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Canadian Council of Ministers of the Environment

Le Conseil canadien des ministres de l'environnement

2010-2011 PROGRESS REPORT ON THE CANADA-WIDE ACID RAIN STRATEGY FOR POST-2000

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The Canadian Council of Ministers of the Environment (CCME) is the primary, minister-led intergovernmental forum for collective action on environmental issues of national and international concern.

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The Canada-Wide Acid Rain Strategy for Post-2000

In October 1998, federal, provincial, and territorial Energy and Environment Ministers signed The Canada-Wide Acid Rain Strategy for Post 2000. The primary long-term goal of The Strategy is "to meet the environmental threshold of critical loads for acid deposition across Canada". As steps towards the achievement of this goal, The Strategy calls for a number of actions, including:

- Pursuing further emission reduction commitments from the United States
- Establishing new sulphur dioxide (SO_2) emission reduction targets in eastern Canada
- Preventing pollution, and keeping "clean" areas clean
- Ensuring the adequacy of acid rain science and monitoring programs and
- Reporting on SO_2 and nitrogen oxides (NO_x) emissions and forecasts, on compliance with international commitments, and on progress in implementing The Strategy.

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Acronyms and Abbreviations Used in this Report

AB	Alberta
BC	British Columbia
MB	Manitoba
NB	New Brunswick
NL	Newfoundland and Labrador
NS	Nova Scotia
NT	Northwest Territories
NU	Nunavut
ON	Ontario
PE	Prince Edward Island
QC	Québec
SK	Saskatchewan
YT	Yukon Territory
AMC	Air Management Committee
AQA	Canada-U.S. Air Quality Agreement
AQMS	Air Quality Management System
ARTG	Acid Rain Task Group
BATEA	Best Available Technology Economically Achievable
BLIERs	Base Level Industrial Emission Requirements
CAIR	Clean Air Interstate Rule
CAPMoN	Canadian Air and Precipitation Monitoring Network
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
CSAPR	Cross-State Air Pollution Rule
ECA	North American Emission Control Area
EPA	(United States) Environmental Protection Agency
IMO	International Marine Organization
KCAC	keeping clean areas clean
Kt	metric kilotonne
Mt	metric megatonne
NAtChem	Canadian National Atmospheric Chemistry Database and Analysis Facility
NO_X	Nitrogen Oxides
NPRI	National Pollutant Release Inventory
PM	particulate matter
SO_2	Sulphur Dioxide
SOMA	Sulphur Oxide Management Area
t	metric tonne

1. Introduction

1.1. *Background*

The Canada-Wide Acid Rain Strategy for Post-2000 (hereafter called *The Strategy)* was signed on October 19, 1998, by all 26 Canadian Energy and Environment Ministers to provide a framework for the long-term management of acid rain in Canada.

The Strategy was developed in response to the recognition by science and policy communities in the 1990s[1] that although acidifying emission control programs in both Canada and the United States were successfully meeting targets and caps, substantially greater reductions would be needed in order to halt acid rain damage in eastern Canada.

The body mandated to coordinate the implementation of *The Strategy* is the Canadian Council of Ministers of the Environment (CCME) Acid Rain Task Group (ARTG)[2]. Since the inception of *The Strategy*, the ARTG has been reporting to Ministers and the Canadian public on progress made on achieving the commitments made under *The Strategy* and on sulphur dioxide (SO_2) and nitrogen oxide (NO_x) emissions and forecasts.

Originally produced on an annual basis, the Progress Report is now a biennial publication beginning with the 2006/07 report, alternating with the biennial Canada-United States Air Quality Agreement progress report which presents similar information.

1.2. *Highlights of the 2010/11 Progress Report*

This progress report provides a summary of activities across Canada contributing to the implementation of *The Strategy* in 2010 and 2011. It includes emissions data from the National Pollutant Release Inventory for 2010 and ambient air quality data from the National Air Pollution Surveillance network for 2010 and 2011. This report provides information on the state of acid rain at the national level, total SO_2 and NO_x emissions by province and sector, an update on the actions taken and actions planned to reduce acidifying emissions across Canada, and an overview of the latest scientific knowledge on acid deposition.

