Climate Change Roadmap for New England and Eastern Canada

Appendix

Environment Northeast

State Data: Connecticut

Population Area Gross State Product (GSP) (M USD) 3,405,565 4,845 sq. mi. (12,528 sq. km.) \$160,685

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Electric Generation Capacity in 2004

Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
СТ	901,698	0.26	5.60
NE-EC	5,952,405	0.25	6.96



Transportation

VMT for Light Duty Vehicles (2003) ²				Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³				
2000	27,847.45	Million miles		Highway diesel vehicles	997	Metric tons		
2003	29,427.82	Million miles		Off-road use of diesel	1,049	Metric tons		
Yearly Change	1.89	%		Total PM 2.5 emissions	2,046	Metric tons		

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

	Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual Averag	je Emissions fro	om Land Use Chang	e (ha)
	kha	MMTCO ₂ e	MMTCO ₂ e	Non-soil Forest ⁷	Forest Soil [®]	Non-Forest Soil [®]	Total
	1,274	423.9 to 661.1	-3.9 to -13.5	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e
Notes: MMTCO ₂ e = million metric tons carbon dioxide equivalents				5.8	45.4	6.1	57.3

Negative numbers indicate sequestration.

Annual Average Land Use Change, 1997-2002



State Data: Maine

Population Area Gross State Product (GSP) (M USD) 1,274,923 30,862 sq. mi. (79,932 sq. km.) \$35,662

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
ME	561,678	0.44	15.8
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Total Electric Generation: 14,047,947 MWh Source: EIA

Transportation

VMT for Light Duty Vehicles (2003) ²				Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³				
2000	12,746.22	Million miles		Highway diesel vehicles		671	Metric tons	
2003	13,490.98	Million miles		Off-road use of diesel		503	Metric tons	
Yearly Change	1.95	%		Total PM 2.5 emissions	1,	174	Metric tons	

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual Av	verage Emissior	is from Land Use C	hange
kha	MMTCO ₂ e	MMTCO ₂ e	Non-soil Forest ⁷	Forest Soil [®]	Non-Forest Soil [®]	Total
7,164	1,807.9 to 2,683.6	4.7 to -17.6	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e
Notes: MMTCO ₂ e = million metric tons carbon dioxide equivalents			0.4	18.4	7.3	26.0
Negative number	rs indicate sequestration.					

Negative numbers indicate sequestration.

Annual Average Land Use Change, 1997-2002 (ha)



State Data: Massachusetts

Population Area Gross State Product (GSP) (M USD) 6,349,097 7,840 sq. mi. (20,306 sq. km.) \$276,786

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
MA	1,632,452	0.26	5.9
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Total Electric Generation: 38,697,881 MWh Source: EIA

Transportation

VMT for Light Duty Vehicles (2003) ²		Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³				
2000	49,533.22	Million miles	Highway diesel vehicles	1,	,514	Metric tons
2003	50,595.84	Million miles	Off-road use of diesel	3,	,842	Metric tons
Yearly Change	0.72	%	Total PM 2.5 emissions	5,	,356	Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual A	verage Emission	ns from Land Use C	hange
kha	MMTCO ₂ e	MMTCO ₂ e	Non-soil Forest ⁷	Forest Soil [®]	Non-Forest Soil [®]	Total
7,164	1,807.9 to 2,683.6	4.7 to -17.6	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e
Notes: MMTCC	$0_2 e = million metric tons$	carbon dioxide equivalents	5.8	45.4	6.1	57.3
Negative number	rs indicate sequestration					

Negative numbers indicate sequestration.

