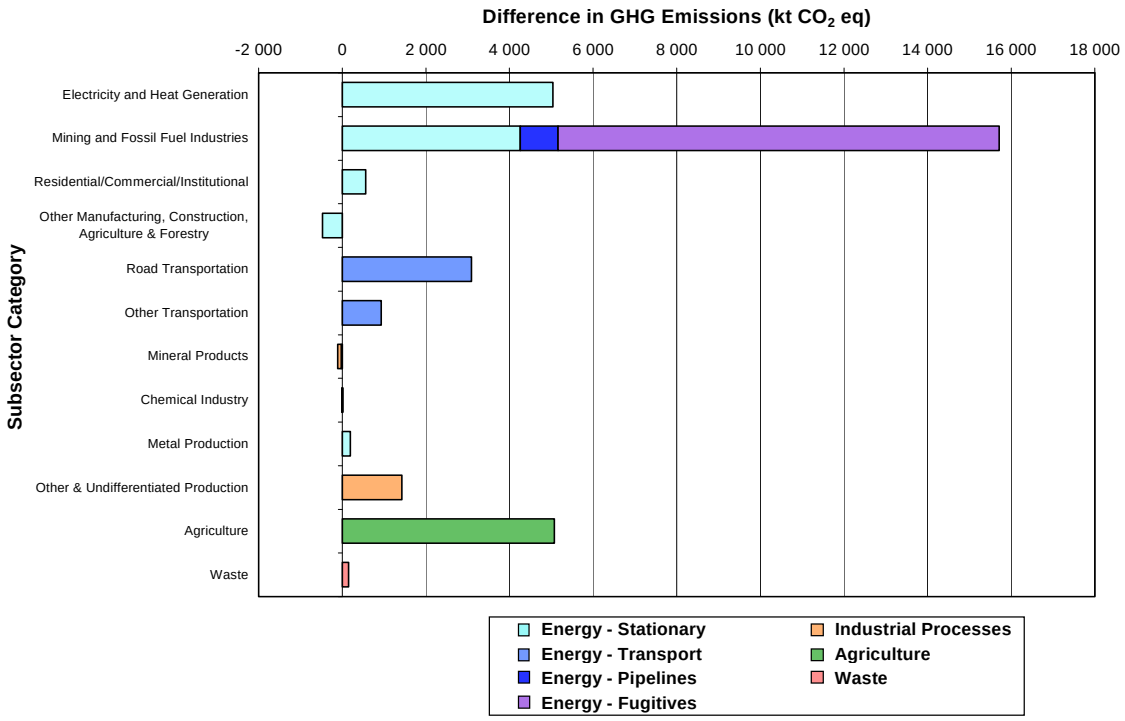

Figure A14-17: Saskatchewan Long-Term Emission Changes, 1990–2008

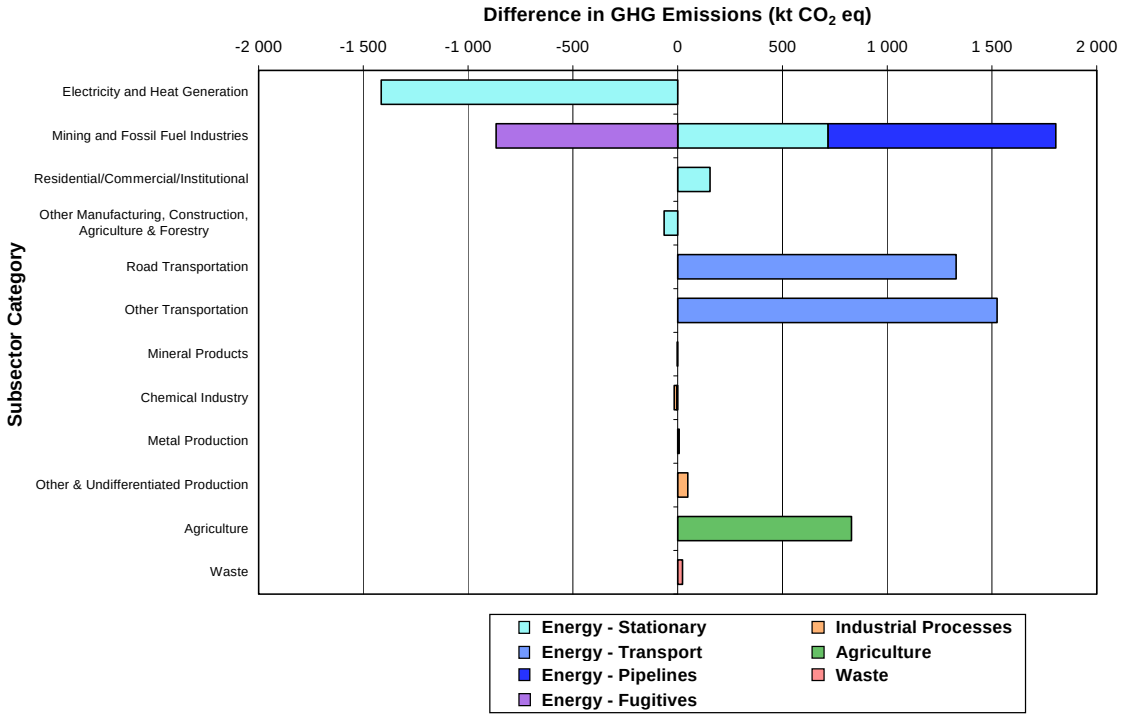

Figure A14-18: Saskatchewan Short-Term Emission Changes, 2004–2008

A14.9 Alberta

Table A14-10: Emissions, Economy, Energy, and Climate, Alberta

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**171.000**	**234.000**	**231.000**	**234.000**	**246.000**	**244.000**
Change Since 1990 (%)	*NA*	*37.0%*	*34.8%*	*36.8%*	*43.9%*	*42.8%*
Annual Change (%)	*NA*	*NA*	*-1.6%*	*1.5%*	*5.2%*	*-0.8%*
GDP (millions)	**98 683**	**163 564**	**171 416**	**181 418**	**185 870**	**185 780**
Change Since 1990 (%)	*NA*	*65.7%*	*73.7%*	*83.8%*	*88.4%*	*88.3%*
GHG Intensity (Mt/$B GDP)	**1.73**	**1.43**	**1.35**	**1.29**	**1.33**	**1.32**
GHG Efficiency ($B GDP/ Mt)	**0.58**	**0.70**	**0.74**	**0.77**	**0.75**	**0.76**
Population (000s)	**2 548**	**3 239**	**3 322**	**3 421**	**3 511**	**3 585**
Change Since 1990 (%)	*NA*	*27.1%*	*30.4%*	*34.3%*	*37.8%*	*40.7%*
GHG Per Capita (tonnes/person)	**67.2**	**72.4**	**69.4**	**68.4**	**70.2**	**68.1**
Energy Production (Primary only) (TJ)	**7 705 473**	**10 540 094**	**10 458 400**	**10 860 150**	**10 900 457**	**10 427 439**
Change Since 1990 (%)	*NA*	*36.8%*	*35.7%*	*40.9%*	*41.5%*	*35.3%*
Net Supply (Primary & Secondary) (TJ)	**1 774 961**	**2 286 674**	**2 540 678**	**2 598 795**	**2 835 049**	**2 771 312**
Change Since 1990 (%)	*NA*	*28.8%*	*43.1%*	*46.4%*	*59.7%*	*56.1%*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**954 942**	**1 369 357**	**1 362 239**	**1 397 472**	**1 570 205**	**1 544 792**
Change Since 1990 (%)	*NA*	*43.4%*	*42.7%*	*46.3%*	*64.4%*	*61.8%*
Climate						
Heating Degree-Days	**5 486**	**5 336**	**5 125**	**5 057**	**5 342**	**5 447**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 2008, the province of Alberta was the largest GHG emitter in Canada, generating 33.3% (244.3 Mt) of GHGs, 14.1% of Canada's GDP, with 10.8% of the total population. Between 1990 and 2008, GDP and GHG output increased 88% and 43% respectively (Table A14-10). Alberta provided a remarkable 63% of Canada's primary energy production in 2008, mostly from fossil fuel, which resulted in the province having the second highest GHG emission per capita, at 68.1 t GHG per person. The province's total GHG emissions are dominated by emissions related to energy. In 2008, the main contributors were the Electricity and Heat Generation Sector (55.9 Mt) and Fossil Fuel Industries subsector (41 Mt), as well as Oil and Natural Gas Fugitive Sources (35.7 Mt,) and Mining (17.5 Mt).

In 2006, Alberta accounted for 21.6% of all farms in Canada and 40% of all Canadian cattle (Statistics Canada 2007). Alberta's total gross farm receipts were $9.9 billion in 2005, while operating expenses reached $8.8 billion. In 2008, Alberta generated 31.7% of Canadian agricultural GHG emissions.

Alberta has long been known as Canada's energy province. Home to significant natural gas, crude oil and coal reserves, the province's economy has boomed thanks to growing international demand for its natural resources. When oil sands reserves are included, the province has the second largest petroleum reserves in the world, second only to Saudi Arabia (EIA 2010). Forestry and agriculture are two other key parts of this diverse, resource-rich economy. The strength of the resource sector has helped support a vibrant and diverse manufacturing industry, including the chemical industry, which has expanded production capacity since 1990.

The Alberta economy has been a key factor behind Canada's economic growth in the past 5 years, even though their economy contracted slightly in 2008 due to the global economic crisis (Government of Alberta, 2009). Energy, primary metals and agricultural products all benefited from higher prices and helped in the increasing valuation of the Canadian dollar. In 2008, oil sands investment was estimated at $19.2 billion, almost four times the $5.2 billion invested in 2003 when the surge in oil prices began (Alberta Energy 2009). Oil sands investment was also spurred by steadily declining conventional crude oil production, a result of the depletion of the highly productive conventional oil wells in the Western Canada Sedimentary Basin.

For a province with such significant coal and limited hydroelectric power resources, it is not surprising to find that the majority of electricity is generated from coal-fired generating stations. Unlike many other provinces, Alberta's landlocked location means that hydroelectric resources are difficult or uneconomic to access and therefore hydroelectricity generates a small percentage of the total for the province. Electricity in Alberta is not solely fossil fuel-based, however. Although landlocked, Alberta's location on the leeward side of the Rocky Mountains means it has excellent wind and solar resource potential. This resulted in the province installing the first commercial wind farm in Canada in 1993.

A14.1.15 Long-Term Trends (1990–2008)

Between 1990 and 2008, GHG emissions increased by 43%, predominantly driven by the increases from the Mining and Fossil Fuel Industries (31.8 Mt), Electricity and Heat Generation (15.8 Mt), and Road Transportation (7.7 Mt) sectors. As for the non-energy-related sectors, the Other & Undifferentiated Production Sector showed an increase of 4.5 Mt, while emissions from the Agriculture Sector increased by 5.9 Mt. Decreases over the long term have been limited to combustion emissions from the Other Manufacturing, Construction, Agriculture and Forestry Sector (4.1 Mt).

Long-term emission trends in Alberta are illustrated in Figure A14-19.

A14.1.15.1 Electricity and Heat Generation (39% increase)

Long-term population growth of almost 38% and a booming resource sector have resulted in increased demand for electricity. Generation-related GHG emissions increased by over 39% while generation increased by over 37%. Due to its very small hydroelectric capacity, readily available GHG-intense fossil fuels are the predominant fuel source, with coal generating over 82% of the electricity in the province in 2008 (Statistics Canada 2009d).

A14.1.15.2 Mining and Fossil Fuel Industries (49% increase)

Alberta is by far the largest producer of fossil fuels in Canada, accounting for 68% of all crude oil, 76% of natural gas, and 44% of coal produced in 2008. Even though natural gas production in Alberta has been slowly declining since the turn of the century as new reserves have become increasingly harder to find, it is still 33% higher than it was in 1990. Coal production has increased slightly (7.4%) since 1990, whereas crude oil production has been expanding rapidly since oil sands exploration and extraction became more financially viable in the late 1990s. Production of crude oil in Alberta has risen by 37% (Statistics Canada 2009b) since 1990, with increasing production from unconventional sources such as enhanced oil recovery and oil sands operations. In fact, from 1990–2008, production of light/medium crude decreased by 53%, while production of crude bitumen and synthetic crude oil grew by 256%, indicating growth in both oil sands extraction and upgrading (Statistics Canada 2009b).

Since 1990, the number of oil and gas wells drilled in the province has increased from 4189 to 14 969 in 2008 (CAPP 2009), demonstrating the increased activity in the oil and gas sector.

The increased oil and gas activity has resulted in increased stationary combustion, fugitive, and pipeline emissions from the Mining and Fossil Fuel Industries Sector, which has contributed approximately 43% (31.8 Mt) to the total provincial emissions increase of 43% (73.2 Mt) since 1990. The largest increase in this Sector has been in the Mining and Oil and Gas extraction subsector, where emissions have increased by over 600% (15.1 Mt) mainly due to oil sands expansion.

A14.1.15.3 Road Transportation (56% increase)

The increasing long-term road transportation emissions in Alberta are due in part to a rising on-road vehicle population, which was 55% greater in 2008 than in 1990. The increasing use of LDGTs as an alternative to LDGVs for passenger transportation is prevalent in Alberta.

In 1990, LDGVs accounted for 57% of the entire on-road provincial fleet, declining to 40% in 2008. In contrast, the provincial fraction of LDGTs increased from 28% in 1990 to 42% in 2008, surpassing the on-road fleet of LDGVs in 2003. The 2008 provincial population of LDGTs was larger than that of LDGVs and is a significant factor in the observed long-term emissions growth due to the greater GHG emissions of LDGTs on a per kilometre basis.

The increase in emissions from HDDVs can also be related to increased usage directly related to activity surrounding the Alberta oil sands. Increased manufacturing and demand for oil patch equipment and domestic goods may have played a role in heightened trucking activity (Statistics Canada 2005).

A14.1.15.4 Other Transportation (98% increase)

There has been a pronounced increase in off-road diesel use and railway activity due to oil sands production. Record high oil prices drove increased exploration activity. In turn, oil sands construction activity increased, as well as infrastructure and residential construction in support of the booming provincial population (Statistics Canada 2008a).

A14.1.15.5 Agriculture (43% increase)

Agricultural emissions rose significantly by 5.9 Mt CO_2 eq between 1990 and 2008. Methane emissions from enteric fermentation increased by 3.0 Mt since 1990, accounting for 51% of the increase. The 39% expansion of the beef cattle population was due to growing demand by the United States market. Increased demand for synthetic N fertilizers (55%) also contributed to the growth of emissions.

A14.1.16 Short-Term Changes (2004–2008)

Emissions increased by 9.9 Mt (4.2%) between 2004 and 2008. The increase was the result of higher emissions from the Other Transportation (3.6 Mt), Electricity and Heat Generation (2.5 Mt), and Road Transportation (2.5 Mt) Sectors. Offsetting these increases was a decrease in the Other Manufacturing, Construction, Agriculture and Forestry (1.3 Mt) Sector.

Short-term emission changes in Alberta are illustrated in Figure A-20.

A14.1.16.1 *Electricity and Heat Generation (4.8% increase)*

A continued increase in electricity generation and demand was the main factor behind the 4.8% increase (2.5 Mt) in emissions. Between 2004 and 2008, electricity generation increased by 1.1% (Statistics Canada 2009b). A 20% increase in non-GHG emitting generation sources (wind and hydroelectricity) helped reduce emissions from higher GHG-intensity fossil-fuelled generation.

A14.1.16.2 *Mining and Fossil Fuel Industries (2.0% increase)*

As seen in the long-term trends, growth in the oil sands has also contributed significantly to short-term growth in emissions in the Mining and Fossil Fuel Industries Sector as emissions have increased by 2.0% (1.9 Mt) since 2004. Increased emissions from oil sands operations and petroleum refining were somewhat offset by decreases in oil and natural gas transmission emissions and fugitive emissions.

Reductions in venting and flaring emissions have caused overall fugitive emissions to decline. Fewer wells were drilled in 2008 (14 969 wells) than in 2004 (19 365) (CAPP 2009), resulting in decreased flaring emissions from well testing. In addition, the Clean Air Strategic Alliance (CASA) established a flaring project team in 1997 as part of their overall mandate to manage air quality issues in Alberta (CASA 2009). As a result, there have been considerable reductions in the amount of solution gas flared in recent years (ERCB 2009).

A14.1.16.3 *Other Manufacturing, Construction, Agriculture and Forestry (45% decrease)*

Decreases in GHG emissions from the Other Manufacturing, Construction, Agriculture and Forestry Industries Sector are largely due to lower emissions in the Other Manufacturing subsector. The exact cause of this decrease cannot be explained with certainty; however, changes in the provincial economic structure may play a role as this category includes a wide and diverse set of industries.

A14.1.16.4 *Road Transportation (13% increase)*

The short-term road transportation emissions growth is explained through a booming provincial population, resulting in a greater number of on-road vehicles, which increased 14% over 2004 levels. The demand for the delivery of goods and services supporting the oil and gas industry also played a part in increased road transportation activity, evident through higher trucking emissions.

A14.1.16.5 *Other Transportation (35% increase)*

The short-term increase in off-road diesel emissions reflects the increased activity in the oil and gas extraction industry, as the Alberta economy has recently experienced rapid growth in this area (Statistics Canada 2008a).