[1] For example, the *1997 Canadian Acid Rain Assessment* (Environment Canada, 1998) indicated that large areas of eastern Canada continued to receive "twice as much sulphate as the local lakes and wetlands can tolerate without suffering long-term damage."

[2] Formerly known as the Acidifying Emissions Task Group.

1.3. *The Strategy's Commitments*

In order to achieve the goal of not exceeding critical loads for acid deposition, *The Strategy* commits federal, provincial and territorial Ministers of Environment and Energy to:

- pursue further emission reduction commitments from the United States
- establish new SO_2 emission reduction targets in eastern Canada
- prevent pollution, and keep "clean" areas clean
- ensure the adequacy of acid rain science and monitoring programs
- report on SO_2 and NO_x emissions and forecasts, on compliance with international commitments, and on progress in implementing *The Strategy*.

The Strategy describes in detail the importance of these commitments in terms of the overall objective of meeting critical loads, however it does not associate timeframes with each commitment or break down the commitments into the specific tasks.

1.4. *Delivery of The Strategy*

Many issues related to environmental protection, including acid rain, are a shared responsibility between federal and provincial/territorial governments. The inter-jurisdictional nature of the acid rain problem requires the cooperation of a broad range of stakeholders and coordination of efforts on a national scale. Because of this, *The Strategy* is delivered through the Canadian Council of Ministers of the Environment which is composed of Ministers of the Environment from the federal, provincial and territorial governments. CCME works to promote effective intergovernmental cooperation and coordinated approaches to issues of a national interest such as air pollution. To achieve a high level of environmental quality across the country, CCME establishes nationally-consistent environmental standards, strategies and objectives.

The Air Management Committee (AMC) was established under CCME to manage intergovernmental approaches to air quality issues in Canada, excluding climate change. AMC manages air-related Canada-wide standards, the work of air-related working groups and serves as the forum for federal-provincial-territorial dialogue on significant air issues. AMC also recommends priorities for cooperative action on existing and new air quality issues, potentially including the development of national plans or strategies to address these priorities and potential mechanisms to accomplish them.

ARTG is a multi-stakeholder working group reporting to AMC. In support of its role of coordinating *The Strategy* and reporting biennially on progress, ARTG:

- provides advice on the implementation of steps aimed at achieving the long-term goal of *The Strategy*
- undertakes stakeholder consultations as outlined in its work plan
- recommends revisions to *The Strategy* as required to better meet its objectives,
- identifies emerging issues related to acid deposition
- tracks acid rain related science developments and provides advice on appropriate response to AMC.

1.5. *The ARTG's approach for coordinating the implementation of The Strategy*

The ARTG uses the Long-Term Strategic Plan as a tool for planning yearly work activities and for ensuring these activities are targeted toward achieving the goals of *The Strategy*. The ARTG developed the Long-Term Strategic Plan by examining the *2004 Canadian Acid Deposition Science Assessment* and the 2006 Five-year review of *The Strategy* and then defining specific actions or tasks required to achieve the various commitments.

The ARTG also considers the Long-Term Strategic Plan to be a set of recommendations to the governments that signed *The Strategy* of the specific actions that are required in order to successfully meet the long-term goal of eliminating critical load exceedances.

The Long-Term Strategic Plan is posted on CCME's website at:
(http://www.ccme.ca/assets/pdf/artg_long_term_stratplan_e.pdf).

Since its inception, the ARTG has undertaken a number of tasks to accomplish the commitments made in *The Strategy*. In 2010, the ARTG contracted Trent University to apply a previously developed framework to assess the uncertainty of acidity critical loads and exceedances for terrestrial mineral forest soils and present the resulting information in a clear non-scientific format for a wide general audience. A critical load is defined as the amount of acid deposition an ecosystem can withstand over the long-term before it is significantly harmed, and so is a measure of how sensitive an ecosystem is over the long-term. A critical load exceedance is a measurement of the amount of acid deposition received beyond this threshold (exceedance = acidifying deposition – critical load).

The maps produced as part of the contract clearly indicate that there has been a decrease in the probability (i.e. that it is less likely) that critical loads will be exceeded in many areas across Canada from 2002 to 2006. Unfortunately, the maps also indicate that there are still many areas in Canada that have a high probability (75-100%) of critical load exceedance, most notably in the southern parts of Ontario and Quebec, in the Vancouver area of British Columbia, and parts of northern Alberta, Saskatchewan and Manitoba.