Annual Average Land Use Change, 1997-2002 (ha)



State Data: New Hampshire

Population Area Gross State Product (GSP) (M USD) 1,235,786 8,968 sq. mi. (23,227 sq. km.) \$43,584

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy





Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
NH	346,154	0.28	7.9
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Total Electric Generation:

15,031,499 MWh Source: EIA

Transportation

VMT for Light Duty Vehicles (2003) ²			Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³			
2000	11,339.76	Million miles		Highway diesel vehicles	34	' Metric tons
2003	12,234.81	Million miles		Off-road use of diesel	34	' Metric tons
Yearly Change	2.63	%		Total PM 2.5 emissions	694	Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual Averag	je Emissions fro	m Land Use Chang	e (ha)
kha 1,950	MMTCO2e 738.1 to 937.2	MMTCO2e -9.0 to -10.6	Non-soil Forest ⁷ MMTCO ₂ e	Forest Soil [®] MMTCO ₂ e	Non-Forest Soil [®] MMTCO ₂ e	Total MMTCO ₂ e
Notes: MMTCO2e = million metric tons carbon dioxide equivalents Negative numbers indicate sequestration.			5.3	15.9	2.0	23.2

Annual Average Land Use Change, 1997-2002



State Data: Rhode Island

Population Area Gross State Product (GSP) (M USD) 1,048,319 1,045 sq. mi. (2,707 sq. km.) \$33,835

GHG Inventory



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
NH	235,479	0.22	7.0
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Transportation

VMT for Light Duty Vehicles (2003) ²		Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³
2000	7,382.12 Million miles	Highway diesel vehicles 80 Metric tons
2003	7,590.09 Million miles	Off-road use of diesel 221 Metric tons
Yearly Change	0.94 %	Total PM 2.5 emissions 301 Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Total: 68.9 PJ Source: EIA

Forestry and Land Use Change

Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual Averag	je Emissions fro	m Land Use Chang	e (ha)
kha	MMTCO ₂ e	MMTCO ₂ e	Non-soil Forest ⁷	Forest Soil [®]	Non-Forest Soil [®]	Total
153	42.3 to 67.8	-0.1 to -1.3	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e
Notes: MMTCO	2e = million metric tons	s carbon dioxide equivalents	0.9	1.8	0.5	3.2
Negative numbers	s indicate sequestration.					

Annual Average Land Use Change, 1997-2002



State Data: Vermont

Population60Area9,7Gross State Product (GSP) (M USD)\$1

608,827 9,250 sq. mi. (23,957 sq. km.) \$17,661

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because states either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy







Total Electric Generation Capacity: 1,093 MW Source: EIA

Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
VT	174,162	0.29	9.9
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Transportation

VMT for Light Duty Vehicles (2003) ²		Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³
2000	6,595.78 Million miles	Highway diesel vehicles 311 Metric tons
2003	7,526.83 Million miles	Off-road use of diesel 270 Metric tons
Yearly Change	4.71 %	Total PM 2.5 emissions 581 Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Total: 54.4 PJ Source: EIA

Forestry and Land Use Change

Forest Land Area⁴	Non-soil Forest Stock⁵	Annual Non-soil Forest Emissions ⁶	Annual Averag	je Emissions fro	om Land Use Chang	e (ha)
kha	MMTCO ₂ e	MMTCO ₂ e	Non-soil Forest ⁷	Forest Soil [®]	Non-Forest Soil [®]	Total
1,846	686.9 to 867.0	-16.2 to 0.6	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e	MMTCO ₂ e
	2e = million metric tons s indicate sequestration.	s carbon dioxide equivalents	-0.4	4.0	2.9	6.5

Annual Average Land Use Change, 1997-2002



Provincial Data: New Brunswick

Population Area Gross State Product (GSP) (M USD) 751,000 28,185 sq. mi. (73,000 sq. km.) \$20,085

GHG Inventory



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because provinces either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Source: Statistics Canada

Large Final Emitter Locations, 2004 (CO₂e)



Total Energy Consumption in 2000¹



D G E

Data Sources: Environment Canada, Facility Level
GHG Reporting for 2004. Locations based on
ESRI Canadian 3-digit postal code data

Total Electric Generation in 2000 (MWh)			
	Total terajoules	Terajoules per capita	Terajoules per GSP
NB	228,453	0.30	11.4
NE-EC	5,952,405	0.25	6.96



Transportation

VMT for Light [Outy Vehicles (2003)²	Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³
2000	5,071.51 Million miles	Highway diesel vehicles 659 Metric tons
2003	4,781.64 Million miles	Off-road use of diesel 1,425 Metric tons
Yearly Change	-1.91 %	Total PM 2.5 emissions 1,569 Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Province-by-province data on forestry and land use change emissions (soil and non-soil) are not available at this time and are not provided here.