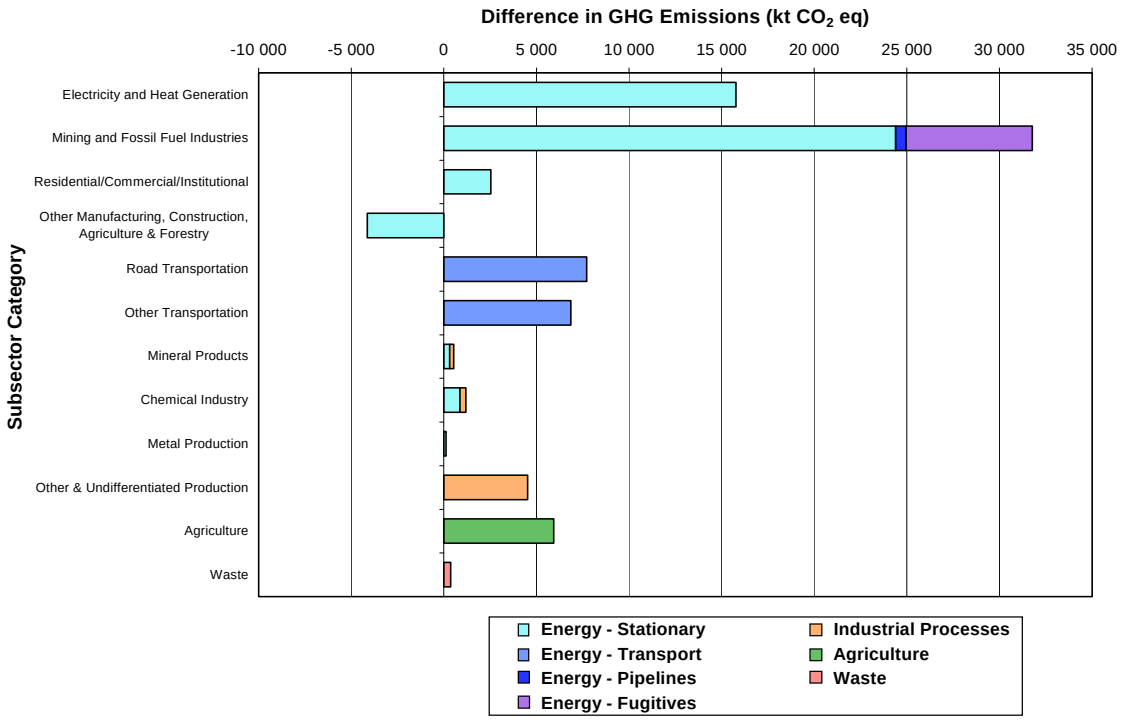

Figure A14-19: Alberta Long-Term Emission Changes, 1990–2008

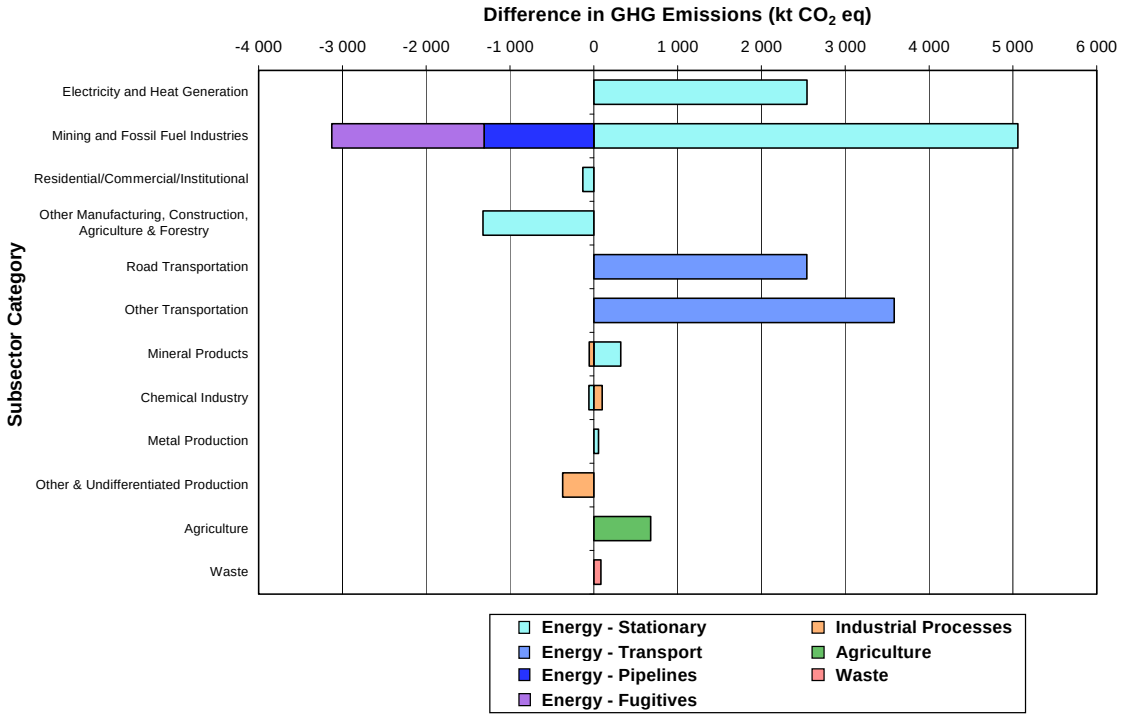

Figure A-20: Alberta Short-Term Emission Changes, 2004–2008

A14.10 British Columbia

Table A14-11: Emissions, Economy, Energy, and Climate, British Columbia

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**49.300**	**64.600**	**62.100**	**61.100**	**64.500**	**65.100**
Change Since 1990 (%)	*NA*	*31.1%*	*25.9%*	*23.9%*	*30.9%*	*32.0%*
Annual Change (%)	*NA*	*NA*	*-4.0%*	*-1.6%*	*5.6%*	*0.9%*
GDP (millions)	**101 408**	**146 541**	**152 998**	**159 916**	**164 519**	**164 520**
Change Since 1990 (%)	*NA*	*44.5%*	*50.9%*	*57.7%*	*62.2%*	*62.2%*
GHG Intensity (Mt/$B GDP)	**0.49**	**0.44**	**0.41**	**0.38**	**0.39**	**0.40**
GHG Efficiency ($B GDP/ Mt)	**2.06**	**2.27**	**2.47**	**2.62**	**2.55**	**2.53**
Population (000s)	**3 292**	**4 155**	**4 197**	**4 244**	**4 310**	**4 382**
Change Since 1990 (%)	*NA*	*26.2%*	*27.5%*	*28.9%*	*30.9%*	*33.1%*
GHG Per Capita (tonnes/person)	**15.0**	**15.5**	**14.8**	**14.4**	**15.0**	**14.8**
Energy Production (Primary only) (TJ)	**1 486 548**	**2 139 096**	**2 165 265**	**2 083 427**	**2 125 388**	**2 110 192**
Change Since 1990 (%)	*NA*	*43.9%*	*45.7%*	*40.2%*	*43.0%*	*42.0%*
Net Supply (Primary & Secondary) (TJ)	**867 436**	**1 066 395**	**1 079 791**	**1 040 227**	**1 459 491**	**1 084 672**
Change Since 1990 (%)	*NA*	*22.9%*	*24.5%*	*19.9%*	*68.3%*	*25.0%*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**740 893**	**918 713**	**904 141**	**889 849**	**946 647**	**928 808**
Change Since 1990 (%)	*NA*	*24.0%*	*22.0%*	*20.1%*	*27.8%*	*25.4%*
Climate						
Heating Degree-Days	**3 461**	**2 822**	**2 935**	**2 965**	**3 130**	**3 304**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 2008, British Columbia's 4.4 million residents generated a total of 65.1 Mt of GHGs (Table A14-11) and contributed $164.5 billion to the country's GDP. This represents 8.9% of Canada's total GHG emissions and 12.5% of the total GDP. Between 1990 and 2008, the province's total emissions increased 15.8 Mt (32.0%), while GDP and population increased 62.2% and 33.1%, respectively. A review of British Columbia's sector-specific emissions shows that, in 2008, 85% of GHG emissions arose from the Energy Sector. The majority of the province's 65.1 Mt of emissions in 2008 were from On-Road Transportation (15.4 Mt), Manufacturing & Construction Industries (6.6 Mt), Fossil Fuel Production (6.2 Mt), and Oil and Natural Gas Fugitives (6.2 Mt).

Historically known for forestry and mining, British Columbia's resource-based economy has matured in recent years. The diversification into many non-resource activities was partly out of necessity, as variability in international markets for natural resources has shown significant fluctuation over the years (BC Ministry of Advanced Education 2006). Regardless, forestry, primary metals (copper, gold, and zinc), mining and oil and gas (coal, petroleum and natural gas) continue to play an important role in the economy as do fishing and agriculture.

British Columbia is rich in hydroelectric power, which provides about 95% of the electricity generated in British Columbia, with most of the remainder provided by natural gas-powered generators (Statistics Canada 2009d). The province has taken advantage of its position and interconnections with Alberta and the north-western United States to become an important and profitable electricity exporter (BC Hydro 2009). The province's significant hydroelectric capacity allows it to take advantage of energy banking, where power is imported during off-peak times to replenish hydro reservoirs for use during high-peak times. As with most provinces with a

significant pulp and paper industry, biomass is also used for power production, although it adds little to the total supply.

A14.1.17 Long-Term Trends (1990–2008)

Over the long term, provincial emissions rose by 15.8 Mt (32%). This long-term growth was the result of growth in the Mining and Fossil Fuel Industries (6.8 Mt), Road Transportation (3.9 Mt), Other Transportation (3.1 Mt) and Mineral Products (1.0 Mt) sectors. The increase was offset by decreases in the Chemical Industry (0.4 Mt) and Metal Production (0.3 Mt) sectors.

Long-term emission trends in British Columbia are illustrated in Figure A14-21.

A14.1.17.1 Mining and Fossil Fuel Industries (85% increase)

British Columbia is Canada's second largest natural gas producer, accounting for 16% of production in 2008 (Statistics Canada 2009b), with production having more than doubled provincially from 1990. This has resulted in significantly higher fugitive and stationary combustion emissions from the Fossil Fuel Industries subsector, which contributed over 6.7 Mt, or 99%, of the 6.8 Mt increase in emissions from the Mining and Fossil Fuel Industries Sector.

British Columbia also has a very active conventional mining industry, including the mining of various metals (i.e. copper, gold, silver, lead, zinc, etc.), coal, industrial minerals (i.e. cement, gypsum, etc.), and construction aggregates. Contributing to the long-term growth in stationary combustion emissions is increased mining of industrial minerals for cement production which have more than doubled since 1990 (BC Ministry of Energy, Mines and Petroleum Resources 2009).

A14.1.17.2 Road Transportation (34% increase)

The provincial on-road fleet grew by 50% from 1990 to 2008, an important contributor to the observed long-term emissions growth. In addition, the provincial on-road vehicle make-up reflects the national trend towards a greater proportion of LDGTs. In 1990, LDGVs accounted for 61% of the entire on-road provincial fleet, declining to 51% in 2008. Comparatively, the provincial fraction of LDGTs increased from 24% in 1990 to 36% in 2008. Since, on average, LDGTs emit approximately 40% more GHGs per kilometre than LDGVs, the increase in road transportation emissions reflects the increasing preference towards LDGTs for passenger transportation.

Increased emissions from HDDVs also contributed to the long-term increase in emissions, and are likely the result of decreasing rail activity, supplanted by the increasing importance of trucking for the transportation of goods.

A14.1.17.3 Other Transportation (52% increase)

Increased domestic marine activity and off-road diesel use are responsible for the majority of the observed long-term emissions increase. Increased trade with the Pacific Rim and rising activity in the fossil fuel industry are the likely drivers. The forestry industry also saw increased activity, driven by greater foreign demand. Global demand for steel resulted in growth in the mining sector, another off-road diesel-dependent industry (Statistics Canada 2005).

A14.1.18 Short-Term Changes (2004–2008)

Between 2004 and 2008, British Columbia's GHG emissions increased by 0.5 Mt (0.7%). The increase was led by the Mining and Fossil Fuel Industries (1.4 Mt) Sector, which was offset by decreases in the Road Transportation (0.4 Mt) and Electricity and Heat Generation (0.4 Mt) sectors.

Short-term emission changes in British Columbia are illustrated in Figure A14-22.

A14.1.18.1 Electricity and Heat Generation (19% decrease)

GHG emissions from the Electricity and Heat Generation Sector decreased by 0.4 Mt, or 19%, between 2004 and 2008 while generation increased by almost 9% over the same period. In 2008, hydroelectric output increased and reduced the requirement for natural-gas-fired generation, causing overall generation to increase by 19% compared to 2004 (BC Hydro 2009, Statistics Canada 2009d). The decrease in GHG emissions was mainly due to lower consumption of natural gas.

A14.1.18.2 Mining and Fossil Fuel Industries (11% increase)

Fugitive emissions from oil and gas activities have increased by 1.1 Mt, or 21%, since 2004. The majority of this increase is from formation CO_2 venting during natural gas production and processing.

Stationary combustion emissions in this sector have increased by 0.6 Mt, or 8.1%, due in large part to increased natural gas activity as well as strong demand and high prices for natural resources from the conventional mining sector.

A14.1.18.3 Metal Production (12% decrease)

With better control of anode events through computerized sensors, the Aluminium subsector in British Columbia decreased its PFC emissions by 29% (0.27 Mt CO_2 eq) between 2004 and 2008, while slightly increasing its production by 1.3% (3.2 kt).

A14.1.18.4 Agriculture (11% decrease)

Since 2004, there has been a significant reduction of emissions (0.3 Mt CO_2 eq) attributable to decreases in beef cattle (20%) and dairy cows (11%). In British Columbia, beef cattle producers faced many challenges in recent years. The B.C. cattle industry has seen a large number of cow herds being dispersed to Alberta, as many producers remained doubtful over the future of the industry. Similarly, the dairy industry has also shrunk because of increased competition for feed grains and fuel prices.

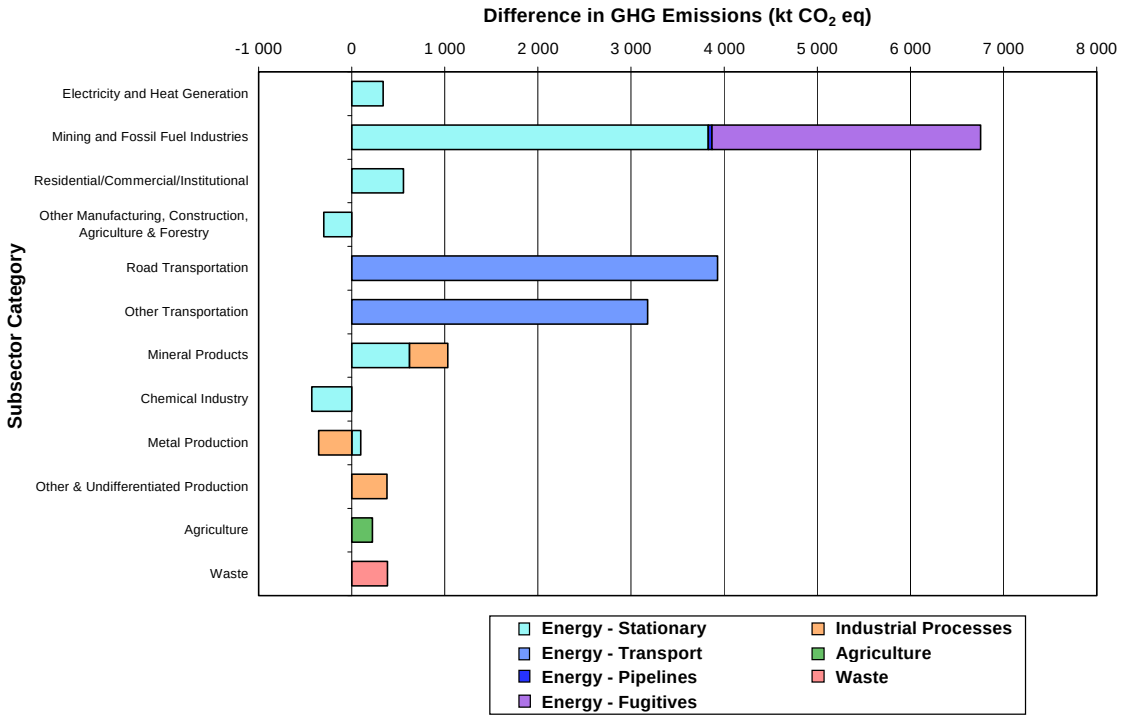

Figure A14-21: British Columbia Long-Term Emission Changes, 1990–2008

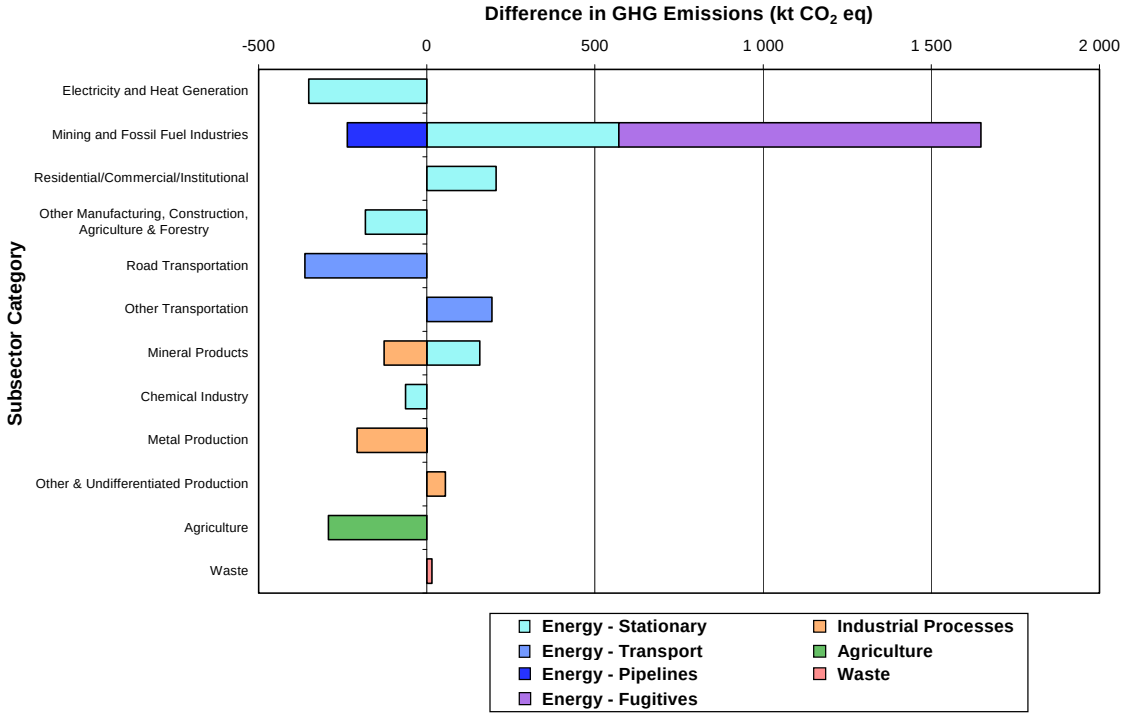

Figure A14-22: British Columbia Short-Term Emission Changes, 2004–2008

A14.11 Yukon, Northwest Territories, and Nunavut

Table A14-12: Emissions, Economy, Energy, and Climate, Total Territories

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG (Mt)	**2.051**	**2.091**	**1.944**	**1.788**	**2.267**	**2.160**
Change Since 1990 (%)	*NA*	*2.0%*	*-4.9%*	*-12.7%*	*10.7%*	*5.5%*
Annual Change (%)	*NA*	*NA*	*-6.8%*	*-8.1%*	*26.7%*	*-4.7%*
GDP (millions)	**3 578**	**5 825**	**5 842**	**5 970**	**6 465**	**6 322**
Change Since 1990 (%)	*NA*	*62.8%*	*63.3%*	*66.9%*	*80.7%*	*76.7%*
GHG Intensity (Mt/$B GDP)	**0.57**	**0.36**	**0.33**	**0.30**	**0.35**	**0.34**
GHG Efficiency ($B GDP/ Mt)	**1.75**	**2.79**	**3.00**	**3.34**	**2.85**	**2.93**
Population (000s)	**87**	**105**	**106**	**106**	**107**	**108**
Change Since 1990 (%)	*NA*	*19.9%*	*21.1%*	*21.8%*	*23.1%*	*23.6%*
GHG Per Capita (tonnes/person)	**23.5**	**19.9**	**18.4**	**16.8**	**21.1**	**20.0**
Energy Production (Primary only) (TJ)	**84 873**	**84 377**	**71 201**	**62 033**	**57 572**	**51 779**
Change Since 1990 (%)	*NA*	*-0.6%*	*-16.1%*	*-26.9%*	*-32.2%*	*-39.0%*
Net Supply (Primary & Secondary) (TJ)	**26 985**	**28 327**	**26 756**	**24 690**	**30 764**	**28 477**
Change Since 1990 (%)	*NA*	*5.0%*	*-0.8%*	*-8.5%*	*14.0%*	*5.5%*
Energy Use - Final Demand (Primary & Secondary) (TJ)	**24 688**	**25 831**	**24 740**	**23 458**	**29 623**	**28 512**
Change Since 1990 (%)	*NA*	*4.6%*	*0.2%*	*-5.0%*	*20.0%*	*15.5%*
Climate						
Heating Degree-Days	**9 171**	**8 625**	**8 012**	**8 127**	**8 434**	**8 584**

Notes:
GDP, expenditure-based, chained 2002 dollars.
NA = Not applicable.

In 1990 (the NIR base year), there were only two territories in Canada–Yukon and the Northwest Territories (N.W.T.). However, in 1999, Nunavut was created from the N.W.T. Due to data limitations, it is not possible to present economic indicators for each territory separately. Together, Canada's territories contributed 2.2 Mt (Table A14-12) or 0.3% to the national GHG total and 0.5% to the national GDP in 2008. The following discussion presents GHG emissions for Yukon and the combined territories of N.W.T. and Nunavut.

Table A14-13: Trends in GHG Emissions, Yukon

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG Emissions (Mt)	**0.531**	**0.411**	**0.394**	**0.408**	**0.407**	**0.350**
Change Since 1990 (%)	*NA*	*-22.6%*	*-25.8%*	*-23.1%*	*-23.4%*	*-34.2%*
Annual Change (%)	*NA*	*NA*	*-4.1%*	*3.6%*	*-0.3%*	*-14.1%*

Note:
NA = Not applicable.

Yukon, with a GHG emission total for 2008 of 0.35 Mt (Table A14-13), has shown a 34.2% reduction since 1990, most of which was due to reductions in combustion emissions from the Electricity and Heat Generation Sector, the Commercial and Institutional subsector, and both the Road and Other Transportation sectors. While total emissions went down, there were increases in emissions from the Mining and Fossil Fuel Industries Sector.

Since 1990, Yukon's population has increased by about 19%, while per capita emissions have decreased from 19.0 to 10.5 t GHG per person, a 44% reduction. The long-term increase in fossil

fuel industry emissions is mainly from the natural gas extraction, collection and transportation facility, which transports raw natural gas via pipeline to British Columbia for further processing. Natural gas production in the Yukon started in 1992, reaching a peak in 1999, and has steadily decreased since that time.

Economic development in the Yukon has been closely linked to the mining industry for more than a century. The impact of mining has been decreasing, with oil and gas development, tourism and public administration growing in importance. The mining sector declined significantly in the late 1990s and early 21st century, although high mineral prices are leading to increases in both mineral and oil and gas exploration.

Utility electricity generation in Yukon is mostly hydro-based, with diesel generators used for back-up purposes. There are also two wind turbines installed near Whitehorse, the first turbine being installed in 1993 (CanWEA 2010).

Table A14-14: Trends in GHG Emissions, Northwest Territories and Nunavut

Emissions, Economy, and Energy	1990	2004	2005	2006	2007	2008
Total GHG Emissions (Mt)	**1.520**	**1.680**	**1.550**	**1.380**	**1.860**	**1.810**
Change Since 1990 (%)	*NA*	*10.6%*	*2.4%*	*-9.0%*	*22.6%*	*19.4%*
Annual Change (%)	*NA*	*NA*	*-7.4%*	*-11.1%*	*34.7%*	*-2.6%*

Note:
NA = Not applicable.

The Territory of Nunavut ("our land" in Inuktitut) was created in 1999 when the Northwest Territories was split into a western part (still known as the Northwest Territories) and an eastern part. Prior to 1999, the entire area's GHG emissions were reported as the Northwest Territories exclusively. The following discusses the Northwest Territories and Nunavut separately, where possible.