2. State of Acid Rain in Canada

2.1. *Emissions of acidifying pollutants*

Despite great strides in reducing acidifying pollutants since the height of the acid rain problem in the 1970s and 80s, the emission of acidifying pollutants such as SO_2 and NO_x continues to negatively impact the health of Canadians and the environment. A breakdown of the national SO_2 and NO_x emissions is provided in the following charts.

Figure 1 presents the distribution of SO_2 emissions by province[3] across Canada in 2010. Overall, the combined SO_2 emissions from all provinces and territories in 2010 were almost 21% lower than the 2008 emissions published in the previous Acid Rain Progress Report (a decrease from 1.74 Mt to 1.37 Mt). The provinces of Alberta and Ontario accounted for almost half the national SO_2 emissions (47% combined) while the next largest emitters were Manitoba with 14% and Québec with 12%.

Compared to 2008, the provinces with the largest relative percentage change were Alberta (whose national percentage went up from 22% to 27%) and Manitoba (whose national percentage went down from 20% to 14%). British Columbia and Saskatchewan increased by 1%. New Brunswick and Nova-Scotia decreased by 1%, Quebec increased by 2%, Ontario decreased by 2%. Newfoundland and Labrador was unchanged.

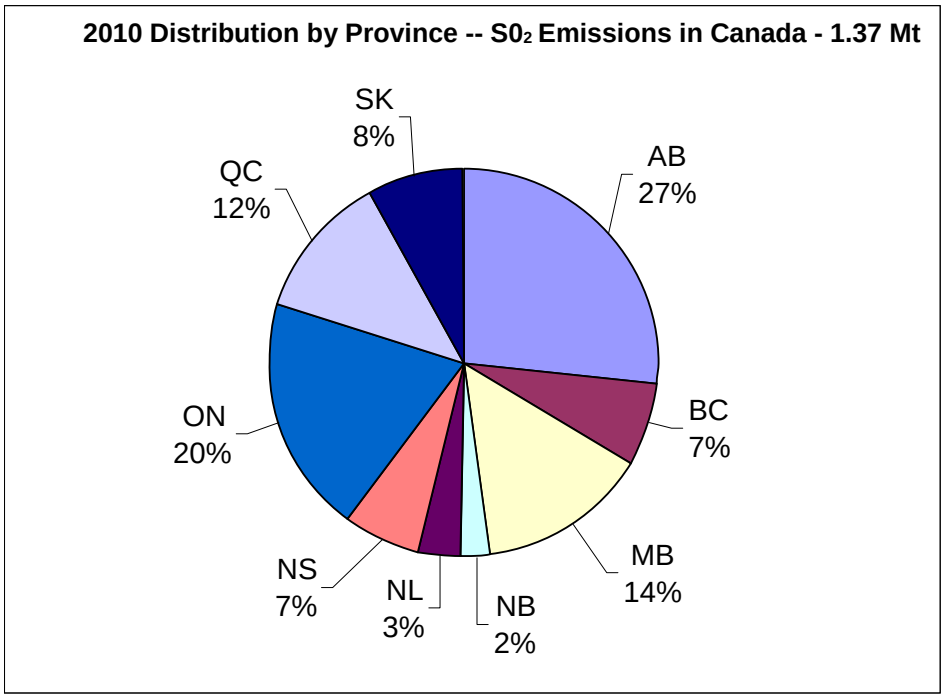


Figure 1 - 2010 Distribution by Province of Sulphur Dioxide Emissions in Canada – 1.37 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figure 2 shows the relative contributions by source of the SO_2 emissions in Canada in 2010. The largest contribution comes from industrial sources, with non-ferrous smelting and refining, the petroleum industry and other industrial sources contributing to more than 65% of the national total. Electric power generation represented 25% and mobile sources (which include marine transportation) contributed another 6.9%. Compared to the 2008 data published in the last Acid Rain Progress Report, the largest relative changes at the national level were from the non-ferrous smelting and refining sector (which proportionally decreased from 33% to 27.2%) and from the petroleum industry (which proportionally increased from 21.8% to 24.3%).