Provincial Data: Newfoundland and Labrador

Population52Area15Gross State Product (GSP) (M USD)\$1

528,000 154,441 sq. mi. (400,000 sq. km.) \$13,922

GHG Inventory



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because provinces either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Large Final Emitter Locations, 2004 (CO₂e)



Data Sources: Environment Canada, Facility Level GHG Reporting for 2004. Locations based on ESRI Canadian 3-digit postal code data

Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
NF/L	147,599	0.28	10.6
NE-EC	5,952,405	0.25	6.96







Transportation

VMT for Light Duty Vehicles (2003) ²		Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³
2000	2,983.51 Million miles	Highway diesel vehicles 251 Metric tons
2003	2,183.19 Million miles	Off-road use of diesel 362 Metric tons
Yearly Change	-8.94 %	Total PM 2.5 emissions 613 Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Province-by-province data on forestry and land use change emissions (soil and non-soil) are not available at this time and are not provided here.

Forest Land Area⁴	Non-soil Forest Stock	Annual Non-soil Forest Emissions	
kha	MMTCO ₂ e	MMTCO ₂ e	
20,000	Not estimated	Not estimated	
Notes: $MMTCO_2e = million metric tons carbon dioxide equivalents$			

Annual Average Land Use Change, 1996-2001 (ha) Source: Cropland from Statistics Canada; forest data from Canada's

GHG Inventory estimates



Provincial Data: Nova Scotia

Population Area Gross State Product (GSP) (M USD) 934,000 21,236 sq. mi. (55,000 sq. km.) \$24,658

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because provinces either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Climate Change Roadmap for New England and Eastern Canada

Coal 54.6%







Total Electric Generation: 11,605,083 MWh Source: Statistics Canada

Total Energy Consumption (2000)¹

digit postal code data

	Total terajoules	Terajoules per capita	Terajoules per GSP
NS	203,250	0.22	8.20
NE-EC	5,952,405	0.25	6.96

Transportation

VMT for Light D	Duty Vehicles (2003) ²	Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³
2000	5,298.24 Million miles	Highway diesel vehicles 463 Metric tons
2003	6,184.63 Million miles	Off-road use of diesel 1,106 Metric tons
Yearly Change	5.58 %	Total PM 2.5 emissions 1,569 Metric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Province-by-province data on forestry and land use change emissions (soil and non-soil) are not available at this time and are not provided here.

Forest Land Area⁴	Non-soil Forest Stock	Annual Non-soil Forest Emissions	Annual Average Land Use Change, 1996-2001 (ha)	-1,000 -
kha 4.400	MMTCO ₂ e Not estimated	MMTCO ₂ e Not estimated	Source: Cropland from Statistics Canada; forest data from Canada's GHG Inventory estimates	-2,000 —
,		carbon dioxide equivalents		-3,000 -
				-4,000 -

Provincial Data: Prince Edward Island

Population Area Gross State Product (GSP) (M USD) 136,000 2,239 sq. mi. (5,800 sq. km.) \$3,366

GHG Inventory



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because provinces either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Electric Generation Capacity in 2000



Source: Statistics Canada



Pata Sources: Environment Canada, Facility Level GFIG Reporting for 2004. Locations based on ESRI Canadian 3-digit postal code data

Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
PEI	25,567	0.19	7.6
NE-EC	5,952,405	0.25	6.96

Total Electric Generation in 2000



Total Electric Generation: 48,081 MWh Source: Statistics Canada

Transportation

VMT for Light Du	ity Vehicles (2003) ²	Heavy Duty Vehicles: PM2.5 Emission	ons from Diesels (2002) ³
2000	734.09 Million miles	Highway diesel vehicles 152 Me	etric tons
2003	797.41 Million miles	Off-road use of diesel 441 Me	etric tons
Yearly Change	2.88 %	Total PM 2.5 emissions 592 Me	etric tons

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Province-by-province data on forestry and land use change emissions (soil and non-soil) are not available at this time and are not provided here.