The Northwest Territories and Nunavut generated approximately 1.81 Mt of GHGs in 2008 (Table A14-14). This is a 19.4% increase from 1990 and has been driven mainly by increases in the Electricity and Heat Generation and Road and Other Transportation sectors. This is not surprising, considering the long distances between industry and population centres. Since 1990, the combined population of these regions has increased 26% to approximately 74 000, while GHG emissions per capita were 24.2 t in 2008, a 5.2% decrease from 1990.

The magnitude of the emissions makes discussion of short-term changes difficult, as both uncertainty and variability in reported data may have higher effects than economically driven inter-annual changes.

The Northwest Territories, like the Yukon, has seen a decline in natural gas production from a peak in 2001. Similarly, a drop in crude oil production since 1990 has resulted in reduced fugitive emissions in both the long and short term.

Electricity in the Northwest Territories is primarily hydro-based, with diesel supplying most of the remainder. Since 1990, the utility has made significant improvements to reduce diesel consumption and increase hydroelectric capacity. There has also been an increase in natural-gas-fired generation to offset diesel generation (NTPC 2010). All electrical power generation in Nunavut is diesel-powered, while most buildings are heated with fuel oil. The remoteness of some communities and lack of roads means that air transport is, in some cases, the primary means of travel.

Long-term emission trends in Yukon and in the Northwest Territories and Nunavut are illustrated in Figure A14-23 and Figure A14-24, respectively. Short-term emission changes in Yukon and in the combined Northwest Territories and Nunavut are illustrated in Figure A14-25 and Figure A14-26 respectively.

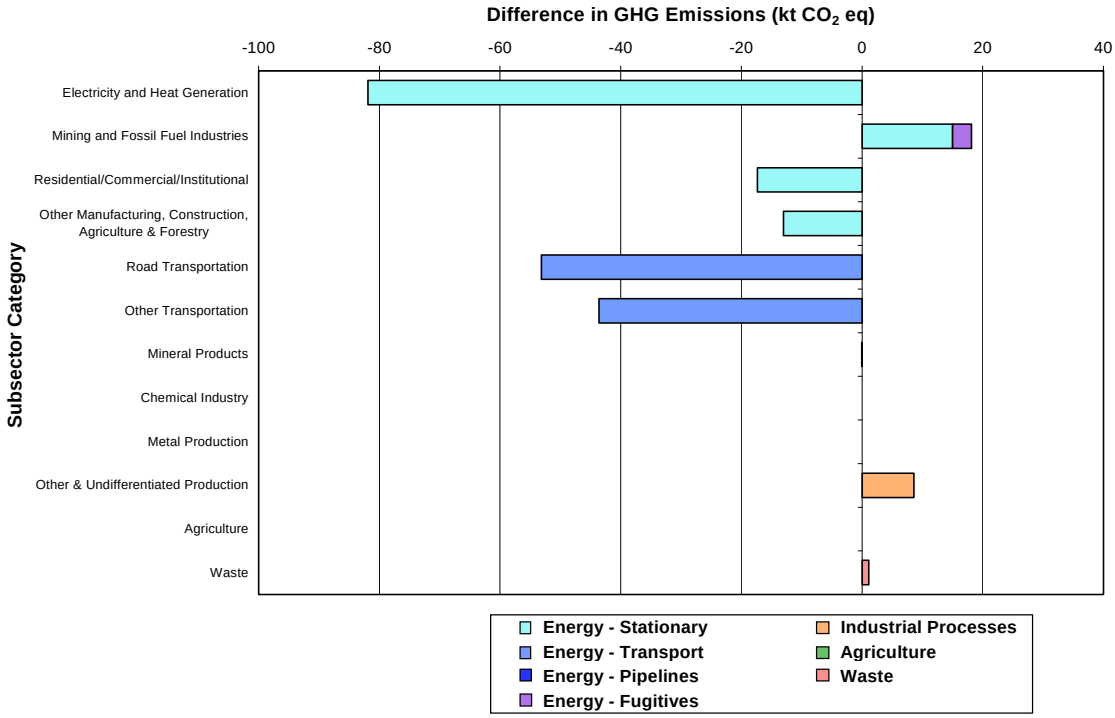

Figure A14-23: Yukon Long-Term Emission Changes, 1990–2008

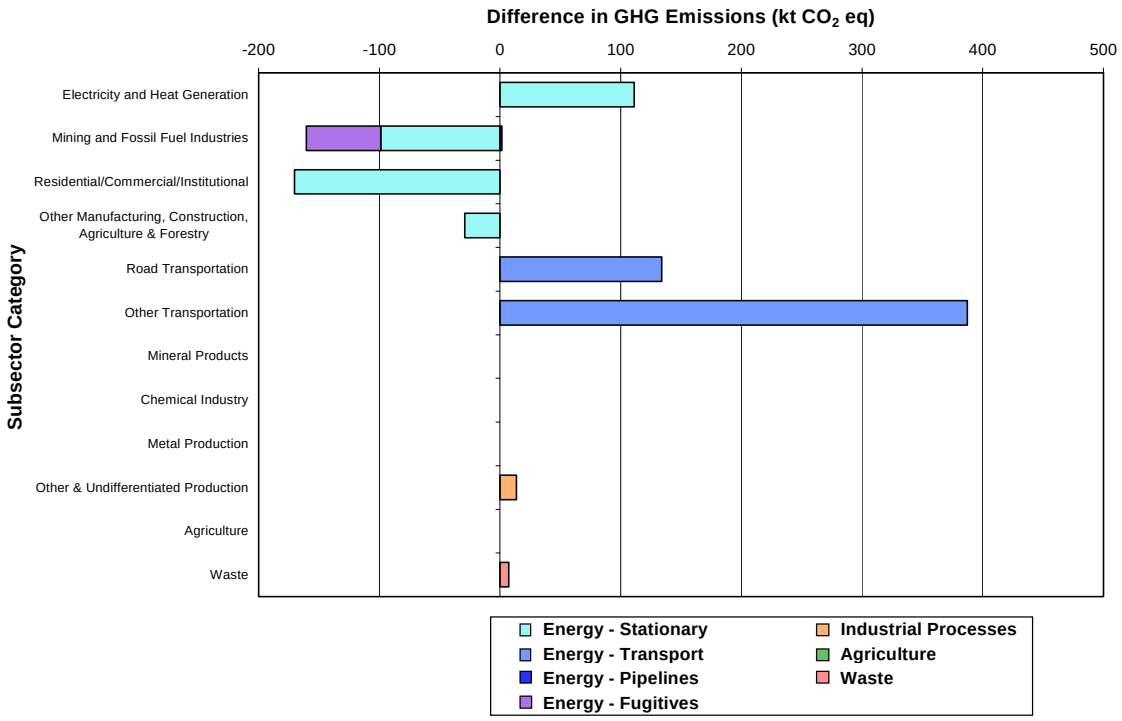

Figure A14-24: Northwest Territories and Nunavut Long-Term Emission Changes, 1990–2008

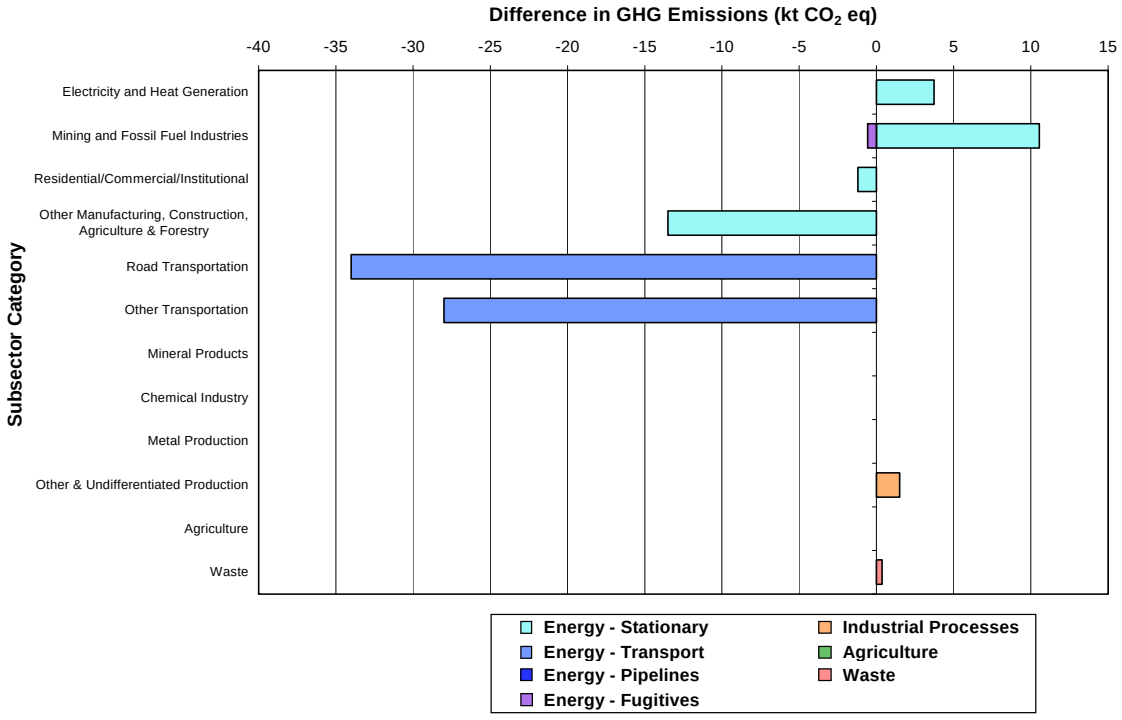

Figure A14-25: Yukon Short-Term Emission Changes, 1990–2008

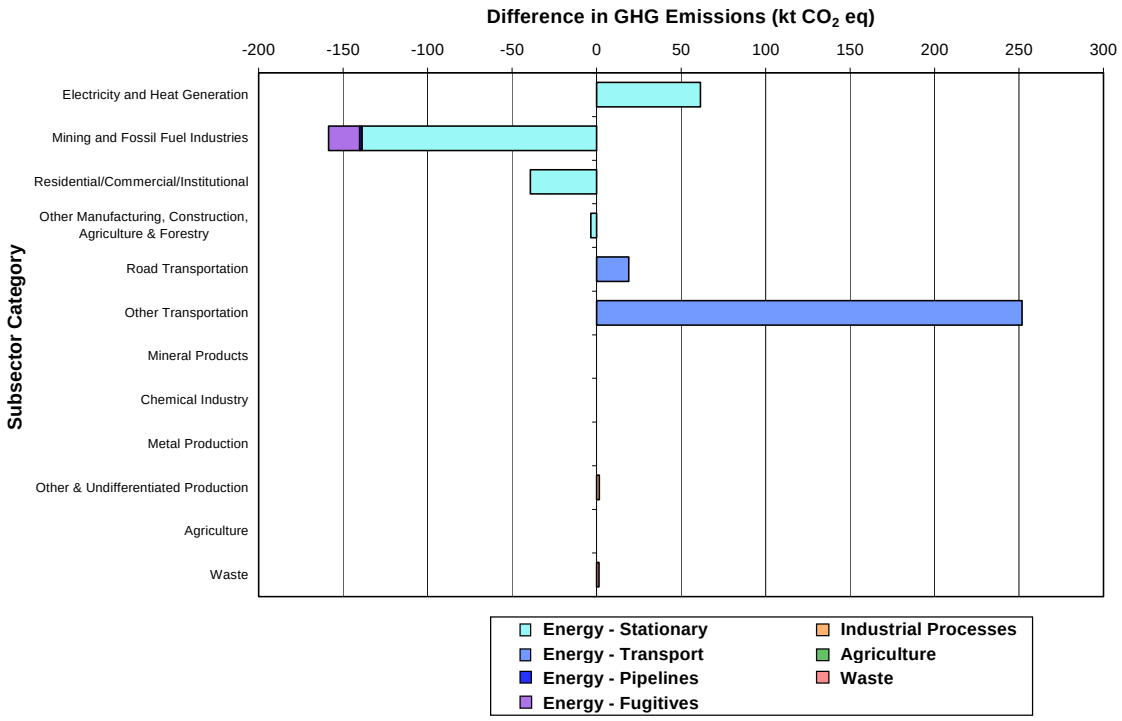

Figure A14-26: Northwest Territories and Nunavut Short-Term Emission Changes, 2004–2008

Annex 15 Provincial/Territorial Greenhouse Gas Emission Tables, 1990–2008

Summary tables illustrating GHG emissions (for GHG categories, see Table AError! **No text of specified style in document.**-1-1) by province/territory, sector, and year are included in this annex (Table A**Error! No text of specified style in document.**-12 to Table A15-28). To account for the creation of Nunavut in 1999, a time series from 1999–2007 is provided for both Nunavut and the Northwest Territories (Table A15-24 and Table A15-26) and the years 1990–1998 are presented as a combined region in Table A15-28.

Although the UNFCCC reporting guidelines require that only national-level detail be reported, provincial- and territorial-level detail is important, owing to the regional differences in emission levels and trends. Note that provincial and territorial emission estimates may not necessarily sum to the national totals due to rounding and suppression of confidential data. For example, provincial and territorial emission totals do not include consumption of PFCs and SF_6 (e.g., refrigeration, air conditioning and semi-conductor manufacturing);

The reader should also note that many provinces develop independent inventories of provincial GHG emissions, in some cases making use of alternate methodologies, data inputs and/or inclusions/omissions of GHG source categories. While Canada is developing a national emissions inventory consistent with IPCC guidelines and international obligations, provincial governments may elect to develop an inventory structure in accordance with specific provincial needs. Environment Canada encourages collaboration with provinces for quality assurance and continuous improvement of this annual National Inventory Report. The Department is striving to ensure consistency between different estimates, as some provincial GHG estimates presented in this report used to develop the national estimates may differ from those developed by provincial governments.

Table A**Error! No text of specified style in document.**-1: G**HG Category Description**

ENERGY	
a. Stationary Combustion Sources	
Electricity and Heat Generation	Emissions from fuel consumed by:
Electricity Generation	Utility and industry electricity generation
Heat Generation	Steam generation (for sale)
Fossil Fuel Production and Refining	Emissions from fuel consumed by:
Petroleum Refining and Upgrading	Petroleum refining and oil sands upgrading industries
Fossil Fuel Production	Natural gas production and some conventional and unconventional oil production industries (some refining is included)
Mining & Oil and Gas Extraction	Emissions from commercial fuel sold to: Metal and non metal mines, stone quarries, and gravel pits Oil and gas extraction industries Mineral exploration and contract drilling operations
Manufacturing Industries	Emissions from fuel consumed by the following industries: Iron and Steel (steel foundries, casting and rolling mills) Non-ferrous metals (aluminium, magnesium, and other production) Chemical (fertilizer manufacturing, organic and inorganic chemical manufacturing) Pulp and Paper (primarily pulp, paper, and paper product manufacturers) Cement production Other manufacturing industries not listed (such as automobile manufacturing, textiles, food and beverage industries)
Construction	Emissions from fuels consumed by the construction industry - buildings, highways etc.
Commercial & Institutional	Emissions from fuel consumed by: Service industries related to mining, communication, wholesale and retail trade, finance and insurance, real estate, education, etc.) education etc.) Federal, provincial, and municipal establishment National Defence and Canadian Coast Guard Train stations, airports, and warehouses
Residential	Emissions from fuel consumed for personal residences (homes, apartment hotels, condominiums, and farm house)
Agriculture & Forestry	Emissions from fuel consumed by: Forestry and logging service industry Agricultural, hunting, and trapping industry (excluding food processing, farm machinery manufacturing, and repair)
b. Transportation	Emissions resulting from the:
Domestic Aviation	-consumption of fossil fuels by Canadian registered airlines flying domestically
Road Transportation	-consumption of fossil fuels (including non-CO2 emissions from ethanol) by vehicles licensed to operate on roads
Railways	-consumption of fossil fuels by Canadian railways
Domestic Marine	-consumption of fossil fuels by Canadian registered marine vessels fuelled domestically
Others - Off Road	-consumption of fossil fuels (including non-CO2 emissions from ethanol) by combustion devices not licensed to operate on roads
Others - Pipelines	-transportation and distribution of crude oil, natural gas, and other products
c. Fugitive Sources	Intentional and unintentional releases of greenhouse gases from the following activities:
Coal Mining	Underground and surface mining
Oil and Natural Gas	Conventional and unconventional oil and gas exploration, production, transportation, and distribution
INDUSTRIAL PROCESSES	Emissions resulting from the following process activities:
a. Mineral Products	Production of cement and lime; use of soda ash, limestone & dolomite, and magnesite
b. Chemical Industry	Production of ammonia, nitric acid, and adipic acid
c. Metal Production	Production of aluminum, iron and steel, and SF_6 used in magnesium smelters and casters
d. Other & Undifferentiated Production	Non-energy use of fossil fuels
SOLVENT & OTHER PRODUCT USE	Emissions resulting from the use of N_2O as anaesthetic and propellant
AGRICULTURE	Emissions resulting from:
a. Enteric Fermentation	Livestock enteric fermentation
b. Manure Management	Livestock waste management
c. Agricultural Soils	
Direct sources	Direct N_2O emissions from synthetic fertilizer, manure on cropland, crop residue, tillage, summerfallow, irrigation, and cultivation of organic soils
Manure on Pasture, Range, and Paddock	Direct N_2O emissions from manure deposited on pasture, range, and paddock
Indirect Sources	Indirect N_2O emissions from volatilization and leaching of animal manure nitrogen, synthetic fertilizer nitrogen,
WASTE	Emissions resulting from:
a. Solid Waste Disposal on Land	Municipal solid waste management sites (landfills) and dedicated wood waste landfills
b. Wastewater Handling	Domestic and industrial wastewater treatment
c. Waste Incineration	Municipal solid waste and sewage sludge incineration
Land Use, Land-Use Change and Forestry	Emissions and removals resulting from:
a. Forest Land	Managed forests and lands converted to forests; includes growth, natural and anthropogenic disturbances
b. Cropland	Mineral and organic cropland soils management, liming, woody biomass (CO_2) ; lands converted to cropland
c. Grassland	Managed grasslands, lands converted to grasslands (CO_2)
d. Wetlands	Lands converted to wetlands (peatlands, flooded lands) and wetlands remaining wetlands (peatlands only)
e. Settlements	Urban trees and forest and grassland conversion to built-up lands (settlements, transport infrastructure, oil & gas infrastructure)

Table A15-2: 1990–2008 GHG Emission Summary for Newfoundland and Labrador

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**9,450**	**10,100**	**10,100**	**9,530**	**10,700**	**10,100**
ENERGY	**8,750**	**9,360**	**9,220**	**8,700**	**9,860**	**9,280**
a. Stationary Combustion Sources	**5,390**	**4,970**	**4,700**	**4,120**	**4,900**	**4,580**
Electricity and Heat Generation	1,630	1,450	1,230	795	1,230	1,040
Fossil Fuel Production and Refining	1,000	1,500	1,500	1,600	1,700	1,600
Mining & Oil and Gas Extraction	1,060	710	821	805	794	852
Manufacturing Industries	501	303	273	201	185	141
Construction	32.7	24.3	17.1	16.3	15.7	20.3
Commercial & Institutional	317	469	439	353	433	410
Residential	800	480	390	380	490	510
Agriculture & Forestry	24.3	8.53	6.64	5.35	7.97	9.06
b. Transport[1]	**3,360**	**3,630**	**3,740**	**3,450**	**4,060**	**4,020**
Civil Aviation (Domestic Aviation)	460	440	430	290	450	520
Road Transportation	1,680	1,800	1,900	1,900	2,060	2,150
Light-Duty Gasoline Vehicles	750	568	582	569	630	654
Light-Duty Gasoline Trucks	440	698	755	741	821	857
Heavy-Duty Gasoline Vehicles	127	52.3	53.7	53.1	58.8	62.0
Motorcycles	4.99	3.90	4.02	3.97	4.41	4.64
Light-Duty Diesel Vehicles	1.78	1.18	1.21	1.17	1.31	1.35
Light-Duty Diesel Trucks	5.69	18.1	21.1	21.1	23.4	24.7
Heavy-Duty Diesel Vehicles	349	453	487	509	519	546
Propane & Natural Gas Vehicles	1.4	0.32	0.31	0.46	0.61	0.61
Railways	-	-	-	-	-	30
Navigation (Domestic Marine)	700	640	590	560	740	480
Other Transportation	520	750	830	700	810	840
Off-Road Gasoline	110	32	34	27	120	180
Off-Road Diesel	410	720	790	670	690	660
Pipelines	-	-	-	-	-	-
c. Fugitive Sources[2]	**-**	**764**	**778**	**1,130**	**899**	**678**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	-	764	778	1,130	899	678
INDUSTRIAL PROCESSES[3]	**75.5**	**81.6**	**158**	**107**	**101**	**92.9**
a. Mineral Products	**57**	**0.11**	**0.10**	**0.14**	**0.13**	**0.12**
Cement Production	57	-	-	-	-	-
Lime Production	-	-	-	-	-	-
Mineral Products Use	0.20	0.11	0.10	0.14	0.13	0.12
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**58**	**65**	**61**	**67**	**67**
e. Other & Undifferentiated Production[4]	**19**	**23**	**94**	**46**	**34**	**25**
SOLVENT & OTHER PRODUCT USE	**3.7**	**3.4**	**2.9**	**5.0**	**4.9**	**5.0**
AGRICULTURE	**48**	**57**	**60**	**63**	**63**	**68**
a. Enteric Fermentation	17	22	24	25	25	28
b. Manure Management	13	14	15	15	15	16
c. Agriculture Soils	18	21	22	23	23	24
Direct Sources	8.6	10	11	12	11	12
Pasture, Range and Paddock Manure	1.7	2.1	2.2	2.3	2.4	2.4
Indirect Sources	8	8	9	9	9	9
WASTE	**570**	**650**	**650**	**650**	**650**	**650**
a. Solid Waste Disposal on Land	560	620	620	620	620	620
b. Wastewater Handling	12	29	29	29	30	30
c. Waste Incineration	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-3: 2008 GHG Emission Summary for Newfoundland and Labrador