[3] Prince Edward Island and the territories account for less than 1% of the total SO_2 emissions and are not shown on the figure.

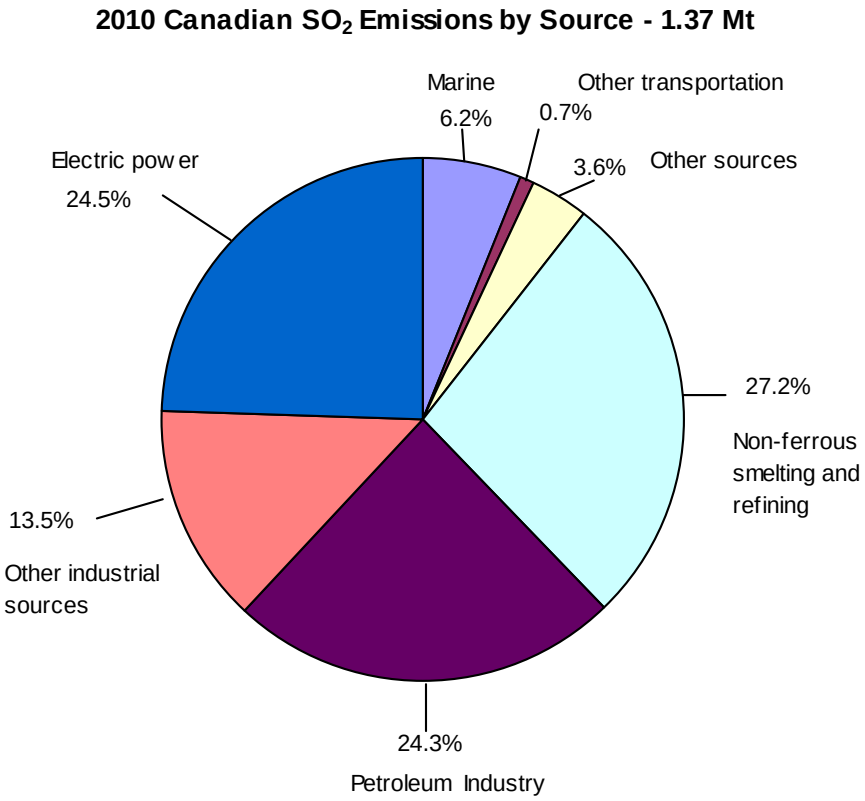


Figure 2 - 2010 Canadian Sulphur Dioxide emissions by Source – 1.37 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figure 3 provides a more detailed breakdown of the SO_2 emissions from industrial sources. The largest contributors from this group are non-ferrous smelting and refining and the upstream petroleum industries which together account for about 73% of the industrial emissions. The other main sources are the downstream petroleum industry and the aluminum industry; each contributing 7% of the total emissions. Emissions from "Other Industries", which includes pulp and paper, cement and concrete, iron and steel, iron ore mining and chemical industries, account for 13% of the industrial emissions. When compared to the 2008 data published in the last Acid Rain Progress Report, the main changes in 2010 are seen in the upstream petroleum industry (which proportionally increased by 5%) and the non-ferrous smelting and refining industry (which proportionally decreased by 6%). Overall, emissions of SO_2 from industrial sources have decreased by almost 24%, from 1.17 Mt in 2008 to 0.89 Mt in 2010.