Forest Land Area⁴	Non-soil Forest Stock	Annual Non-soil Forest Emissions	Annual Average Land Use Change, 1996-2001 (ha)	-200		
kha 270	MMTCO ₂ e Not estimated	MMTCO ₂ e Not estimated	Source: Cropland from Statistics Canada; forest data from Canada's GHG Inventory estimates	-400 -		Forest -28
Notes: MMTCO	₂ e = million metric tons	carbon dioxide equivalents		-600 —		
				-800	Cropland -747	

Provincial Data: Quebec

Population Area Gross State Product (GSP) (M USD) 7,357,000 586,875 sq. mi. (1,520,000 sq. km.) \$224,928

GHG Inventory

Historical Greenhouse Gas Emissions



Source: NESCAUM and EPA State Inventory Tool for New England and Natural Resources Canada for Eastern Canadian Provinces Note: Forestry and land use change data are not included in the historical greenhouse gas emissions because provinces either do not report these emissions or do not report them consistently. See the Forestry and Land Use Change section for more information.

Energy



Electric Generation Capacity in 2000



* Wind data through 2005 Total Electric Generation Capacity: 35,376 MW Source: Statistics Canada

Large Final Emitter Locations, 2004 (CO₂e)



Data Sources: Environment Canada, Facility Level GHG Reporting for 2004. Locations based on ESRI Canadian 3-digit postal code data

Total Energy Consumption (2000)¹

	Total terajoules	Terajoules per capita	Terajoules per GSP
Quebec	1,724,365	0.23	7.7
NE-EC	5,952,405	0.25	6.96





Total Electric Generation: 179,728,120 MWh Source: Statistics Canada

Transportation

VMT for Light Duty Vehicles (2003) ²			Heavy Duty Vehicles: PM2.5 Emissions from Diesels (2002) ³			
2000	39,081.69	Million miles	Highway diesel vehicles	4,349	Metric tons	
2003	42.874.29	Million miles	Off-road use of diesel	11,417	Metric tons	
Yearly Change	3.23	%	Total PM 2.5 emissions	15,767	Metric tons	

Energy Consumption from Transportation in 2001 (Petajoules)



Forestry and Land Use Change

Province-by-province data on forestry and land use change emissions (soil and non-soil) are not available at this time and are not provided here.

Forest Land Area⁴	Non-soil Forest Stock	Annual Non-soil Forest Emissions	Annual Average Land Use Change, 1996-2001 (ha)	-2,000 -
kha 84,600	MMTCO ₂ e Not estimated	MMTCO ₂ e Not estimated	Source: Cropland from Statistics Canada; forest data from Canada's GHG Inventory estimates	-4,000 —
Notes: MMTCO	₂ e = million metric tons	carbon dioxide equivalents		-6,000 -
				-8,000 -

Sources for New England States Data

- 1 Source: US Energy Information Administration.
- 2 Source: US Highway Performance Monitoring System.
- 3 Source: New England States emissions 2002 data.
- 4 Source: Neil Sampson, 2006.
- 5 Source: Left estimate from USDA 2003. Right estimate from Neil Sampson, 2006.
- 6 Source: Left estimate from USDA 2003. Right estimate from Neil Sampson, 2006. Note that this estimate includes emissions from development.
- 7 Developed using USDA 2005 forest land estimates for 1997-2002 and Sampson 2006 estimate of non-soil forest stock.
- 8 Source: Neil Sampson, 2006.
- 9 *Ibid.* Note that possible double counting of agriculture-related soil carbon emissions, though negligible, may exist between these land use change (development) emissions estimates and those given by the historical GHG emissions inventory.

Sources for Eastern Canada Data

- 1 Source: Statistics Canada.
- 2 Source: Statistics Canada.
- 3 Source: Environment Canada.
- 4 Source: Natural Resources Canada, 2006.