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**8,820**	**44**	**920**	**0.93**	**290**	**67**	**-**	**-**	**10,100**
ENERGY	**8,800**	**12**	**240**	**0.8**	**200**				**9,280**
a. Stationary Combustion Sources	**4,350**	**9**	**200**	**0.2**	**50**				**4,580**
Electricity and Heat Generation	1,040	0.01	0.27	0.02	7				1,040
Fossil Fuel Production and Refining	1,510	3	70	0.04	10				1,600
Mining & Oil and Gas Extraction	848	0.02	0.5	0.01	4				852
Manufacturing Industries	138	0.02	0.4	0.01	3				141
Construction	20.2	0.00	0.00	0.00	0.08				20.3
Commercial & Institutional	407	0.01	0.1	0.01	3				410
Residential	379	6	100	0.06	20				510
Agriculture & Forestry	9.02	0.00	0.00	0.00	0.04				9.06
b. Transport[1]	**3,820**	**0.4**	**9**	**0.6**	**200**				**4,020**
Civil Aviation (Domestic Aviation)	506	0.02	0.4	0.05	10				520
Road Transportation	2,100	0.14	3.0	0.15	47				2,150
Light-Duty Gasoline Vehicles	640	0.05	0.95	0.04	14				654
Light-Duty Gasoline Trucks	829	0.07	1.4	0.09	27				857
Heavy-Duty Gasoline Vehicles	60.6	0.00	0.07	0.00	1.4				62.0
Motorcycles	4.55	0.00	0.06	0.00	0.03				4.64
Light-Duty Diesel Vehicles	1.32	0.00	0.00	0.00	0.03				1.35
Light-Duty Diesel Trucks	24.0	0.00	0.01	0.00	0.6				24.7
Heavy-Duty Diesel Vehicles	540	0.02	0.5	0.02	5				546
Propane & Natural Gas Vehicles	0.60	0.00	0.01	0.00	0.00				0.61
Railways	26.4	0.00	0.03	0.01	3				30
Navigation (Domestic Marine)	433	0.03	0.5	0.2	50				480
Other Transportation	760	0.2	5	0.2	80				840
Off-Road Gasoline	180	0.2	4	0.00	1				180
Off-Road Diesel	580	0.03	0.7	0.2	70				660
Pipelines	-	-	-	-	-				0
c. Fugitive Sources[2]	**630**	**2.4**	**50**	**-**	**-**				**678**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	627	2.40	50.5	-	-				678
INDUSTRIAL PROCESSES[3]	**26**	**-**	**-**	**-**	**-**	**67**	**-**	**-**	**92.9**
a. Mineral Products	**0.12**								**0.12**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	0.12								0.12
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**67**			67
e Other & Undifferentiated Production[4]	**25**								**25**
SOLVENT & OTHER PRODUCT USE				**0.02**	**5.0**				**5.0**
AGRICULTURE		**1.6**	**34**	**0.11**	**34**				**68**
a. Enteric Fermentation		1.3	28						28
b. Manure Management		0.28	6.0	0.03	9.5				16
c. Agriculture Soils				**0.08**	**24**				**24**
Direct Sources				0.04	12				12
Pasture, Range and Paddock Manure				0.01	2.4				2.4
Indirect Sources				0.03	9				9
WASTE	**-**	**31**	**640**	**0.03**	**10**				**650**
a. Solid Waste Disposal on Land		30	620		-				620
b. Wastewater Handling		0.94	20	0.03	10				30
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-4: 1990–2008 GHG Emission Summary for Prince Edward Island

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**1,980**	**2,290**	**2,230**	**2,110**	**2,070**	**1,970**
ENERGY	**1,420**	**1,580**	**1,530**	**1,450**	**1,470**	**1,370**
a. Stationary Combustion Sources	**733**	**703**	**649**	**591**	**596**	**524**
Electricity and Heat Generation	103	18.0	11.9	7.82	-	-
Fossil Fuel Production and Refining	0.11	0.02	-	-	-	-
Mining & Oil and Gas Extraction	0.77	0.10	-	-	-	-
Manufacturing Industries	54.2	139	137	137	90.8	83.7
Construction	11.0	6.18	7.54	6.17	5.62	5.20
Commercial & Institutional	158	236	211	187	164	168
Residential	390	280	260	240	320	250
Agriculture & Forestry	18.4	20.1	18.6	16.0	13.2	13.7
b. Transport[1]	**690**	**875**	**880**	**862**	**876**	**842**
Civil Aviation (Domestic Aviation)	13	10	11	11	12	12
Road Transportation	528	630	628	627	632	634
Light-Duty Gasoline Vehicles	241	219	215	213	215	216
Light-Duty Gasoline Trucks	114	229	238	238	240	243
Heavy-Duty Gasoline Vehicles	67.2	24.7	24.3	24.3	24.8	25.2
Motorcycles	0.98	2.54	2.69	2.70	2.73	2.78
Light-Duty Diesel Vehicles	1.77	1.60	1.58	1.56	1.57	1.58
Light-Duty Diesel Trucks	3.26	9.15	10.0	10.2	10.3	10.5
Heavy-Duty Diesel Vehicles	98.6	144	136	137	138	135
Propane & Natural Gas Vehicles	1.1	0.04	-	-	-	-
Railways	-	-	-	-	-	5
Navigation (Domestic Marine)	89	100	99	97	97	80
Other Transportation	61	130	140	130	130	110
Off-Road Gasoline	28	75	75	71	78	77
Off-Road Diesel	33	58	67	58	56	33
Pipelines	-	-	-	-	-	-
c. Fugitive Sources[2]	**-**	**-**	**-**	**-**	**-**	**-**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	-	-	-	-	-	-
INDUSTRIAL PROCESSES[3]	**3.33**	**23.7**	**25.6**	**24.7**	**26.4**	**26.1**
a. Mineral Products	**-**	**0.40**	**0.35**	**0.53**	**0.49**	**0.43**
Cement Production	-	-	-	-	-	-
Lime Production	-	-	-	-	-	-
Mineral Products Use	-	0.40	0.35	0.53	0.49	0.43
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**21**	**23**	**22**	**24**	**24**
e. Other & Undifferentiated Production[4]	**3.3**	**2.5**	**1.8**	**1.8**	**1.8**	**1.6**
SOLVENT & OTHER PRODUCT USE	**0.82**	**0.91**	**0.77**	**1.4**	**1.3**	**1.4**
AGRICULTURE	**470**	**580**	**560**	**520**	**460**	**460**
a. Enteric Fermentation	130	120	120	120	120	120
b. Manure Management	54	53	52	52	52	44
c. Agriculture Soils	280	410	380	340	280	290
Direct Sources	150	230	220	190	150	160
Pasture, Range and Paddock Manure	19	20	20	21	21	19
Indirect Sources	100	200	100	100	100	100
WASTE	**88**	**110**	**110**	**110**	**110**	**120**
a. Solid Waste Disposal on Land	75	98	99	100	100	100
b. Wastewater Handling	3.6	4.1	4.0	4.0	4.0	4.0
c. Waste Incineration	9.1	9.4	9.5	9.5	9.5	9.7

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-5: 2008 GHG Emission Summary for Prince Edward Island

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**1,300**	**13**	**280**	**1.2**	**360**	**24**	**-**	**-**	**1,970**
ENERGY	**1,290**	**1.7**	**37**	**0.1**	**40**				**1,370**
a. Stationary Combustion Sources	**482**	**2**	**30**	**0.02**	**7**				**524**
Electricity and Heat Generation	-	-	-	-	-				0
Fossil Fuel Production and Refining	-	-	-	-	-				0
Mining & Oil and Gas Extraction	-	-	-	-	-				0
Manufacturing Industries	83.1	0.00	0.06	0.00	0.5				83.7
Construction	5.18	0.00	0.00	0.00	0.02				5.20
Commercial & Institutional	167	0.00	0.04	0.00	0.9				168
Residential	214	2	30	0.02	6				250
Agriculture & Forestry	13.6	0.00	0.00	0.00	0.07				13.7
b. Transport[1]	**811**	**0.1**	**3**	**0.09**	**30**				**842**
Civil Aviation (Domestic Aviation)	12.0	0.00	0.02	0.00	0.3				12
Road Transportation	619	0.05	1.0	0.05	14				634
Light-Duty Gasoline Vehicles	211	0.02	0.35	0.02	4.5				216
Light-Duty Gasoline Trucks	235	0.02	0.44	0.02	7.4				243
Heavy-Duty Gasoline Vehicles	24.7	0.00	0.04	0.00	0.50				25.2
Motorcycles	2.73	0.00	0.04	0.00	0.02				2.78
Light-Duty Diesel Vehicles	1.54	0.00	0.00	0.00	0.04				1.58
Light-Duty Diesel Trucks	10.3	0.00	0.01	0.00	0.3				10.5
Heavy-Duty Diesel Vehicles	134	0.01	0.1	0.00	1				135
Propane & Natural Gas Vehicles	-	-	-	-	-				0
Railways	4.79	0.00	0.01	0.00	0.6				5
Navigation (Domestic Marine)	71.2	0.00	0.08	0.03	9				80
Other Transportation	100	0.09	2	0.01	4				110
Off-Road Gasoline	75	0.09	2	0.00	0.5				77
Off-Road Diesel	29	0.00	0.03	0.01	4				33
Pipelines	-	-	-	-	-				0
c. Fugitive Sources[2]	**-**	**-**	**-**	**-**	**-**				**0**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	-	-	-	-	-				0
INDUSTRIAL PROCESSES[3]	**2.0**	**-**	**-**	**-**	**-**	**24**	**-**	**-**	**26.1**
a. Mineral Products	**0.43**								**0.43**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	0.43								0.43
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						24			24
e Other & Undifferentiated Production[4]	**1.6**								**1.6**
SOLVENT & OTHER PRODUCT USE				**0.00**	**1.4**				**1.4**
AGRICULTURE		**6.6**	**140**	**1.0**	**320**				**460**
a. Enteric Fermentation		5.6	120						120
b. Manure Management		0.91	19	0.08	24				44
c. Agriculture Soils				**0.95**	**290**				**290**
Direct Sources				0.53	160				160
Pasture, Range and Paddock Manure				0.06	19				19
Indirect Sources				0.4	100				100
WASTE	**8.1**	**4.9**	**100**	**0.01**	**4**				**120**
a. Solid Waste Disposal on Land		4.9	100		-				100
b. Wastewater Handling		0.06	1.2	0.01	3				4.0
c. Waste Incineration	8.1	-	-	0.01	2				9.7

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-6: 1990–2008 GHG Emission Summary for Nova Scotia

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**19,000**	**22,800**	**21,800**	**20,100**	**20,700**	**20,900**
ENERGY	**17,500**	**21,300**	**20,400**	**18,800**	**19,400**	**19,600**
a. Stationary Combustion Sources	**11,300**	**15,100**	**14,100**	**13,000**	**13,700**	**14,200**
Electricity and Heat Generation	6,840	9,990	9,360	8,680	9,140	9,420
Fossil Fuel Production and Refining	660	1,100	980	960	930	1,200
Mining & Oil and Gas Extraction	35.2	28.2	27.6	27.5	29.5	29.4
Manufacturing Industries	721	598	471	463	465	428
Construction	49.2	54.1	38.1	31.3	28.9	26.4
Commercial & Institutional	790	1,950	1,990	1,760	1,870	1,820
Residential	2,100	1,300	1,100	1,100	1,200	1,100
Agriculture & Forestry	103	75.1	78.5	58.2	82.6	73.4
b. Transport[1]	**4,980**	**6,190**	**6,230**	**5,690**	**5,640**	**5,370**
Civil Aviation (Domestic Aviation)	390	490	500	390	380	350
Road Transportation	3,170	3,750	3,750	3,840	3,750	3,810
Light-Duty Gasoline Vehicles	1,560	1,290	1,250	1,260	1,230	1,260
Light-Duty Gasoline Trucks	689	1,280	1,310	1,330	1,290	1,330
Heavy-Duty Gasoline Vehicles	194	111	108	110	108	112
Motorcycles	9.59	9.26	9.09	9.27	9.06	9.40
Light-Duty Diesel Vehicles	17.5	18.5	18.3	18.4	18.0	18.5
Light-Duty Diesel Trucks	24.1	54.9	58.4	60.2	58.8	61.4
Heavy-Duty Diesel Vehicles	663	986	994	1,050	1,030	1,010
Propane & Natural Gas Vehicles	7.5	4.2	4.9	5.1	5.1	5.5
Railways	70	100	100	100	200	100
Navigation (Domestic Marine)	610	770	860	590	650	450
Other Transportation	740	1,100	1,000	760	710	630
Off-Road Gasoline	280	270	230	240	150	210
Off-Road Diesel	460	770	740	480	500	360
Pipelines	-	30.0	34.3	46.9	61.7	58.4
c. Fugitive Sources[2]	**1,170**	**73.5**	**72.5**	**68.6**	**74.3**	**76.0**
Coal Mining	1,000	0.09	0.01	0.00	-	-
Oil and Natural Gas	-	73.4	72.5	68.6	74.3	76.0
INDUSTRIAL PROCESSES[3]	**280**	**419**	**423**	**383**	**412**	**406**
a. Mineral Products	**180**	**230**	**230**	**200**	**210**	**210**
Cement Production	170	230	230	200	210	210
Lime Production	-	-	-	-	-	-
Mineral Products Use	8.53	2.19	1.99	3.30	1.61	1.44
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**120**	**130**	**130**	**140**	**140**
e. Other & Undifferentiated Production[4]	**100**	**66**	**56**	**51**	**64**	**56**
SOLVENT & OTHER PRODUCT USE	**5.7**	**6.2**	**5.2**	**9.3**	**9.1**	**9.3**
AGRICULTURE	**470**	**450**	**440**	**430**	**420**	**410**
a. Enteric Fermentation	200	180	180	180	170	180
b. Manure Management	89	82	82	81	79	74
c. Agriculture Soils	180	190	180	170	160	160
Direct Sources	83	92	86	82	75	75
Pasture, Range and Paddock Manure	26	24	24	24	24	24
Indirect Sources	70	70	70	70	60	60
WASTE	**750**	**600**	**540**	**490**	**470**	**450**
a. Solid Waste Disposal on Land	710	570	500	460	430	420
b. Wastewater Handling	25	25	25	25	25	25
c. Waste Incineration	21	10	11	11	11	11

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-7: 2008 GHG Emission Summary for Nova Scotia

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**19,300**	**43**	**910**	**1.6**	**510**	**140**	**-**	**-**	**20,900**
ENERGY	**19,100**	**13**	**280**	**0.9**	**300**				**19,600**
a. Stationary Combustion Sources	**13,900**	**9**	**200**	**0.3**	**90**				**14,200**
Electricity and Heat Generation	9,380	0.30	6.3	0.1	40				9,420
Fossil Fuel Production and Refining	1,190	2	30	0.02	5				1,200
Mining & Oil and Gas Extraction	29.1	0.00	0.02	0.00	0.2				29.4
Manufacturing Industries	416	0.08	2	0.04	10				428
Construction	26.2	0.00	0.01	0.00	0.1				26.4
Commercial & Institutional	1,810	0.02	0.5	0.03	10				1,820
Residential	938	8	200	0.09	30				1,100
Agriculture & Forestry	73.0	0.00	0.02	0.00	0.4				73.4
b. Transport[1]	**5,180**	**0.6**	**10**	**0.6**	**200**				**5,370**
Civil Aviation (Domestic Aviation)	335	0.01	0.3	0.03	9				350
Road Transportation	3,720	0.26	5.4	0.26	82				3,810
Light-Duty Gasoline Vehicles	1,230	0.09	1.9	0.08	26				1,260
Light-Duty Gasoline Trucks	1,290	0.10	2.2	0.13	41				1,330
Heavy-Duty Gasoline Vehicles	109	0.01	0.11	0.01	2.6				112
Motorcycles	9.22	0.01	0.12	0.00	0.06				9.40
Light-Duty Diesel Vehicles	18.0	0.00	0.01	0.00	0.5				18.5
Light-Duty Diesel Trucks	59.8	0.00	0.03	0.01	2				61.4
Heavy-Duty Diesel Vehicles	1,000	0.05	1	0.03	10				1,010
Propane & Natural Gas Vehicles	5.44	0.00	0.05	0.00	0.03				5.5
Railways	123	0.01	0.1	0.05	20				100
Navigation (Domestic Marine)	419	0.03	0.6	0.08	30				450
Other Transportation	580	0.3	7	0.1	40				630
Off-Road Gasoline	200	0.2	5	0.00	1				210
Off-Road Diesel	320	0.02	0.4	0.1	40				360
Pipelines	56.7	0.06	1.2	0.00	0.5				58.4
c. Fugitive Sources[2]	**7.3**	**3.3**	**69**	**-**	**-**				**76.0**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	7.26	3.27	68.7	-	-				76.0
INDUSTRIAL PROCESSES[3]	**270**	**-**	**-**	**-**	**-**	**140**	**-**	**-**	**406**
a. Mineral Products	**210**								**210**
Cement Production	210								210
Lime Production	-								0
Mineral Product Use	1.44								1.44
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						140			140
e Other & Undifferentiated Production[4]	**56**								**56**
SOLVENT & OTHER PRODUCT USE				**0.03**	**9.3**				**9.3**
AGRICULTURE		**9.7**	**200**	**0.68**	**210**				**410**
a. Enteric Fermentation		8.4	180						180
b. Manure Management		1.3	27	0.15	48				74
c. Agriculture Soils				**0.52**	**160**				**160**
Direct Sources				0.24	75				75
Pasture, Range and Paddock Manure				0.08	24				24
Indirect Sources				0.2	60				60
WASTE	**9.4**	**20**	**420**	**0.07**	**20**				**450**
a. Solid Waste Disposal on Land		20	420		-				420
b. Wastewater Handling		0.28	6.0	0.06	20				25
c. Waste Incineration	9.4	-	-	0.01	2				11

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-8: 1990–2008 GHG Emission Summary for New Brunswick

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**15,900**	**21,300**	**21,000**	**18,700**	**19,100**	**18,000**
ENERGY	**14,700**	**19,700**	**19,500**	**17,300**	**17,700**	**16,600**
a. Stationary Combustion Sources	**10,700**	**14,200**	**14,000**	**11,900**	**12,400**	**11,600**
Electricity and Heat Generation	6,130	8,690	8,630	7,060	7,310	6,830
Fossil Fuel Production and Refining	1,100	2,500	2,500	2,500	2,600	2,500
Mining & Oil and Gas Extraction	125	116	120	115	106	96.3
Manufacturing Industries	1,440	1,220	982	795	816	686
Construction	68.0	10.6	3.86	5.00	17.9	16.7
Commercial & Institutional	574	964	1,080	794	818	811
Residential	1,200	730	710	650	720	720
Agriculture & Forestry	52.4	29.7	24.4	24.2	27.8	23.7
b. Transport[1]	**3,980**	**5,420**	**5,400**	**5,280**	**5,210**	**4,880**
Civil Aviation (Domestic Aviation)	75	130	140	130	150	160
Road Transportation	3,030	3,790	3,860	3,840	3,890	3,900
Light-Duty Gasoline Vehicles	1,310	1,080	1,050	1,040	1,050	1,050
Light-Duty Gasoline Trucks	667	1,190	1,220	1,220	1,230	1,240
Heavy-Duty Gasoline Vehicles	200	116	126	127	128	130
Motorcycles	6.83	10.2	10.3	10.4	10.5	10.6
Light-Duty Diesel Vehicles	11.2	10.3	10.1	10.1	10.2	10.2
Light-Duty Diesel Trucks	23.7	50.9	54.0	55.0	55.5	56.6
Heavy-Duty Diesel Vehicles	800	1,320	1,390	1,380	1,410	1,400
Propane & Natural Gas Vehicles	5.1	1.3	0.61	0.77	0.77	0.77
Railways	100	300	300	300	300	200
Navigation (Domestic Marine)	270	430	420	390	390	330
Other Transportation	490	780	720	650	510	260
Off-Road Gasoline	130	140	100	88	82	130
Off-Road Diesel	360	650	610	560	420	140
Pipelines	-	-	-	-	-	-
c. Fugitive Sources[2]	**1.46**	**31.2**	**31.3**	**31.2**	**31.3**	**31.1**
Coal Mining	1	0.3	0.4	0.3	0.4	0.2
Oil and Natural Gas	-	30.9	30.9	30.9	30.9	30.9
INDUSTRIAL PROCESSES[3]	**163**	**405**	**360**	**343**	**335**	**357**
a. Mineral Products	**91**	**100**	**96**	**94**	**85**	**82**
Cement Production	-	-	-	-	-	-
Lime Production	76	90	86	79	76	74
Mineral Products Use	14.6	10.9	9.90	15.6	8.38	7.44
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**98**	**110**	**110**	**120**	**110**
e. Other & Undifferentiated Production[4]	**72**	**210**	**160**	**140**	**130**	**160**
SOLVENT & OTHER PRODUCT USE	**4.7**	**4.9**	**4.2**	**7.4**	**7.2**	**7.4**
AGRICULTURE	**460**	**540**	**520**	**490**	**450**	**450**
a. Enteric Fermentation	160	150	150	150	150	140
b. Manure Management	67	71	70	69	67	64
c. Agriculture Soils	230	320	300	270	230	240
Direct Sources	120	180	170	150	130	130
Pasture, Range and Paddock Manure	21	21	21	21	20	19
Indirect Sources	80	100	100	100	90	90
WASTE	**610**	**630**	**630**	**620**	**600**	**600**
a. Solid Waste Disposal on Land	570	590	590	580	570	560
b. Wastewater Handling	40	38	37	38	38	37
c. Waste Incineration	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-9: 2008 GHG Emission Summary for New Brunswick