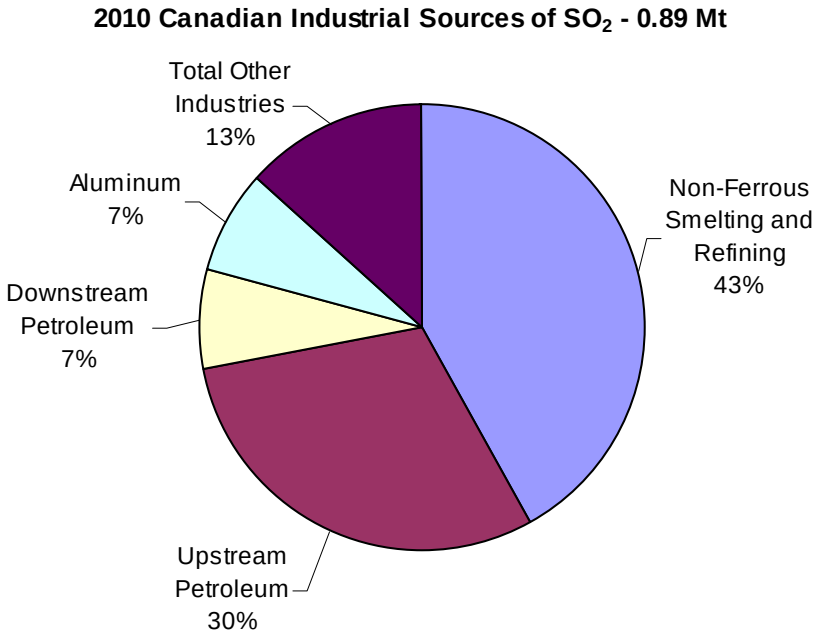


Figure 3 - 2010 Canadian Industrial Sources of Sulphur Dioxide – 0.89 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figure 4 illustrates the distribution of NO_x emissions by province[4] across Canada. The largest contributing provinces are Alberta at 38%, followed by Ontario at 19%, and then British Columbia and Québec which each contribute 12% of the total emissions. The provinces of Saskatchewan, Manitoba, New Brunswick, Nova Scotia and Newfoundland and Labrador account for the remaining 19% of the total emissions. This proportional breakdown of NO_x emissions has changed slightly since the 2008 data published in the previous Acid Rain Progress Report. Except for Alberta (which increased by 2%) and Ontario (which decreased by 2%), all of the provincial proportions remained the same.

[4] Prince Edward Island and the territories account for approximately 1% of the total NOx emissions and are not shown on the figure.