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**16,300**	**46**	**970**	**1.8**	**550**	**110**	**-**	**-**	**18,000**
ENERGY	**16,100**	**10**	**210**	**0.8**	**200**				**16,600**
a. Stationary Combustion Sources	**11,400**	**8**	**200**	**0.3**	**90**				**11,600**
Electricity and Heat Generation	6,800	0.18	3.8	0.1	30				6,830
Fossil Fuel Production and Refining	2,450	0.04	0.9	0.01	4				2,500
Mining & Oil and Gas Extraction	95.6	0.00	0.06	0.00	0.7				96.3
Manufacturing Industries	666	0.1	3	0.06	20				686
Construction	16.7	0.00	0.00	0.00	0.07				16.7
Commercial & Institutional	805	0.01	0.3	0.02	5				811
Residential	525	8	200	0.09	30				720
Agriculture & Forestry	23.6	0.00	0.01	0.00	0.1				23.7
b. Transport[1]	**4,710**	**0.5**	**10**	**0.5**	**200**				**4,880**
Civil Aviation (Domestic Aviation)	153	0.01	0.2	0.01	4				160
Road Transportation	3,820	0.26	5.6	0.25	78				3,900
Light-Duty Gasoline Vehicles	1,030	0.08	1.7	0.07	22				1,050
Light-Duty Gasoline Trucks	1,200	0.11	2.2	0.12	38				1,240
Heavy-Duty Gasoline Vehicles	127	0.01	0.13	0.01	2.9				130
Motorcycles	10.4	0.01	0.13	0.00	0.06				10.6
Light-Duty Diesel Vehicles	9.96	0.00	0.00	0.00	0.3				10.2
Light-Duty Diesel Trucks	55.2	0.00	0.03	0.00	1				56.6
Heavy-Duty Diesel Vehicles	1,390	0.06	1	0.04	10				1,400
Propane & Natural Gas Vehicles	0.76	0.00	0.01	0.00	0.00				0.77
Railways	203	0.01	0.2	0.08	30				200
Navigation (Domestic Marine)	299	0.02	0.4	0.1	40				330
Other Transportation	240	0.2	3	0.05	20				260
Off-Road Gasoline	120	0.1	3	0.00	0.8				130
Off-Road Diesel	120	0.01	0.1	0.05	20				140
Pipelines	-	-	-	-	-				0
c. Fugitive Sources[2]	**0.01**	**1.5**	**31**	**-**	**-**				**31.1**
Coal Mining		0.01	0.2	-	-				0.2
Oil and Natural Gas	0.01	1.47	30.9	-	-				30.9
INDUSTRIAL PROCESSES[3]	**240**	**-**	**-**	**-**	**-**	**110**	**-**	**-**	**357**
a. Mineral Products	**82**								**82**
Cement Production	-								0
Lime Production	74								74
Mineral Product Use	7.44								7.44
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						110			110
e Other & Undifferentiated Production[4]	**160**								**160**
SOLVENT & OTHER PRODUCT USE				**0.02**	**7.4**				**7.4**
AGRICULTURE		**8.1**	**170**	**0.89**	**280**				**450**
a. Enteric Fermentation		6.9	140						140
b. Manure Management		1.2	26	0.12	38				64
c. Agriculture Soils				**0.77**	**240**				**240**
Direct Sources				0.43	130				130
Pasture, Range and Paddock Manure				0.06	19				19
Indirect Sources				0.3	90				90
WASTE	**-**	**28**	**580**	**0.05**	**20**				**600**
a. Solid Waste Disposal on Land		27	560		-				560
b. Wastewater Handling		1.1	22	0.05	20				37
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-10: 1990–2008 GHG Emission Summary for Quebec

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**82,800**	**89,100**	**85,400**	**83,800**	**86,800**	**82,000**
ENERGY	**57,600**	**65,100**	**61,500**	**59,800**	**63,400**	**59,500**
a. Stationary Combustion Sources	**29,500**	**30,100**	**27,000**	**25,500**	**27,400**	**23,200**
Electricity and Heat Generation	1,520	1,660	727	918	2,180	470
Fossil Fuel Production and Refining	3,300	3,600	3,700	3,700	3,800	3,500
Mining & Oil and Gas Extraction	734	449	227	246	239	684
Manufacturing Industries	12,100	11,200	10,000	9,550	9,610	7,560
Construction	456	318	289	263	258	248
Commercial & Institutional	4,210	6,830	6,750	5,950	6,180	6,040
Residential	6,800	5,700	5,000	4,600	4,800	4,300
Agriculture & Forestry	288	312	272	256	273	261
b. Transport[1]	**27,800**	**34,500**	**34,000**	**33,900**	**35,500**	**35,800**
Civil Aviation (Domestic Aviation)	950	1,400	1,100	1,100	1,100	790
Road Transportation	21,000	27,500	27,700	27,700	28,500	27,800
Light-Duty Gasoline Vehicles	11,900	10,800	10,500	10,500	10,800	10,600
Light-Duty Gasoline Trucks	3,850	7,540	7,840	7,850	8,130	8,000
Heavy-Duty Gasoline Vehicles	608	826	848	854	887	879
Motorcycles	31.2	76.2	80.0	80.7	83.8	83.0
Light-Duty Diesel Vehicles	143	172	171	172	179	177
Light-Duty Diesel Trucks	209	406	426	435	454	453
Heavy-Duty Diesel Vehicles	4,090	7,620	7,820	7,820	7,860	7,630
Propane & Natural Gas Vehicles	110	39	34	29	33	29
Railways	600	800	700	800	900	900
Navigation (Domestic Marine)	1,400	1,400	1,300	1,200	1,200	1,500
Other Transportation	3,900	3,400	3,100	3,200	3,900	4,800
Off-Road Gasoline	1,100	1,300	1,100	830	1,200	740
Off-Road Diesel	2,800	1,900	1,700	2,100	2,400	3,800
Pipelines	25.8	249	335	284	268	255
c. Fugitive Sources[2]	**281**	**496**	**500**	**510**	**510**	**510**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	281	496	500	510	510	510
INDUSTRIAL PROCESSES[3]	**13,000**	**11,300**	**11,300**	**11,200**	**10,300**	**9,280**
a. Mineral Products	**1,800**	**1,900**	**1,900**	**2,000**	**1,800**	**1,600**
Cement Production	1,300	1,200	1,300	1,300	1,300	1,200
Lime Production	270	490	460	430	420	400
Mineral Products Use	209	184	179	193	97.8	71.3
b. Chemical Industry	**80**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	79.7	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**10,200**	**6,900**	**7,110**	**6,750**	**6,210**	**6,270**
Iron and Steel Production	-	8.14	-	-	-	-
Aluminum Production	7,800	5,900	7,000	6,700	6,200	6,300
SF_6 Used in Magnesium Smelters and Casters	2,370	950	75.1	81.3	14.1	-
d. Production and Consumption of Halocarbons	**-**	**980**	**1,100**	**1,100**	**1,100**	**1,200**
e. Other & Undifferentiated Production[4]	**930**	**1,500**	**1,200**	**1,500**	**1,100**	**220**
SOLVENT & OTHER PRODUCT USE	**44**	**50**	**42**	**76**	**75**	**77**
AGRICULTURE	**6,900**	**7,600**	**7,500**	**7,300**	**7,800**	**7,800**
a. Enteric Fermentation	2,100	2,600	2,500	2,500	2,400	2,500
b. Manure Management	1,200	1,400	1,400	1,300	1,300	1,300
c. Agriculture Soils	3,600	3,600	3,600	3,400	4,000	4,000
Direct Sources	2,000	2,000	1,900	1,800	2,300	2,300
Pasture, Range and Paddock Manure	290	320	320	310	310	300
Indirect Sources	1,000	1,000	1,000	1,000	1,000	1,000
WASTE	**5,200**	**5,100**	**5,200**	**5,400**	**5,200**	**5,400**
a. Solid Waste Disposal on Land	4,800	4,700	4,800	5,100	4,800	5,000
b. Wastewater Handling	210	260	270	270	280	280
c. Waste Incineration	170	91	92	94	96	98

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

[5] Only SF6 emissions from magnesium smelters are included. Information on SF6 use in casters is confidential for this province.

Table A15-11: 2008 GHG Emission Summary for Quebec

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**63,300**	**460**	**9,600**	**20**	**6,300**	**1,200**	**1,600**	**3.7**	**82,000**
ENERGY	**56,700**	**62**	**1,300**	**5**	**1,000**				**59,500**
a. Stationary Combustion Sources	**22,200**	**30**	**700**	**0.9**	**300**				**23,200**
Electricity and Heat Generation	465	0.06	1.2	0.01	4				470
Fossil Fuel Production and Refining	3,530	0.06	1	0.04	10				3,500
Mining & Oil and Gas Extraction	681	0.01	0.3	0.01	3				684
Manufacturing Industries	7,470	0.5	10	0.3	80				7,560
Construction	246	0.00	0.09	0.01	2				248
Commercial & Institutional	6,000	0.1	2	0.1	40				6,040
Residential	3,520	30	700	0.4	100				4,300
Agriculture & Forestry	257	0.00	0.09	0.01	4				261
b. Transport[1]	**34,600**	**3**	**70**	**4**	**1,000**				**35,800**
Civil Aviation (Domestic Aviation)	769	0.08	2	0.07	20				790
Road Transportation	27,200	1.9	39	1.9	590				27,800
Light-Duty Gasoline Vehicles	10,400	0.76	16	0.72	220				10,600
Light-Duty Gasoline Trucks	7,730	0.62	13	0.82	250				8,000
Heavy-Duty Gasoline Vehicles	858	0.04	0.87	0.07	20				879
Motorcycles	81.4	0.05	1.1	0.00	0.51				83.0
Light-Duty Diesel Vehicles	172	0.00	0.07	0.01	4				177
Light-Duty Diesel Trucks	442	0.01	0.2	0.04	10				453
Heavy-Duty Diesel Vehicles	7,550	0.3	7	0.2	70				7,630
Propane & Natural Gas Vehicles	28.8	0.02	0.5	0.00	0.2				29
Railways	761	0.04	0.9	0.3	100				900
Navigation (Domestic Marine)	1,460	0.1	2	0.2	50				1,500
Other Transportation	4,400	1	30	1	400				4,800
Off-Road Gasoline	720	0.9	20	0.02	5				740
Off-Road Diesel	3,400	0.2	4	1	400				3,800
Pipelines	247	0.22	4.7	0.01	3				255
c. Fugitive Sources[2]	**0.13**	**24**	**510**	**-**	**-**				**510**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	0.13	24.3	510	-	-				510
INDUSTRIAL PROCESSES[3]	**6,500**	**-**	**-**	**-**	**-**	**1,200**	**1,600**	**3.7**	**9,280**
a. Mineral Products	**1,600**								**1,600**
Cement Production	1,200								1,200
Lime Production	400								400
Mineral Product Use	71.3								71.3
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**4,660**						**1,600**	**3.74**	**6,270**
Iron and Steel Production	-								0
Aluminum Production	4,700						1,600	3.74	6,300
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						1,200			1,200
e Other & Undifferentiated Production[4]	**220**								**220**
SOLVENT & OTHER PRODUCT USE				**0.25**	**77**				**77**
AGRICULTURE		**150**	**3,200**	**15**	**4,600**				**7,800**
a. Enteric Fermentation		120	2,500						2,500
b. Manure Management		35	730	1.8	560				1,300
c. Agriculture Soils				**13**	**4,000**				**4,000**
Direct Sources				7.3	2,300				2,300
Pasture, Range and Paddock Manure				0.98	300				300
Indirect Sources				5	1,000				1,000
WASTE	**69**	**250**	**5,100**	**0.6**	**200**				**5,400**
a. Solid Waste Disposal on Land		240	5,000		-				5,000
b. Wastewater Handling		5.9	120	0.5	200				280
c. Waste Incineration	69	0.08	2	0.09	30				98

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

[5] Only SF6 emissions from magnesium smelters are included. Information on SF6 use in casters is confidential for this province.

Table A15-12: 1990–2008 GHG Emission Summary for Ontario

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**176,000**	**199,000**	**200,000**	**192,000**	**200,000**	**190,000**
ENERGY	**132,000**	**159,000**	**161,000**	**152,000**	**161,000**	**151,000**
a. Stationary Combustion Sources	**83,500**	**96,000**	**95,000**	**88,100**	**96,000**	**87,200**
Electricity and Heat Generation	26,600	32,300	34,300	28,600	32,000	27,400
Fossil Fuel Production and Refining	6,100	7,100	5,200	5,300	6,900	5,500
Mining & Oil and Gas Extraction	489	445	582	614	651	664
Manufacturing Industries	22,600	21,500	19,800	21,500	21,600	19,000
Construction	569	543	602	544	487	524
Commercial & Institutional	9,090	14,000	13,900	12,500	13,400	13,200
Residential	17,000	19,000	20,000	18,000	20,000	20,000
Agriculture & Forestry	770	963	957	950	1,210	1,140
b. Transport[1]	**47,100**	**61,100**	**64,100**	**62,000**	**63,000**	**62,000**
Civil Aviation (Domestic Aviation)	1,600	1,800	2,200	2,300	3,000	2,800
Road Transportation	35,600	46,400	47,300	47,200	48,100	47,600
Light-Duty Gasoline Vehicles	18,800	16,700	16,300	16,200	16,500	16,400
Light-Duty Gasoline Trucks	7,740	16,000	16,800	16,800	17,200	17,200
Heavy-Duty Gasoline Vehicles	1,570	1,280	1,260	1,270	1,300	1,310
Motorcycles	43.1	64.6	66.2	66.7	68.2	68.7
Light-Duty Diesel Vehicles	111	142	144	144	147	148
Light-Duty Diesel Trucks	148	441	482	489	500	508
Heavy-Duty Diesel Vehicles	6,600	11,400	11,800	11,800	11,900	11,500
Propane & Natural Gas Vehicles	540	330	350	380	420	450
Railways	2,000	1,000	2,000	1,000	2,000	2,000
Navigation (Domestic Marine)	940	640	590	500	470	460
Other Transportation	7,200	11,000	12,000	11,000	9,900	9,600
Off-Road Gasoline	1,800	3,300	3,200	2,800	2,600	2,300
Off-Road Diesel	3,100	5,500	6,200	5,000	5,000	5,600
Pipelines	2,260	2,080	3,040	2,720	2,240	1,680
c. Fugitive Sources[2]	**1,340**	**1,830**	**1,840**	**1,860**	**1,850**	**1,850**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	1,340	1,830	1,840	1,860	1,850	1,850
INDUSTRIAL PROCESSES[3]	**27,400**	**22,400**	**21,700**	**21,400**	**20,700**	**21,300**
a. Mineral Products	**4,000**	**4,500**	**4,500**	**4,600**	**4,400**	**4,000**
Cement Production	2,300	3,400	3,500	3,600	3,500	3,100
Lime Production	1,100	820	800	790	770	750
Mineral Products Use	595	209	222	243	166	160
b. Chemical Industry	**11,000**	**3,200**	**2,700**	**1,300**	**1,600**	**2,500**
Nitric Acid Production	99.4	101	67.2	78.9	74.9	64.3
Adipic Acid Production	11,000	3,100	2,600	1,200	1,500	2,400
c. Metal Production	**7,780**	**8,400**	**8,210**	**9,030**	**8,200**	**7,860**
Iron and Steel Production	7,060	7,190	7,020	7,760	7,720	7,440
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	720	1,210	1,180	1,270	478	424
d. Production and Consumption of Halocarbons	**770**	**1,800**	**2,000**	**1,900**	**2,000**	**2,100**
e. Other & Undifferentiated Production[4]	**4,100**	**4,500**	**4,300**	**4,500**	**4,500**	**4,900**
SOLVENT & OTHER PRODUCT USE	**65**	**82**	**70**	**130**	**120**	**130**
AGRICULTURE	**11,000**	**11,000**	**10,000**	**11,000**	**11,000**	**10,000**
a. Enteric Fermentation	3,800	3,700	3,600	3,500	3,400	3,400
b. Manure Management	1,600	1,700	1,700	1,600	1,600	1,500
c. Agriculture Soils	5,400	5,300	5,100	6,000	5,700	5,500
Direct Sources	3,000	2,900	2,700	3,400	3,200	3,100
Pasture, Range and Paddock Manure	510	550	540	530	500	500
Indirect Sources	2,000	2,000	2,000	2,000	2,000	2,000
WASTE	**5,800**	**6,900**	**7,200**	**7,400**	**7,400**	**7,400**
a. Solid Waste Disposal on Land	5,500	6,600	6,800	7,100	7,000	7,100
b. Wastewater Handling	220	290	290	290	290	290
c. Waste Incineration	130	52	55	58	61	65

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-13: 2008 GHG Emission Summary for Ontario

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**162,000**	**650**	**14,000**	**39**	**12,000**	**2,100**	**-**	**420**	**190,000**
ENERGY	**146,000**	**120**	**2,600**	**9**	**3,000**				**151,000**
a. Stationary Combustion Sources	**86,000**	**30**	**600**	**2**	**600**				**87,200**
Electricity and Heat Generation	27,200	1.5	32	0.5	200				27,400
Fossil Fuel Production and Refining	5,440	0.07	1	0.03	8				5,500
Mining & Oil and Gas Extraction	655	0.01	0.2	0.03	9				664
Manufacturing Industries	18,900	0.8	20	0.5	200				19,000
Construction	519	0.01	0.2	0.01	4				524
Commercial & Institutional	13,100	0.2	5	0.3	90				13,200
Residential	19,100	20	500	0.6	200				20,000
Agriculture & Forestry	1,130	0.02	0.4	0.03	10				1,140
b. Transport[1]	**59,600**	**8**	**200**	**7**	**2,000**				**62,000**
Civil Aviation (Domestic Aviation)	2,770	0.1	2	0.3	80				2,800
Road Transportation	46,200	3.2	67	4.0	1,300				47,600
Light-Duty Gasoline Vehicles	16,000	1.0	22	1.4	440				16,400
Light-Duty Gasoline Trucks	16,500	1.0	21	2.1	650				17,200
Heavy-Duty Gasoline Vehicles	1,280	0.06	1.3	0.10	32				1,310
Motorcycles	67.2	0.05	1.0	0.00	0.44				68.7
Light-Duty Diesel Vehicles	144	0.00	0.06	0.01	4				148
Light-Duty Diesel Trucks	496	0.01	0.3	0.04	10				508
Heavy-Duty Diesel Vehicles	11,300	0.5	10	0.3	100				11,500
Propane & Natural Gas Vehicles	433	0.5	10	0.01	3				450
Railways	1,340	0.07	2	0.6	200				2,000
Navigation (Domestic Marine)	433	0.03	0.7	0.09	30				460
Other Transportation	8,800	5	100	2	700				9,600
Off-Road Gasoline	2,300	3	60	0.05	20				2,300
Off-Road Diesel	5,000	0.3	6	2	600				5,600
Pipelines	1,630	1.6	34	0.04	10				1,680
c. Fugitive Sources[2]	**0.77**	**88**	**1,900**	**-**	**-**				**1,850**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	0.77	88.2	1,850	-	-				1,850
INDUSTRIAL PROCESSES[3]	**16,000**	**-**	**-**	**7.98**	**2,470**	**2,100**	**-**	**420**	**21,300**
a. Mineral Products	**4,000**								**4,000**
Cement Production	3,100								3,100
Lime Production	750								750
Mineral Product Use	160								160
b. Chemical Industry	**-**			**7.98**	**2,470**				**2,500**
Nitric Acid Production				0.21	64.3				64.3
Adipic Acid Production				7.8	2,400				2,400
c. Metal Production	**7,440**						**-**	**424**	**7,860**
Iron and Steel Production	7,440								7,440
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								424	424
d. Production and Consumption of Halocarbons						**2,100**	**-**	**-**	**2,100**
e Other & Undifferentiated Production[4]	**4,900**								**4,900**
SOLVENT & OTHER PRODUCT USE				**0.41**	**130**				**130**
AGRICULTURE		**190**	**4,000**	**20**	**6,300**				**10,000**
a. Enteric Fermentation		160	3,400						3,400
b. Manure Management		32	670	2.7	830				1,500
c. Agriculture Soils				**18**	**5,500**				**5,500**
Direct Sources				10	3,100				3,100
Pasture, Range and Paddock Manure				1.6	500				500
Indirect Sources				6	2,000				2,000
WASTE	**54**	**340**	**7,100**	**0.9**	**300**				**7,400**
a. Solid Waste Disposal on Land		340	7,100		-				7,100
b. Wastewater Handling		1.6	34	0.8	300				290
c. Waste Incineration	54	-	-	0.04	10				65

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-14: 1990–2008 GHG Emission Summary for Manitoba

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**18,600**	**21,400**	**21,000**	**21,100**	**21,700**	**21,900**
ENERGY	**12,200**	**12,300**	**12,500**	**12,100**	**12,800**	**12,800**
a. Stationary Combustion Sources	**4,820**	**4,660**	**4,560**	**4,200**	**4,570**	**4,780**
Electricity and Heat Generation	569	393	511	382	497	488
Fossil Fuel Production and Refining	0.14	0.01	0.01	0.05	0.01	0.01
Mining & Oil and Gas Extraction	73.5	105	114	112	135	152
Manufacturing Industries	1,040	1,200	1,240	1,320	1,300	1,350
Construction	63.1	82.1	84.9	90.9	102	98.4
Commercial & Institutional	1,400	1,580	1,450	1,290	1,410	1,500
Residential	1,600	1,200	1,100	960	1,100	1,100
Agriculture & Forestry	41.9	55.3	44.9	46.7	55.1	60.4
b. Transport[1]	**6,990**	**7,070**	**7,280**	**7,220**	**7,530**	**7,310**
Civil Aviation (Domestic Aviation)	330	340	330	330	410	420
Road Transportation	3,920	4,790	4,650	4,930	5,240	5,130
Light-Duty Gasoline Vehicles	1,630	1,230	1,110	1,200	1,240	1,160
Light-Duty Gasoline Trucks	859	1,670	1,600	1,740	1,800	1,690
Heavy-Duty Gasoline Vehicles	439	253	233	254	263	249
Motorcycles	6.80	8.43	7.92	8.67	8.96	8.49
Light-Duty Diesel Vehicles	10.7	8.87	8.08	8.91	9.34	8.91
Light-Duty Diesel Trucks	40.2	105	106	119	125	121
Heavy-Duty Diesel Vehicles	868	1,490	1,560	1,590	1,780	1,870
Propane & Natural Gas Vehicles	61	21	14	15	18	20
Railways	600	300	300	200	200	200
Navigation (Domestic Marine)	0.02	0.11	-	-	0.32	-
Other Transportation	2,100	1,700	2,000	1,700	1,700	1,500
Off-Road Gasoline	340	400	370	330	360	340
Off-Road Diesel	960	850	1,100	830	860	960
Pipelines	841	429	596	535	426	244
c. Fugitive Sources[2]	**421**	**593**	**614**	**668**	**681**	**696**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	421	593	614	668	681	696
INDUSTRIAL PROCESSES[3]	**513**	**663**	**742**	**718**	**742**	**644**
a. Mineral Products	**210**	**65**	**62**	**57**	**55**	**53**
Cement Production	140	-	-	-	-	-
Lime Production	58	62	59	54	53	51
Mineral Products Use	8.79	3.44	2.95	3.17	2.58	2.29
b. Chemical Industry	**20**	**50**	**54**	**50**	**47**	**-**
Nitric Acid Production	20.1	50.4	53.7	50.2	47.5	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**180**	**190**	**180**	**200**	**200**
e. Other & Undifferentiated Production[4]	**280**	**370**	**430**	**430**	**440**	**400**
SOLVENT & OTHER PRODUCT USE	**7.0**	**7.7**	**6.5**	**12**	**12**	**12**
AGRICULTURE	**5,300**	**7,600**	**7,000**	**7,500**	**7,300**	**7,600**
a. Enteric Fermentation	1,400	2,400	2,400	2,400	2,200	2,200
b. Manure Management	520	910	920	930	880	840
c. Agriculture Soils	3,300	4,200	3,600	4,100	4,200	4,500
Direct Sources	1,900	2,200	1,800	2,100	2,200	2,400
Pasture, Range and Paddock Manure	230	420	430	420	390	390
Indirect Sources	1,000	2,000	1,000	2,000	2,000	2,000
WASTE	**600**	**810**	**820**	**840**	**850**	**860**
a. Solid Waste Disposal on Land	570	780	790	800	810	830
b. Wastewater Handling	31	34	33	33	34	34
c. Waste Incineration	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-15: 2008 GHG Emission Summary for Manitoba

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**12,200**	**200**	**4,200**	**17**	**5,300**	**200**	**-**	**-**	**21,900**
ENERGY	**11,800**	**34**	**720**	**1**	**300**				**12,800**
a. Stationary Combustion Sources	**4,680**	**3**	**60**	**0.1**	**40**				**4,780**
Electricity and Heat Generation	484	0.01	0.28	0.01	3				488
Fossil Fuel Production and Refining	-	-	-	0.00	0.01				0.01
Mining & Oil and Gas Extraction	148	0.00	0.05	0.01	3				152
Manufacturing Industries	1,340	0.05	1	0.03	10				1,350
Construction	97.7	0.00	0.04	0.00	0.6				98.4
Commercial & Institutional	1,480	0.03	0.6	0.03	10				1,500
Residential	1,060	3	60	0.05	20				1,100
Agriculture & Forestry	59.2	0.00	0.02	0.00	1				60.4
b. Transport[1]	**7,040**	**1**	**20**	**0.8**	**300**				**7,310**
Civil Aviation (Domestic Aviation)	413	0.03	0.7	0.04	10				420
Road Transportation	5,020	0.37	7.7	0.33	100				5,130
Light-Duty Gasoline Vehicles	1,130	0.10	2.1	0.08	24				1,160
Light-Duty Gasoline Trucks	1,640	0.15	3.1	0.16	51				1,690
Heavy-Duty Gasoline Vehicles	244	0.01	0.29	0.02	5.5				249
Motorcycles	8.33	0.01	0.11	0.00	0.05				8.49
Light-Duty Diesel Vehicles	8.69	0.00	0.00	0.00	0.2				8.91
Light-Duty Diesel Trucks	118	0.00	0.06	0.01	3				121
Heavy-Duty Diesel Vehicles	1,850	0.08	2	0.06	20				1,870
Propane & Natural Gas Vehicles	19.1	0.02	0.3	0.00	0.1				20
Railways	186	0.01	0.2	0.08	20				200
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	1,400	0.7	10	0.4	100				1,500
Off-Road Gasoline	330	0.4	8	0.01	2				340
Off-Road Diesel	850	0.05	1	0.4	100				960
Pipelines	237	0.24	5.0	0.01	2				244
c. Fugitive Sources[2]	**54**	**31**	**640**	**-**	**-**				**696**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	54.2	30.6	642	-	-				696
INDUSTRIAL PROCESSES[3]	**450**	**-**	**-**	**-**	**-**	**200**	**-**	**-**	**644**
a. Mineral Products	**53**								**53**
Cement Production	-								0
Lime Production	51								51
Mineral Product Use	2.29								2.29
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**200**	**-**	**-**	**200**
e Other & Undifferentiated Production[4]	**400**								**400**
SOLVENT & OTHER PRODUCT USE				**0.04**	**12**				**12**
AGRICULTURE		**120**	**2,600**	**16**	**5,000**				**7,600**
a. Enteric Fermentation		110	2,200						2,200
b. Manure Management		17	370	1.5	470				840
c. Agriculture Soils				**15**	**4,500**				**4,500**
Direct Sources				7.7	2,400				2,400
Pasture, Range and Paddock Manure				1.2	390				390
Indirect Sources				6	2,000				2,000
WASTE	**-**	**40**	**840**	**0.08**	**20**				**860**
a. Solid Waste Disposal on Land		39	830		-				830
b. Wastewater Handling		0.45	9.4	0.08	20				34
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-16: 1990–2008 GHG Emission Summary for Saskatchewan

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**43,400**	**71,700**	**72,300**	**71,300**	**74,000**	**75,000**
ENERGY	**34,500**	**57,100**	**57,200**	**57,000**	**59,600**	**59,600**
a. Stationary Combustion Sources	**19,300**	**29,500**	**28,600**	**27,800**	**28,500**	**28,900**
Electricity and Heat Generation	10,400	16,800	15,500	14,900	15,700	15,400
Fossil Fuel Production and Refining	3,800	6,400	6,600	6,300	6,200	6,500
Mining & Oil and Gas Extraction	930	1,870	2,280	2,310	2,420	2,430
Manufacturing Industries	833	638	627	587	561	588
Construction	70.0	41.2	40.7	43.3	63.9	72.3
Commercial & Institutional	980	1,760	1,700	1,730	1,580	1,900
Residential	2,100	1,700	1,600	1,700	1,600	1,700
Agriculture & Forestry	292	270	254	245	232	227
b. Transport[1]	**9,190**	**10,200**	**11,400**	**11,700**	**14,000**	**14,100**
Civil Aviation (Domestic Aviation)	210	110	130	140	150	150
Road Transportation	4,100	5,860	5,850	6,200	6,710	7,190
Light-Duty Gasoline Vehicles	1,150	1,160	1,070	1,150	1,280	1,370
Light-Duty Gasoline Trucks	828	1,840	1,800	1,940	2,160	2,330
Heavy-Duty Gasoline Vehicles	722	377	350	380	422	459
Motorcycles	1.96	6.93	7.05	7.68	8.53	9.26
Light-Duty Diesel Vehicles	6.73	8.79	8.32	8.96	9.92	10.7
Light-Duty Diesel Trucks	51.4	231	242	267	296	323
Heavy-Duty Diesel Vehicles	1,270	2,220	2,360	2,430	2,530	2,670
Propane & Natural Gas Vehicles	65	17	11	10	10	11
Railways	600	200	400	400	200	500
Navigation (Domestic Marine)	0.10	0.01	-	-	-	-
Other Transportation	4,300	4,000	5,000	5,000	6,900	6,300
Off-Road Gasoline	1,200	750	920	1,000	1,100	1,200
Off-Road Diesel	1,600	1,900	2,200	2,400	3,000	2,600
Pipelines	1,580	1,390	1,880	1,580	2,800	2,480
c. Fugitive Sources[2]	**6,060**	**17,500**	**17,200**	**17,500**	**17,000**	**16,600**
Coal Mining	10	10	10	10	10	10
Oil and Natural Gas	6,050	17,500	17,100	17,500	17,000	16,600
INDUSTRIAL PROCESSES[3]	**297**	**1,610**	**1,590**	**1,660**	**1,600**	**1,640**
a. Mineral Products	**95**	**7.1**	**6.5**	**8.6**	**4.9**	**4.3**
Cement Production	83	-	-	-	-	-
Lime Production	-	-	-	-	-	-
Mineral Products Use	12.1	7.05	6.53	8.61	4.86	4.34
b. Chemical Industry	**-**	**28**	**13**	**14**	**13**	**15**
Nitric Acid Production	-	27.7	12.7	13.6	13.0	15.2
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**160**	**170**	**170**	**190**	**190**
e. Other & Undifferentiated Production[4]	**200**	**1,400**	**1,400**	**1,500**	**1,400**	**1,400**
SOLVENT & OTHER PRODUCT USE	**6.4**	**6.6**	**5.5**	**9.8**	**9.7**	**10**
AGRICULTURE	**8,100**	**12,000**	**13,000**	**12,000**	**12,000**	**13,000**
a. Enteric Fermentation	2,400	4,200	4,300	4,200	4,200	4,100
b. Manure Management	680	1,200	1,200	1,200	1,200	1,100
c. Agriculture Soils	5,000	7,000	7,300	6,600	6,900	7,900
Direct Sources	2,800	3,600	3,800	3,300	3,500	4,100
Pasture, Range and Paddock Manure	420	800	830	810	800	800
Indirect Sources	2,000	3,000	3,000	2,000	3,000	3,000
WASTE	**500**	**620**	**630**	**640**	**640**	**650**
a. Solid Waste Disposal on Land	460	580	590	600	600	610
b. Wastewater Handling	37	39	38	38	39	38
c. Waste Incineration	0.52	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-17: 2008 GHG Emission Summary for Saskatchewan

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**44,700**	**980**	**21,000**	**31**	**9,500**	**190**	**-**	**-**	**75,000**
ENERGY	**43,300**	**740**	**16,000**	**2**	**700**				**59,600**
a. Stationary Combustion Sources	**28,300**	**20**	**300**	**0.7**	**200**				**28,900**
Electricity and Heat Generation	15,300	0.72	15	0.4	100				15,400
Fossil Fuel Production and Refining	6,200	10	300	0.1	40				6,500
Mining & Oil and Gas Extraction	2,410	0.05	1	0.06	20				2,430
Manufacturing Industries	584	0.02	0.4	0.01	4				588
Construction	71.8	0.00	0.03	0.00	0.5				72.3
Commercial & Institutional	1,890	0.04	0.8	0.04	10				1,900
Residential	1,670	2	30	0.05	10				1,700
Agriculture & Forestry	226	0.01	0.09	0.01	1				227
b. Transport[1]	**13,500**	**5**	**100**	**2**	**500**				**14,100**
Civil Aviation (Domestic Aviation)	144	0.01	0.3	0.01	4				150
Road Transportation	7,030	0.57	12	0.46	140				7,190
Light-Duty Gasoline Vehicles	1,340	0.14	3.0	0.10	30				1,370
Light-Duty Gasoline Trucks	2,260	0.24	5.1	0.23	70				2,330
Heavy-Duty Gasoline Vehicles	448	0.03	0.71	0.03	9.9				459
Motorcycles	9.08	0.01	0.12	0.00	0.06				9.26
Light-Duty Diesel Vehicles	10.4	0.00	0.01	0.00	0.3				10.7
Light-Duty Diesel Trucks	315	0.01	0.2	0.03	8				323
Heavy-Duty Diesel Vehicles	2,640	0.1	3	0.08	30				2,670
Propane & Natural Gas Vehicles	10.8	0.01	0.3	0.00	0.07				11
Railways	418	0.02	0.5	0.2	50				500
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	5,900	4	90	1	300				6,300
Off-Road Gasoline	1,200	1	30	0.03	8				1,200
Off-Road Diesel	2,300	0.1	3	1	300				2,600
Pipelines	2,410	2.5	53	0.07	20				2,480
c. Fugitive Sources[2]	**1,400**	**720**	**15,000**	**0.01**	**4**				**16,600**
Coal Mining		0.6	10	-	-				10
Oil and Natural Gas	1,450	721	15,100	0.01	4				16,600
INDUSTRIAL PROCESSES[3]	**1,400**	**-**	**-**	**0.05**	**15.2**	**190**	**-**	**-**	**1,640**
a. Mineral Products	**4.3**								**4.3**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	4.34								4.34
b. Chemical Industry	**-**			**0.05**	**15.2**				**15**
Nitric Acid Production				0.05	15.2				15.2
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**190**	**-**	**-**	**190**
e Other & Undifferentiated Production[4]	**1,400**								**1,400**
SOLVENT & OTHER PRODUCT USE				**0.03**	**10**				**10**
AGRICULTURE		**210**	**4,400**	**28**	**8,800**				**13,000**
a. Enteric Fermentation		200	4,100						4,100
b. Manure Management		13	280	2.8	850				1,100
c. Agriculture Soils				**25**	**7,900**				**7,900**
Direct Sources				13	4,100				4,100
Pasture, Range and Paddock Manure				2.6	800				800
Indirect Sources				10	3,000				3,000
WASTE	**-**	**30**	**630**	**0.07**	**20**				**650**
a. Solid Waste Disposal on Land		29	610		-				610
b. Wastewater Handling		0.84	18	0.07	20				38
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-18: 1990–2008 GHG Emission Summary for Alberta

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**171,000**	**234,000**	**231,000**	**234,000**	**246,000**	**244,000**
ENERGY	**148,000**	**200,000**	**196,000**	**200,000**	**211,000**	**209,000**
a. Stationary Combustion Sources	**96,500**	**130,000**	**125,000**	**126,000**	**137,000**	**136,000**
Electricity and Heat Generation	40,200	53,400	52,600	53,900	55,400	55,900
Fossil Fuel Production and Refining	32,000	43,000	40,000	40,000	42,000	41,000
Mining & Oil and Gas Extraction	2,430	10,600	11,100	11,500	17,400	17,500
Manufacturing Industries	9,540	7,990	7,820	7,040	7,470	6,960
Construction	237	159	167	188	191	145
Commercial & Institutional	5,020	6,180	5,540	5,330	5,490	5,510
Residential	6,700	8,200	7,500	7,600	9,000	8,800
Agriculture & Forestry	475	269	238	237	273	304
b. Transport[1]	**22,000**	**32,300**	**33,400**	**36,100**	**37,300**	**37,200**
Civil Aviation (Domestic Aviation)	1,100	1,400	1,400	1,400	1,600	1,600
Road Transportation	13,700	18,900	19,600	20,600	21,400	21,400
Light-Duty Gasoline Vehicles	4,460	3,620	3,560	3,670	3,800	3,780
Light-Duty Gasoline Trucks	3,270	6,420	6,680	6,920	7,160	7,170
Heavy-Duty Gasoline Vehicles	1,830	1,630	1,640	1,710	1,780	1,790
Motorcycles	22.8	35.6	36.5	38.2	39.5	39.8
Light-Duty Diesel Vehicles	22.9	22.8	22.9	23.7	24.6	24.6
Light-Duty Diesel Trucks	165	606	673	709	735	744
Heavy-Duty Diesel Vehicles	3,330	6,380	6,850	7,410	7,790	7,780
Propane & Natural Gas Vehicles	630	190	120	150	120	110
Railways	2,000	2,000	2,000	3,000	3,000	3,000
Navigation (Domestic Marine)	0.32	0.01	-	-	-	-
Other Transportation	5,400	9,600	9,900	11,000	11,000	11,000
Off-Road Gasoline	1,300	910	820	840	900	700
Off-Road Diesel	2,800	5,500	5,900	6,800	8,100	8,500
Pipelines	1,290	3,160	3,190	3,680	2,210	1,850
c. Fugitive Sources[2]	**29,100**	**37,800**	**37,100**	**37,500**	**36,700**	**36,000**
Coal Mining	200	100	200	200	200	200
Oil and Natural Gas	28,900	37,600	36,900	37,200	36,500	35,700
INDUSTRIAL PROCESSES[3]	**8,350**	**13,700**	**13,700**	**13,700**	**14,100**	**13,400**
a. Mineral Products	**990**	**1,300**	**1,300**	**1,300**	**1,300**	**1,200**
Cement Production	740	1,000	1,000	1,100	1,100	1,000
Lime Production	100	130	120	110	110	100
Mineral Products Use	146	124	123	131	78.1	79.4
b. Chemical Industry	**810**	**1,000**	**1,100**	**1,100**	**1,000**	**1,100**
Nitric Acid Production	813	1,050	1,120	1,090	996	1,150
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**600**	**680**	**670**	**730**	**750**
e. Other & Undifferentiated Production[4]	**6,500**	**11,000**	**11,000**	**11,000**	**11,000**	**10,000**
SOLVENT & OTHER PRODUCT USE	**16**	**21**	**18**	**34**	**34**	**36**
AGRICULTURE	**14,000**	**19,000**	**20,000**	**19,000**	**19,000**	**20,000**
a. Enteric Fermentation	5,700	8,600	9,000	8,800	8,800	8,700
b. Manure Management	1,500	2,300	2,300	2,300	2,300	2,200
c. Agriculture Soils	6,700	8,200	8,300	8,000	8,300	8,900
Direct Sources	3,500	3,800	3,800	3,600	3,800	4,300
Pasture, Range and Paddock Manure	900	1,500	1,600	1,600	1,600	1,500
Indirect Sources	2,000	3,000	3,000	3,000	3,000	3,000
WASTE	**1,300**	**1,600**	**1,600**	**1,600**	**1,600**	**1,700**
a. Solid Waste Disposal on Land	1,200	1,500	1,600	1,500	1,600	1,600
b. Wastewater Handling	69	67	67	69	72	72
c. Waste Incineration	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-19: 2008 GHG Emission Summary for Alberta