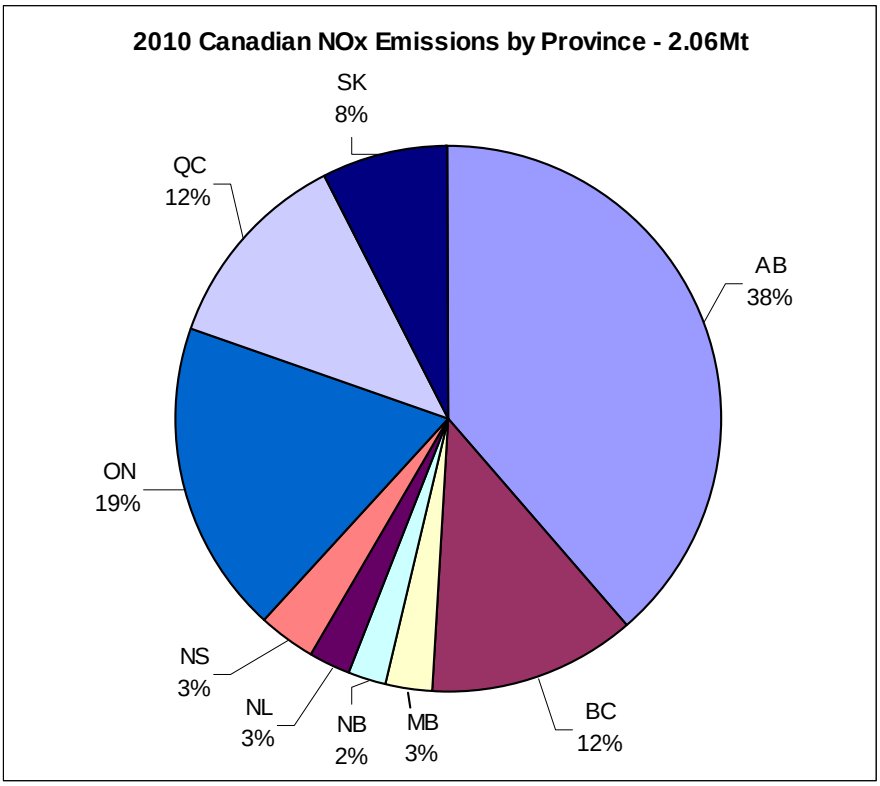


Figure 4 - 2010 Canadian Nitrogen Oxide Emissions by Province – 2.06 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figure 5 presents the relative contribution by source of Canada's NO_x emissions. Whereas the transportation sector is a minor contributor to SO_2 emissions, it is by far the largest contributor to NO_x emissions, accounting for 55% of the Canadian total (1.1 Mt of the 2.06 Mt total). The transportation category includes emissions from aircrafts, marine transportation and on-road and off-road vehicles. Other major contributing sectors include electric power generation and the upstream oil and gas industry which account for 10% and 21% of the national total respectively. Overall, national NO_x emissions decreased from 2.13 Mt in 2008 to 2.06 Mt in 2010, a decrease of more than 3%. Compared to the 2008 data published in the previous Acid Rain Progress Report, the relative distribution of the NO_x emissions sources remained constant with modest changes: transportation (increased by 1%), electric power generation (decreased by 1%), upstream oil and gas (no change), other industrial sources (increased by 2%) and other sources (decreased by 2%).

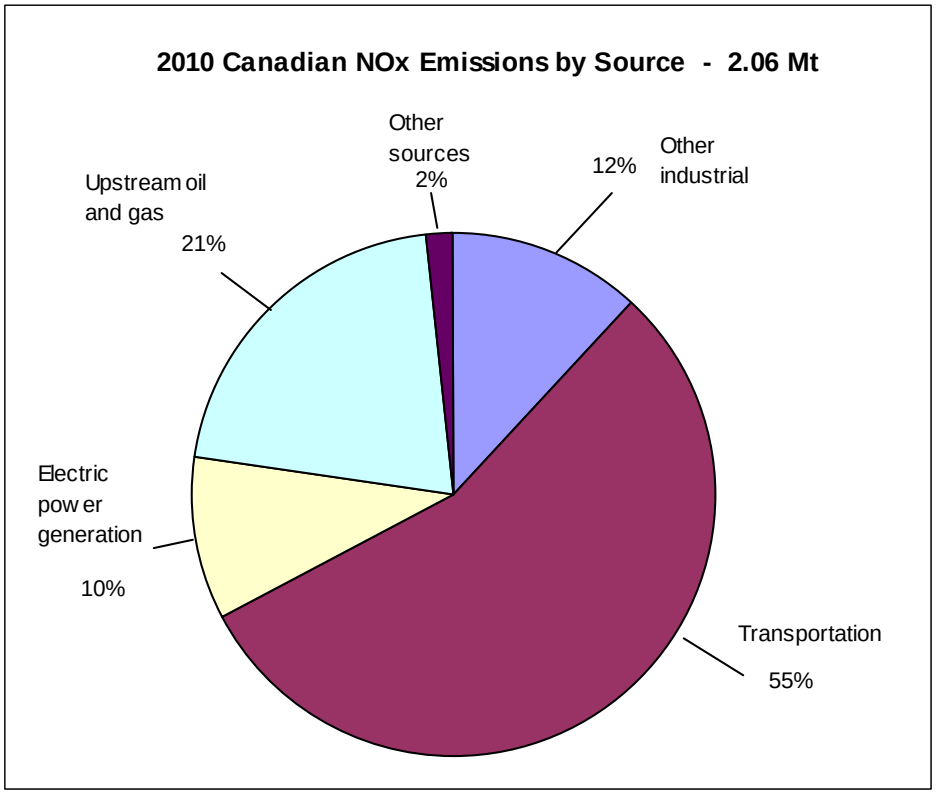


Figure 5 - 2010 Canadian Nitrogen Oxide Emissions by Source – 2.06 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figure 6 shows a more detailed breakdown of the national industrial NO_x emissions for 2010. The upstream petroleum sector accounted for 69% of Canada's total NO_x emissions (434kt of the 632 kt total.). Other industrial sectors contributed 5% or less each, e.g., cement and concrete (5%), pulp and paper (4%), petroleum product transportation and distribution (3%), downstream petroleum (3%), chemicals (2%), mining and rock quarrying (3%), iron ore mining (2%) and several others below 2%. Overall, NO_x emissions from industrial sources decreased from 0.66 Mt in 2008 to 0.63 Mt in 2010, a reduction of 4.5%.