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**190,000**	**1,900**	**39,000**	**47**	**15,000**	**750**	**-**	**-**	**244,000**
ENERGY	**179,000**	**1,300**	**28,000**	**9**	**3,000**				**209,000**
a. Stationary Combustion Sources	**134,000**	**80**	**2,000**	**3**	**900**				**136,000**
Electricity and Heat Generation	55,600	1.6	33	1	300				55,900
Fossil Fuel Production and Refining	39,300	70	2,000	1	300				41,000
Mining & Oil and Gas Extraction	17,400	0.3	7	0.4	100				17,500
Manufacturing Industries	6,890	0.4	8	0.2	70				6,960
Construction	143	0.00	0.05	0.01	2				145
Commercial & Institutional	5,470	0.1	2	0.1	40				5,510
Residential	8,680	1	30	0.2	50				8,800
Agriculture & Forestry	302	0.01	0.1	0.01	2				304
b. Transport[1]	**35,200**	**5**	**100**	**6**	**2,000**				**37,200**
Civil Aviation (Domestic Aviation)	1,590	0.09	2	0.1	40				1,600
Road Transportation	21,000	1.4	30	1.4	430				21,400
Light-Duty Gasoline Vehicles	3,690	0.32	6.8	0.25	79				3,780
Light-Duty Gasoline Trucks	6,940	0.58	12	0.71	220				7,170
Heavy-Duty Gasoline Vehicles	1,750	0.08	1.7	0.13	42				1,790
Motorcycles	39.1	0.02	0.51	0.00	0.24				39.8
Light-Duty Diesel Vehicles	24.0	0.00	0.01	0.00	0.6				24.6
Light-Duty Diesel Trucks	725	0.02	0.4	0.06	20				744
Heavy-Duty Diesel Vehicles	7,700	0.4	7	0.2	70				7,780
Propane & Natural Gas Vehicles	107	0.06	1	0.00	0.6				110
Railways	2,670	0.1	3	1	300				3,000
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	10,000	3	60	3	1,000				11,000
Off-Road Gasoline	680	0.8	20	0.01	5				700
Off-Road Diesel	7,500	0.4	9	3	1,000				8,500
Pipelines	1,800	1.8	37	0.05	10				1,850
c. Fugitive Sources[2]	**9,500**	**1,300**	**26,000**	**0.01**	**4**				**36,000**
Coal Mining		10	200	-	-				200
Oil and Natural Gas	9,500	1,250	26,200	0.01	4				35,700
INDUSTRIAL PROCESSES[3]	**12,000**	**-**	**-**	**3.71**	**1,150**	**750**	**-**	**-**	**13,400**
a. Mineral Products	**1,200**								**1,200**
Cement Production	1,000								1,000
Lime Production	100								100
Mineral Product Use	79.4								79.4
b. Chemical Industry	**-**			**3.71**	**1,150**				**1,100**
Nitric Acid Production				3.71	1,150				1,150
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**750**	**-**	**-**	**750**
e Other & Undifferentiated Production[4]	**10,000**								**10,000**
SOLVENT & OTHER PRODUCT USE				**0.11**	**36**				**36**
AGRICULTURE		**440**	**9,200**	**34**	**11,000**				**20,000**
a. Enteric Fermentation		410	8,700						8,700
b. Manure Management		26	550	5.3	1,600				2,200
c. Agriculture Soils				**29**	**8,900**				**8,900**
Direct Sources				14	4,300				4,300
Pasture, Range and Paddock Manure				4.9	1,500				1,500
Indirect Sources				10	3,000				3,000
WASTE	**-**	**76**	**1,600**	**0.2**	**70**				**1,700**
a. Solid Waste Disposal on Land		76	1,600		-				1,600
b. Wastewater Handling		-	-	0.2	70				72
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-20: 1990–2008 GHG Emission Summary for British Columbia

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**49,300**	**64,600**	**62,100**	**61,100**	**64,500**	**65,100**
ENERGY	**40,500**	**54,200**	**51,800**	**51,300**	**54,700**	**55,300**
a. Stationary Combustion Sources	**18,800**	**23,200**	**21,600**	**21,600**	**24,200**	**23,500**
Electricity and Heat Generation	1,180	1,870	1,480	1,540	1,460	1,520
Fossil Fuel Production and Refining	3,500	6,500	5,800	5,800	6,200	6,200
Mining & Oil and Gas Extraction	255	494	299	1,000	1,310	1,350
Manufacturing Industries	6,080	6,610	6,190	5,360	7,360	6,540
Construction	306	101	107	111	117	100
Commercial & Institutional	2,840	3,520	3,400	3,360	3,330	3,370
Residential	4,300	4,000	4,300	4,400	4,400	4,300
Agriculture & Forestry	321	67.8	66.5	66.2	64.1	56.4
b. Transport[1]	**18,400**	**25,900**	**25,000**	**24,300**	**24,900**	**25,500**
Civil Aviation (Domestic Aviation)	1,100	1,500	1,500	1,500	1,400	1,500
Road Transportation	11,400	15,700	15,300	15,300	15,600	15,400
Light-Duty Gasoline Vehicles	3,850	4,440	4,170	4,100	4,130	4,050
Light-Duty Gasoline Trucks	2,200	5,000	4,770	4,710	4,750	4,680
Heavy-Duty Gasoline Vehicles	2,040	1,720	1,640	1,630	1,650	1,630
Motorcycles	17.5	26.3	27.2	27.1	27.4	27.1
Light-Duty Diesel Vehicles	26.4	43.9	45.7	45.1	45.8	45.4
Light-Duty Diesel Trucks	35.3	57.1	56.1	56.9	57.9	58.5
Heavy-Duty Diesel Vehicles	2,490	4,190	4,430	4,530	4,690	4,630
Propane & Natural Gas Vehicles	780	260	190	190	230	250
Railways	1,000	400	400	400	400	600
Navigation (Domestic Marine)	1,000	2,700	2,500	2,500	2,600	2,500
Other Transportation	3,400	5,700	5,200	4,700	4,900	5,500
Off-Road Gasoline	350	510	450	450	450	350
Off-Road Diesel	2,200	4,000	3,700	3,500	3,600	4,300
Pipelines	856	1,130	989	774	933	895
c. Fugitive Sources[2]	**3,320**	**5,130**	**5,240**	**5,320**	**5,510**	**6,200**
Coal Mining	500	500	500	500	500	500
Oil and Natural Gas	2,830	4,620	4,700	4,850	4,990	5,700
INDUSTRIAL PROCESSES[3]	**3,160**	**3,860**	**3,840**	**3,540**	**3,590**	**3,560**
a. Mineral Products	**870**	**1,400**	**1,400**	**1,400**	**1,400**	**1,300**
Cement Production	610	1,200	1,200	1,200	1,200	1,100
Lime Production	160	190	180	170	160	160
Mineral Products Use	96.9	42.7	43.7	61.7	43.2	38.0
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**1,510**	**1,360**	**1,130**	**1,020**	**1,100**	**1,150**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	1,500	1,400	1,100	1,000	1,100	1,200
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**660**	**740**	**720**	**780**	**790**
e. Other & Undifferentiated Production[4]	**780**	**430**	**560**	**410**	**300**	**340**
SOLVENT & OTHER PRODUCT USE	**21**	**27**	**23**	**42**	**42**	**43**
AGRICULTURE	**2,200**	**2,700**	**2,600**	**2,400**	**2,400**	**2,400**
a. Enteric Fermentation	1,000	1,300	1,300	1,200	1,100	1,200
b. Manure Management	320	400	400	380	370	370
c. Agriculture Soils	860	950	950	820	890	870
Direct Sources	370	340	350	290	340	340
Pasture, Range and Paddock Manure	200	290	280	260	250	240
Indirect Sources	300	300	300	300	300	300
WASTE	**3,400**	**3,800**	**3,700**	**3,800**	**3,800**	**3,800**
a. Solid Waste Disposal on Land	3,300	3,600	3,500	3,600	3,600	3,600
b. Wastewater Handling	85	110	110	110	110	110
c. Waste Incineration	66	69	69	68	68	68

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-21: 2008 GHG Emission Summary for British Columbia

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**52,800**	**390**	**8,300**	**8.4**	**2,600**	**790**	**640**	**-**	**65,100**
ENERGY	**50,600**	**160**	**3,300**	**4**	**1,000**				**55,300**
a. Stationary Combustion Sources	**22,800**	**20**	**500**	**0.8**	**300**				**23,500**
Electricity and Heat Generation	1,510	0.21	4.4	0.03	10				1,520
Fossil Fuel Production and Refining	5,860	20	300	0.2	50				6,200
Mining & Oil and Gas Extraction	1,340	0.02	0.5	0.03	8				1,350
Manufacturing Industries	6,410	0.8	20	0.4	100				6,540
Construction	99.8	0.00	0.04	0.00	0.7				100
Commercial & Institutional	3,350	0.06	1	0.07	20				3,370
Residential	4,150	7	100	0.2	50				4,300
Agriculture & Forestry	55.9	0.00	0.02	0.00	0.5				56.4
b. Transport[1]	**24,300**	**3**	**60**	**4**	**1,000**				**25,500**
Civil Aviation (Domestic Aviation)	1,460	0.07	1	0.1	40				1,500
Road Transportation	14,900	1.0	22	1.3	410				15,400
Light-Duty Gasoline Vehicles	3,900	0.29	6.1	0.44	140				4,050
Light-Duty Gasoline Trucks	4,490	0.29	6.1	0.60	190				4,680
Heavy-Duty Gasoline Vehicles	1,600	0.09	2.0	0.11	35				1,630
Motorcycles	26.6	0.02	0.39	0.00	0.17				27.1
Light-Duty Diesel Vehicles	44.3	0.00	0.02	0.00	1				45.4
Light-Duty Diesel Trucks	57.0	0.00	0.03	0.01	1				58.5
Heavy-Duty Diesel Vehicles	4,580	0.2	4	0.1	40				4,630
Propane & Natural Gas Vehicles	248	0.1	3	0.01	1				250
Railways	554	0.03	0.6	0.2	70				600
Navigation (Domestic Marine)	2,380	0.2	4	0.4	100				2,500
Other Transportation	5,000	1	30	2	500				5,500
Off-Road Gasoline	340	0.4	8	0.01	2				350
Off-Road Diesel	3,800	0.2	4	2	500				4,300
Pipelines	870	0.86	18	0.02	7				895
c. Fugitive Sources[2]	**3,500**	**130**	**2,700**	**-**	**-**				**6,200**
Coal Mining		20	500	-	-				500
Oil and Natural Gas	3,470	106	2,230	-	-				5,700
INDUSTRIAL PROCESSES[3]	**2,100**	**-**	**-**	**-**	**-**	**790**	**640**	**-**	**3,560**
a. Mineral Products	**1,300**								**1,300**
Cement Production	1,100								1,100
Lime Production	160								160
Mineral Product Use	38.0								38.0
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**510**						**640**	**-**	**1,150**
Iron and Steel Production	-								0
Aluminum Production	510						640	-	1,200
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**790**	**-**	**-**	**790**
e Other & Undifferentiated Production[4]	**340**								**340**
SOLVENT & OTHER PRODUCT USE				**0.14**	**43**				**43**
AGRICULTURE		**63**	**1,300**	**3.4**	**1,100**				**2,400**
a. Enteric Fermentation		55	1,200						1,200
b. Manure Management		8.1	170	0.64	200				370
c. Agriculture Soils				**2.8**	**870**				**870**
Direct Sources				1.1	340				340
Pasture, Range and Paddock Manure				0.77	240				240
Indirect Sources				0.9	300				300
WASTE	**57**	**170**	**3,600**	**0.3**	**100**				**3,800**
a. Solid Waste Disposal on Land		170	3,600		-				3,600
b. Wastewater Handling		0.98	21	0.3	90				110
c. Waste Incineration	57	-	-	0.04	10				68

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-22: 1990–2008 GHG Emission Summary for Yukon

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008
	kt CO_2 equivalent					
TOTAL	**531**	**411**	**394**	**408**	**407**	**350**
ENERGY	**526**	**398**	**380**	**394**	**393**	**335**
a. Stationary Combustion Sources	**226**	**129**	**124**	**140**	**133**	**129**
Electricity and Heat Generation	93.6	7.99	7.53	7.81	10.9	11.7
Fossil Fuel Production and Refining	2.9	9.8	28	36	30	17
Mining & Oil and Gas Extraction	4.12	1.73	3.08	3.26	3.93	5.08
Manufacturing Industries	8.01	-	-	-	-	-
Construction	5.46	1.95	1.07	1.70	2.09	1.67
Commercial & Institutional	81.9	40.0	39.8	42.5	47.6	49.7
Residential	29	55	39	42	39	44
Agriculture & Forestry	1.24	13.2	6.27	6.02	-	-
b. Transport[1]	**300**	**265**	**252**	**252**	**256**	**203**
Civil Aviation (Domestic Aviation)	21	22	21	25	29	24
Road Transportation	180	161	156	144	133	127
Light-Duty Gasoline Vehicles	79.1	39.1	34.1	29.3	23.9	19.1
Light-Duty Gasoline Trucks	30.4	40.4	37.6	32.3	26.4	21.2
Heavy-Duty Gasoline Vehicles	10.2	5.83	5.26	4.51	3.67	2.96
Motorcycles	0.46	0.35	0.32	0.27	0.22	0.18
Light-Duty Diesel Vehicles	0.55	0.32	0.28	0.24	0.20	0.16
Light-Duty Diesel Trucks	0.60	2.54	2.64	2.33	1.91	1.56
Heavy-Duty Diesel Vehicles	57.2	70.3	74.9	73.3	75.0	79.9
Propane & Natural Gas Vehicles	1.5	2.1	1.1	1.5	1.8	1.8
Railways	-	-	-	-	-	-
Navigation (Domestic Marine)	-	-	-	-	-	-
Other Transportation	98	82	75	83	94	52
Off-Road Gasoline	10	2.7	2.9	2.5	1.9	1.5
Off-Road Diesel	88	79	72	80	92	50
Pipelines	-	-	-	-	-	-
c. Fugitive Sources[2]	**-**	**3.68**	**3.88**	**3.32**	**3.02**	**3.10**
Coal Mining	-	-	-	-	-	-
Oil and Natural Gas	-	3.68	3.88	3.32	3.02	3.10
INDUSTRIAL PROCESSES[3]	**1.43**	**8.42**	**9.30**	**8.92**	**9.48**	**9.81**
a. Mineral Products	**0.06**	**-**	**-**	**-**	**-**	**-**
Cement Production	-	-	-	-	-	-
Lime Production	-	-	-	-	-	-
Mineral Products Use	0.06	-	-	-	-	-
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**7.9**	**8.7**	**8.4**	**8.8**	**9.1**
e. Other & Undifferentiated Production[4]	**1.4**	**0.48**	**0.56**	**0.56**	**0.71**	**0.71**
SOLVENT & OTHER PRODUCT USE	**0.18**	**0.21**	**0.18**	**0.32**	**0.32**	**0.33**
AGRICULTURE	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
a. Enteric Fermentation	0.0	0.0	0.0	0.0	0.0	0.0
b. Manure Management	0.0	0.0	0.0	0.0	0.0	0.0
c. Agriculture Soils	0.0	0.0	0.0	0.0	0.0	0.0
Direct Sources	0.0	0.0	0.0	0.0	0.0	0.0
Pasture, Range and Paddock Manure	0.0	0.0	0.0	0.0	0.0	0.0
Indirect Sources	0.0	0.0	0.0	0.0	0.0	0.0
WASTE	**3.4**	**4.1**	**4.2**	**4.3**	**4.4**	**4.5**
a. Solid Waste Disposal on Land	0.55	0.93	0.96	0.99	1.0	1.1
b. Wastewater Handling	2.9	3.2	3.3	3.3	3.4	3.4
c. Waste Incineration	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A Error! No text of specified style in document.**-23: 2008 GHG Emission Summary for Yukon**

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**322**	**0.37**	**7.8**	**0.04**	**11**	**9.1**	**-**	**-**	**350**
ENERGY	**321**	**0.19**	**3.9**	**0.03**	**10**				**335**
a. Stationary Combustion Sources	**124**	**0.2**	**3**	**0.01**	**2**				**129**
Electricity and Heat Generation	11.2	0.00	0.01	0.00	0.5				11.7
Fossil Fuel Production and Refining	15.8	0.05	1	0.00	0.1				17
Mining & Oil and Gas Extraction	5.00	0.00	0.00	0.00	0.08				5.08
Manufacturing Industries	-	-	-	-	-				0
Construction	1.64	0.00	0.00	0.00	0.02				1.67
Commercial & Institutional	49.3	0.00	0.01	0.00	0.5				49.7
Residential	41.1	0.1	2	0.00	0.5				44
Agriculture & Forestry	-	-	-	-	-				0
b. Transport[1]	**194**	**0.02**	**0.3**	**0.03**	**8**				**203**
Civil Aviation (Domestic Aviation)	23.5	0.00	0.05	0.00	0.7				24
Road Transportation	125	0.01	0.18	0.01	1.9				127
Light-Duty Gasoline Vehicles	18.7	0.00	0.04	0.00	0.39				19.1
Light-Duty Gasoline Trucks	20.5	0.00	0.04	0.00	0.61				21.2
Heavy-Duty Gasoline Vehicles	2.89	0.00	0.00	0.00	0.07				2.96
Motorcycles	0.18	0.00	0.00	0.00	0.00				0.18
Light-Duty Diesel Vehicles	0.15	0.00	0.00	0.00	0.00				0.16
Light-Duty Diesel Trucks	1.52	0.00	0.00	0.00	0.04				1.56
Heavy-Duty Diesel Vehicles	79.1	0.00	0.08	0.00	0.8				79.9
Propane & Natural Gas Vehicles	1.81	0.00	0.02	0.00	0.01				1.8
Railways	-	-	-	-	-				0
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	46	0.00	0.09	0.02	6				52
Off-Road Gasoline	1.4	0.00	0.04	0.00	0.01				1.5
Off-Road Diesel	44	0.00	0.05	0.02	6				50
Pipelines	-	-	-	-	-				0
c. Fugitive Sources[2]	**2.8**	**0.02**	**0.34**	**-**	**-**				**3.10**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	2.76	0.02	0.34	-	-				3.10
INDUSTRIAL PROCESSES[3]	**0.71**	**-**	**-**	**-**	**-**	**9.1**	**-**	**-**	**9.81**
a. Mineral Products	**-**								**0**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	-								0
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**9.1**	**-**	**-**	**9.1**
e Other & Undifferentiated Production[4]	**0.71**								**0.71**
SOLVENT & OTHER PRODUCT USE				**0.00**	**0.33**				**0.33**
AGRICULTURE		**-**	**-**	**-**	**-**				**-**
a. Enteric Fermentation		-	-						-
b. Manure Management		-	-	-	-				-
c. Agriculture Soils				**-**	**-**				**-**
Direct Sources				-	-				-
Pasture, Range and Paddock Manure				-	-				-
Indirect Sources				-	-				-
WASTE	**-**	**0.18**	**3.8**	**0.00**	**0.7**				**4.5**
a. Solid Waste Disposal on Land		0.05	1.1		-				1.1
b. Wastewater Handling		0.13	2.8	0.00	0.7				3.4
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-24: 1999–2008 GHG Emission Summary for Northwest Territories

Greenhouse Gas Categories	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL	**1,170**	**1,360**	**1,800**	**1,400**	**1,280**	**1,250**	**1,400**	**1,130**	**1,490**	**1,450**
ENERGY	**1,150**	**1,340**	**1,780**	**1,380**	**1,260**	**1,230**	**1,380**	**1,110**	**1,460**	**1,430**
a. Stationary Combustion Sources	**579**	**798**	**1,000**	**872**	**801**	**756**	**699**	**662**	**695**	**689**
Electricity and Heat Generation	222	264	282	222	256	228	260	271	274	337
Fossil Fuel Production and Refining	3.4	180	330	290	180	200	130	85	94	50
Mining & Oil and Gas Extraction	75.7	82.0	104	105	92.9	79.0	71.1	83.8	75.7	82.2
Manufacturing Industries	0.00	0.00	0.01	0.00	0.08	0.18	0.25	0.00	0.00	0.00
Construction	0.77	0.41	0.51	1.26	1.12	1.71	1.68	0.92	0.42	0.19
Commercial & Institutional	188	164	162	129	168	156	147	148	162	131
Residential	89	110	100	100	91	93	83	74	88	90
Agriculture & Forestry	0.01	0.00	19.6	21.8	13.5	1.75	1.53	-	0.25	-
b. Transport[1]	**571**	**534**	**767**	**497**	**442**	**450**	**662**	**445**	**764**	**735**
Civil Aviation (Domestic Aviation)	91	84	180	110	100	110	81	90	86	85
Road Transportation	222	219	219	207	203	206	248	208	301	233
Light-Duty Gasoline Vehicles	38.0	38.8	40.1	35.8	34.8	33.2	23.5	25.1	29.9	29.2
Light-Duty Gasoline Trucks	27.5	27.6	29.5	27.3	28.0	28.3	20.9	22.5	26.8	26.3
Heavy-Duty Gasoline Vehicles	3.37	3.74	4.28	3.73	3.65	3.74	2.71	2.93	3.55	3.53
Motorcycles	0.21	0.24	0.27	0.26	0.28	0.29	0.21	0.22	0.27	0.26
Light-Duty Diesel Vehicles	0.28	0.31	0.32	0.29	0.29	0.30	0.21	0.23	0.27	0.27
Light-Duty Diesel Trucks	1.42	1.67	1.87	1.75	1.85	1.90	1.58	1.74	2.08	2.08
Heavy-Duty Diesel Vehicles	150	146	143	137	133	137	198	154	237	170
Propane & Natural Gas Vehicles	0.83	0.34	0.51	0.78	0.95	1.0	0.54	0.73	0.88	0.92
Railways	3	3	3	4	3	3	3	3	5	5
Navigation (Domestic Marine)	4.6	5.8	12	7.3	-	-	-	-	1.2	-
Other Transportation	250	220	360	170	130	130	330	140	370	410
Off-Road Gasoline	20	24	26	11	16	17	15	13	14	15
Off-Road Diesel	230	190	320	160	110	110	310	130	360	400
Pipelines	4.72	5.66	6.04	3.64	2.93	2.88	2.51	2.23	2.23	1.39
c. Fugitive Sources[2]	**4.91**	**9.36**	**11.4**	**14.1**	**16.5**	**19.7**	**14.9**	**2.58**	**5.01**	**1.38**
Coal Mining	-	-	-	-	-	-	-	-	-	-
Oil and Natural Gas	4.91	9.36	11.4	14.1	16.5	19.7	14.9	2.58	5.01	1.38
INDUSTRIAL PROCESSES[3]	**6.07**	**8.83**	**11.5**	**12.7**	**13.2**	**11.9**	**13.8**	**13.5**	**13.5**	**12.4**
a. Mineral Products	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cement Production	-	-	-	-	-	-	-	-	-	-
Lime Production	-	-	-	-	-	-	-	-	-	-
Mineral Products Use	-	-	-	-	-	-	-	-	-	-
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**3.7**	**4.7**	**6.3**	**7.3**	**7.8**	**8.4**	**9.2**	**8.7**	**8.9**	**9.3**
e. Other & Undifferentiated Production[4]	**2.4**	**4.1**	**5.2**	**5.4**	**5.4**	**3.5**	**4.7**	**4.8**	**4.7**	**3.0**
SOLVENT & OTHER PRODUCT USE	**0.29**	**0.32**	**0.28**	**0.22**	**0.30**	**0.29**	**0.24**	**0.43**	**0.42**	**0.43**
AGRICULTURE	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
a. Enteric Fermentation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b. Manure Management	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c. Agriculture Soils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture, Range and Paddock Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WASTE	**8.6**	**8.7**	**8.9**	**9.1**	**9.4**	**9.6**	**9.7**	**9.8**	**10**	**10**
a. Solid Waste Disposal on Land	4.4	4.5	4.7	4.8	4.9	5.1	5.2	5.3	5.4	5.6
b. Wastewater Handling	4.2	4.2	4.2	4.3	4.4	4.5	4.5	4.5	4.5	4.6
c. Waste Incineration	-	-	-	-	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-25: 2008 GHG Emission Summary for Northwest Territories

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential			21		310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**1,350**	**0.94**	**20**	**0.22**	**67**	**9.3**	**-**	**-**	**1,450**
ENERGY	**1,350**	**0.50**	**10**	**0.2**	**70**				**1,430**
a. Stationary Combustion Sources	**667**	**0.4**	**8**	**0.05**	**10**				**689**
Electricity and Heat Generation	325	0.01	0.28	0.04	10				337
Fossil Fuel Production and Refining	46.7	0.1	3	0.00	0.4				50
Mining & Oil and Gas Extraction	81.7	0.00	0.03	0.00	0.5				82.2
Manufacturing Industries	0.00	0.00	0.00	-	-				0.00
Construction	0.18	0.00	0.00	0.00	0.00				0.19
Commercial & Institutional	130	0.00	0.04	0.00	0.7				131
Residential	83.5	0.2	5	0.00	1				90
Agriculture & Forestry	-	-	-	-	-				0
b. Transport[1]	**682**	**0.06**	**1**	**0.2**	**50**				**735**
Civil Aviation (Domestic Aviation)	82.5	0.01	0.2	0.01	2				85
Road Transportation	229	0.01	0.30	0.01	3.1				233
Light-Duty Gasoline Vehicles	28.5	0.00	0.06	0.00	0.59				29.2
Light-Duty Gasoline Trucks	25.5	0.00	0.05	0.00	0.75				26.3
Heavy-Duty Gasoline Vehicles	3.45	0.00	0.01	0.00	0.07				3.53
Motorcycles	0.26	0.00	0.00	0.00	0.00				0.26
Light-Duty Diesel Vehicles	0.26	0.00	0.00	0.00	0.01				0.27
Light-Duty Diesel Trucks	2.02	0.00	0.00	0.00	0.05				2.08
Heavy-Duty Diesel Vehicles	168	0.01	0.2	0.01	2				170
Propane & Natural Gas Vehicles	0.91	0.00	0.01	0.00	0.01				0.92
Railways	3.99	0.00	0.01	0.00	0.5				5
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	370	0.04	0.8	0.1	50				410
Off-Road Gasoline	15	0.02	0.4	0.00	0.1				15
Off-Road Diesel	350	0.02	0.4	0.1	40				400
Pipelines	1.33	0.00	0.00	0.00	0.06				1.39
c. Fugitive Sources[2]	**0.01**	**0.07**	**1.4**	**-**	**-**				**1.38**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	0.01	0.07	1.37	-	-				1.38
INDUSTRIAL PROCESSES[3]	**3.0**	**-**	**-**	**-**	**-**	**9.3**	**-**	**-**	**12.4**
a. Mineral Products	**-**								**0**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	-								0
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**9.3**	**-**	**-**	**9.3**
e Other & Undifferentiated Production[4]	**3.0**								**3.0**
SOLVENT & OTHER PRODUCT USE				**0.00**	**0.43**				**0.43**
AGRICULTURE		**-**	**-**	**-**	**-**				**-**
a. Enteric Fermentation		-	-						-
b. Manure Management		-	-	-	-				-
c. Agriculture Soils				**-**	**-**				**-**
Direct Sources				-	-				-
Pasture, Range and Paddock Manure				-	-				-
Indirect Sources				-	-				-
WASTE	**-**	**0.44**	**9.3**	**0.00**	**0.9**				**10**
a. Solid Waste Disposal on Land		0.27	5.6		-				5.6
b. Wastewater Handling		0.18	3.7	0.00	0.9				4.6
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-26: 1999–2008 GHG Emission Summary for Nunavut

Greenhouse Gas Categories	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL	**197**	**271**	**378**	**393**	**412**	**429**	**152**	**246**	**370**	**361**
ENERGY	**189**	**263**	**369**	**385**	**403**	**419**	**142**	**236**	**359**	**350**
a. Stationary Combustion Sources	**105**	**72.9**	**66.2**	**88.5**	**65.5**	**78.0**	**26.5**	**23.8**	**30.5**	**24.5**
Electricity and Heat Generation	91.2	45.1	35.3	54.4	34.9	47.6	-	-	-	-
Fossil Fuel Production and Refining	0.08	0.09	0.08	0.08	0.04	0.10	0.06	0.12	0.12	0.12
Mining & Oil and Gas Extraction	2.20	4.25	4.54	6.07	5.80	5.00	7.47	7.74	8.86	9.97
Manufacturing Industries	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Construction	0.05	0.11	0.17	0.13	0.13	0.12	0.12	0.14	0.16	0.19
Commercial & Institutional	6.40	14.3	15.5	15.1	16.3	19.5	14.3	10.9	15.6	7.80
Residential	4.7	9.1	11	13	8.3	5.7	4.6	5.0	5.7	6.4
Agriculture & Forestry	0.01	0.00	0.00	-	-	-	-	-	-	-
b. Transport[1]	**84.4**	**190**	**303**	**296**	**337**	**341**	**116**	**212**	**329**	**326**
Civil Aviation (Domestic Aviation)	23	26	29	30	35	39	31	35	35	34
Road Transportation	19.2	25.2	25.6	25.5	27.7	29.1	25.1	24.9	28.5	21.5
Light-Duty Gasoline Vehicles	3.84	5.28	5.03	4.45	4.77	4.67	3.71	3.40	3.84	3.82
Light-Duty Gasoline Trucks	8.39	12.7	12.7	11.6	13.1	13.6	11.3	10.4	11.8	11.8
Heavy-Duty Gasoline Vehicles	0.11	0.15	0.15	0.13	0.17	0.19	0.14	0.14	0.17	0.17
Motorcycles	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03
Light-Duty Diesel Vehicles	0.03	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04
Light-Duty Diesel Trucks	0.46	0.72	0.73	0.69	0.78	0.84	0.80	0.74	0.81	0.83
Heavy-Duty Diesel Vehicles	5.53	5.91	6.44	7.76	7.78	8.66	8.56	9.45	11.0	3.89
Propane & Natural Gas Vehicles	0.83	0.34	0.51	0.78	0.95	1.0	0.54	0.73	0.88	0.92
Railways	-	-	-	-	-	-	-	-	-	-
Navigation (Domestic Marine)	3.6	4.6	4.9	2.3	-	-	-	-	0.90	-
Other Transportation	38	130	240	240	270	270	59	150	260	270
Off-Road Gasoline	-	1.7	1.5	-	1.2	1.0	0.00	-	-	-
Off-Road Diesel	38	130	240	240	270	270	59	150	260	270
Pipelines	-	-	-	-	-	-	-	-	-	-
c. Fugitive Sources[2]	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Coal Mining	-	-	-	-	-	-	-	-	-	-
Oil and Natural Gas	-	-	-	-	-	-	-	-	-	-
INDUSTRIAL PROCESSES[3]	**1.60**	**1.89**	**2.20**	**2.34**	**2.82**	**3.07**	**3.32**	**3.00**	**3.08**	**3.38**
a. Mineral Products	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Cement Production	-	-	-	-	-	-	-	-	-	-
Lime Production	-	-	-	-	-	-	-	-	-	-
Mineral Products Use	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**1.5**	**1.8**	**2.0**	**2.3**	**2.8**	**3.0**	**3.3**	**3.0**	**3.1**	**3.4**
e. Other & Undifferentiated Production[4]	**0.08**	**0.08**	**0.18**	**0.02**	**0.02**	**0.02**	**-**	**-**	**-**	**-**
SOLVENT & OTHER PRODUCT USE	**0.19**	**0.22**	**0.19**	**0.15**	**0.20**	**0.20**	**0.17**	**0.30**	**0.30**	**0.31**
AGRICULTURE	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
a. Enteric Fermentation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b. Manure Management	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c. Agriculture Soils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture, Range and Paddock Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WASTE	**5.7**	**5.9**	**6.1**	**6.3**	**6.5**	**6.7**	**6.9**	**7.1**	**7.3**	**7.4**
a. Solid Waste Disposal on Land	2.9	3.1	3.2	3.3	3.4	3.5	3.7	3.9	4.0	4.1
b. Wastewater Handling	2.8	2.8	2.9	3.0	3.1	3.1	3.2	3.2	3.3	3.3
c. Waste Incineration	-	-	-	-	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-27: 2008 GHG Emission Summary for Nunavut

Greenhouse Gas Categories	Greenhouse Gases								
	CO_2	CH_4	CH_4	N_2O	N_2O	HFCs	PFCs	SF_6	TOTAL
Global Warming Potential		21			310				
Unit	kt	kt	kt CO_2 equivalent	kt	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent	kt CO_2 equivalent
TOTAL	**317**	**0.34**	**7.1**	**0.11**	**34**	**3.4**	**-**	**-**	**361**
ENERGY	**317**	**0.02**	**0.36**	**0.1**	**30**				**350**
a. Stationary Combustion Sources	**24.0**	**0.00**	**0.01**	**0.00**	**0.5**				**24.5**
Electricity and Heat Generation	-	-	-	-	-				0
Fossil Fuel Production and Refining	0.11	0.00	0.00	0.00	0.00				0.12
Mining & Oil and Gas Extraction	9.75	0.00	0.00	0.00	0.2				9.97
Manufacturing Industries	0.00	-	-	-	-				0.00
Construction	0.18	0.00	0.00	0.00	0.00				0.19
Commercial & Institutional	7.63	0.00	0.00	0.00	0.2				7.80
Residential	6.29	0.00	0.00	0.00	0.1				6.4
Agriculture & Forestry	-	-	-	-	-				0
b. Transport[1]	**293**	**0.02**	**0.3**	**0.1**	**30**				**326**
Civil Aviation (Domestic Aviation)	33.5	0.00	0.03	0.00	0.9				34
Road Transportation	20.9	0.00	0.05	0.00	0.48				21.5
Light-Duty Gasoline Vehicles	3.74	0.00	0.01	0.00	0.08				3.82
Light-Duty Gasoline Trucks	11.4	0.00	0.02	0.00	0.34				11.8
Heavy-Duty Gasoline Vehicles	0.16	0.00	0.00	0.00	0.00				0.17
Motorcycles	0.03	0.00	0.00	0.00	0.00				0.03
Light-Duty Diesel Vehicles	0.04	0.00	0.00	0.00	0.00				0.04
Light-Duty Diesel Trucks	0.80	0.00	0.00	0.00	0.02				0.83
Heavy-Duty Diesel Vehicles	3.85	0.00	0.00	0.00	0.04				3.89
Propane & Natural Gas Vehicles	0.91	0.00	0.01	0.00	0.01				0.92
Railways	-	-	-	-	-				0
Navigation (Domestic Marine)	-	-	-	-	-				0
Other Transportation	240	0.01	0.3	0.1	30				270
Off-Road Gasoline	-	-	-	-	-				0
Off-Road Diesel	240	0.01	0.3	0.1	30				270
Pipelines	-	-	-	-	-				0
c. Fugitive Sources[2]	**-**	**-**	**-**	**-**	**-**				**0**
Coal Mining		-	-	-	-				0
Oil and Natural Gas	-	-	-	-	-				0
INDUSTRIAL PROCESSES[3]	**0.00**	**-**	**-**	**-**	**-**	**3.4**	**-**	**-**	**3.38**
a. Mineral Products	**0.00**								**0.00**
Cement Production	-								0
Lime Production	-								0
Mineral Product Use	0.00								0.00
b. Chemical Industry	**-**			**-**	**-**				**0**
Nitric Acid Production				-	-				0
Adipic Acid Production				-	-				0
c. Metal Production	**-**						**-**	**-**	**0**
Iron and Steel Production	-								0
Aluminum Production	-						-		0
SF_6 Used in Magnesium Smelters and Casters								-	0
d. Production and Consumption of Halocarbons						**3.4**	**-**	**-**	**3.4**
e Other & Undifferentiated Production[4]	**-**								**0**
SOLVENT & OTHER PRODUCT USE				**0.00**	**0.31**				**0.31**
AGRICULTURE		**-**	**-**	**-**	**-**				**-**
a. Enteric Fermentation		-	-						-
b. Manure Management		-	-	-	-				-
c. Agriculture Soils				**-**	**-**				**-**
Direct Sources				-	-				-
Pasture, Range and Paddock Manure				-	-				-
Indirect Sources				-	-				-
WASTE	**-**	**0.32**	**6.8**	**0.00**	**0.6**				**7.4**
a. Solid Waste Disposal on Land		0.20	4.1		-				4.1
b. Wastewater Handling		0.13	2.7	0.00	0.6				3.3
c. Waste Incineration	-	-	-	-	-				0

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

Table A15-28: 1990–1998 GHG Emission Summary for Northwest Territories (including Nunavut)

Greenhouse Gas Categories	1990	1991	1992	1993	1994	1995	1996	1997	1998
					kt CO_2 equivalent				
TOTAL	**1,520**	**1,510**	**1,320**	**1,610**	**1,800**	**1,900**	**2,030**	**1,740**	**1,560**
ENERGY	**1,500**	**1,480**	**1,300**	**1,580**	**1,680**	**1,800**	**1,950**	**1,720**	**1,540**
a. Stationary Combustion Sources	**901**	**972**	**837**	**943**	**1,000**	**1,150**	**1,060**	**982**	**734**
Electricity and Heat Generation	226	227	199	209	210	386	366	364	393
Fossil Fuel Production and Refining	190	110	16	31	20	23	14	3.9	2.8
Mining & Oil and Gas Extraction	52.3	56.5	42.8	68.8	156	102	50.4	53.1	42.9
Manufacturing Industries	23.6	14.2	16.3	6.58	12.7	19.8	17.6	9.17	0.00
Construction	3.76	3.28	3.49	4.22	3.15	20.4	0.67	0.69	0.57
Commercial & Institutional	242	359	350	386	398	469	406	364	201
Residential	160	190	200	230	200	130	200	190	93
Agriculture & Forestry	2.30	8.75	11.8	2.02	1.03	0.01	-	0.01	0.01
b. Transport[1]	**538**	**444**	**409**	**572**	**637**	**611**	**855**	**732**	**801**
Civil Aviation (Domestic Aviation)	160	170	180	200	220	180	250	210	170
Road Transportation	120	105	103	115	136	147	159	155	208
Light-Duty Gasoline Vehicles	31.9	30.7	30.6	38.4	40.5	36.1	37.0	38.2	31.0
Light-Duty Gasoline Trucks	13.7	14.0	14.8	20.3	23.5	22.5	24.6	28.2	23.2
Heavy-Duty Gasoline Vehicles	5.67	4.74	4.33	5.19	3.88	3.68	3.66	3.43	2.83
Motorcycles	0.19	0.18	0.18	0.23	0.24	0.22	0.23	0.24	0.17
Light-Duty Diesel Vehicles	0.23	0.22	0.22	0.28	0.29	0.26	0.27	0.28	0.23
Light-Duty Diesel Trucks	0.23	0.24	0.28	0.39	0.49	0.49	0.88	1.57	1.33
Heavy-Duty Diesel Vehicles	66.8	53.2	49.7	48.4	61.3	79.7	90.5	81.3	148
Propane & Natural Gas Vehicles	1.5	1.5	2.9	2.3	5.9	4.0	2.2	1.9	1.8
Railways	3	2	2	2	1	2	1	3	2
Navigation (Domestic Marine)	0.15	0.23	0.59	0.51	0.11	70	89	13	31
Other Transportation	250	160	120	250	280	210	360	350	390
Off-Road Gasoline	52	41	42	61	59	45	59	59	31
Off-Road Diesel	200	120	81	190	220	160	300	290	350
Pipelines	-	-	-	-	2.28	0.14	0.09	0.04	5.11
c. Fugitive Sources[2]	**63.0**	**67.5**	**57.7**	**61.3**	**41.4**	**41.3**	**38.6**	**6.20**	**4.92**
Coal Mining	-	-	-	-	-	-	-	-	-
Oil and Natural Gas	63.0	67.5	57.7	61.3	41.4	41.3	38.6	6.20	4.92
INDUSTRIAL PROCESSES[3]	**3.04**	**11.4**	**2.23**	**24.3**	**104**	**85.9**	**65.9**	**5.65**	**5.51**
a. Mineral Products	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cement Production	-	-	-	-	-	-	-	-	-
Lime Production	-	-	-	-	-	-	-	-	-
Mineral Products Use	-	-	-	-	-	-	-	-	-
b. Chemical Industry	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Nitric Acid Production	-	-	-	-	-	-	-	-	-
Adipic Acid Production	-	-	-	-	-	-	-	-	-
c. Metal Production	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Iron and Steel Production	-	-	-	-	-	-	-	-	-
Aluminum Production	-	-	-	-	-	-	-	-	-
SF_6 Used in Magnesium Smelters and Casters	-	-	-	-	-	-	-	-	-
d. Production and Consumption of Halocarbons	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.3**	**2.7**	**4.2**
e. Other & Undifferentiated Production[4]	**3.0**	**11**	**2.2**	**24**	**100**	**85**	**65**	**3.0**	**1.4**
SOLVENT & OTHER PRODUCT USE	**0.37**	**0.36**	**0.30**	**0.34**	**0.38**	**0.47**	**0.48**	**0.51**	**0.46**
AGRICULTURE	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
a. Enteric Fermentation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b. Manure Management	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c. Agriculture Soils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture, Range and Paddock Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WASTE	**10**	**11**	**12**	**12**	**13**	**13**	**13**	**14**	**14**
a. Solid Waste Disposal on Land	5.1	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.1
b. Wastewater Handling	5.2	6.1	6.4	6.6	6.6	6.9	6.9	6.9	6.9
c. Waste Incineration	-	-	-	-	-	-	-	-	-

Notes:

[1] Emissions from Fuel Ethanol are reported within the gasoline transportation sub-categories.

[2] Fugitive emissions from refineries are only reported at the national level.

[3] Emissions associated with the consumption of PFCs and SF6 are only reported at the national level.

[4] Emissions coming from ammonia production are included in the category Other & Undifferentiated Production at provincial levels.

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