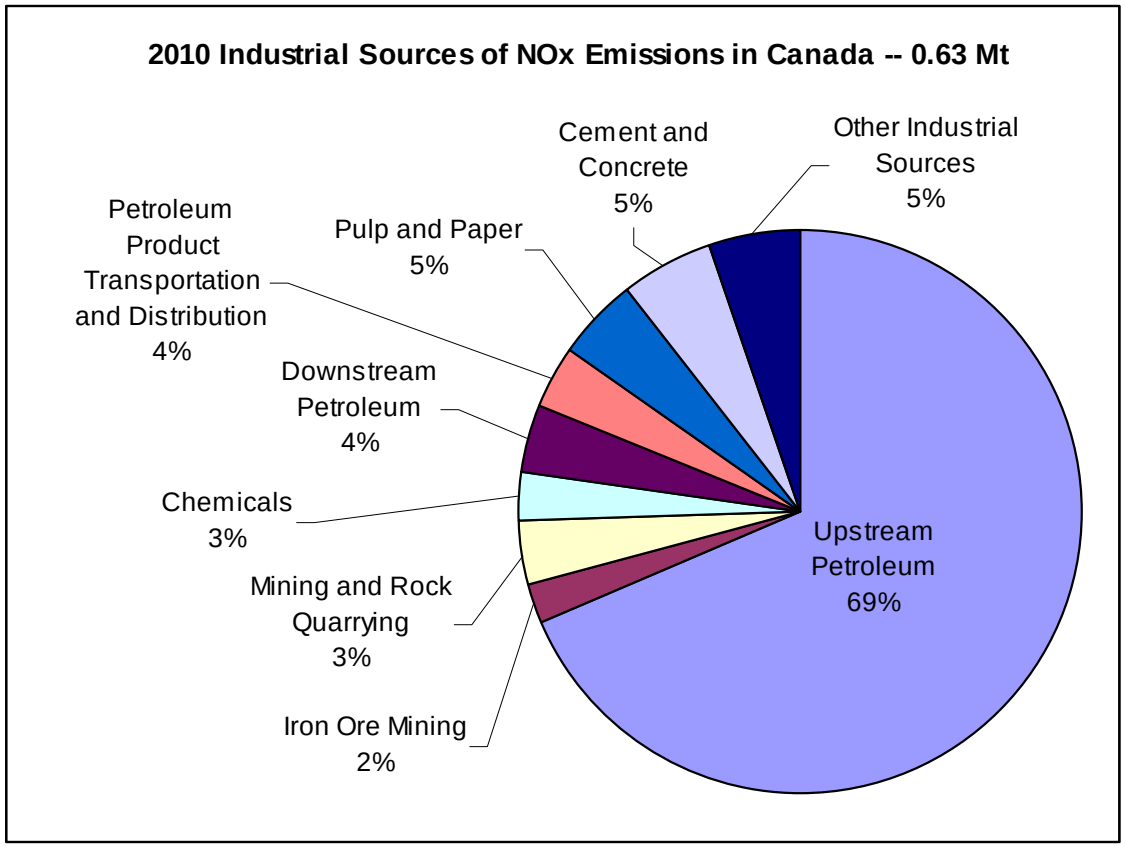


Figure 6 - 2010 Industrial Sources of Nitrogen Oxide Emissions in Canada – 0.63 Mt
Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012)

Figures 7 and 8 illustrate the overall trend of SO_2 and NO_x emissions between 1985 and 2010. Despite normal variability in overall emissions, downward trends can be seen in both graphs. Since 1985, SO_2 emissions have decreased by about 63% and NO_x emissions by about 17%. Notably, since 2004, a steady decrease in emissions of SO_2 and NO_x has been achieved through reductions from the base metal smelters (e.g. through a code of practice and the implementation of pollution prevention plans), from reduction from the on-road vehicles (e.g. through the implementation of emission regulations), and from the closure of fossil-fuel fired electricity generating utilities. Compared to the 2008 data published in the previous Acid Rain Progress Report, the 2010 emissions of SO_2 were lower by 21% and the NO_x emissions were lower by almost 3.5%. The most significant source of SO_2 in Canada continues to be the industrial sector, while the most significant source of NO_x continues to be the mobile sector.

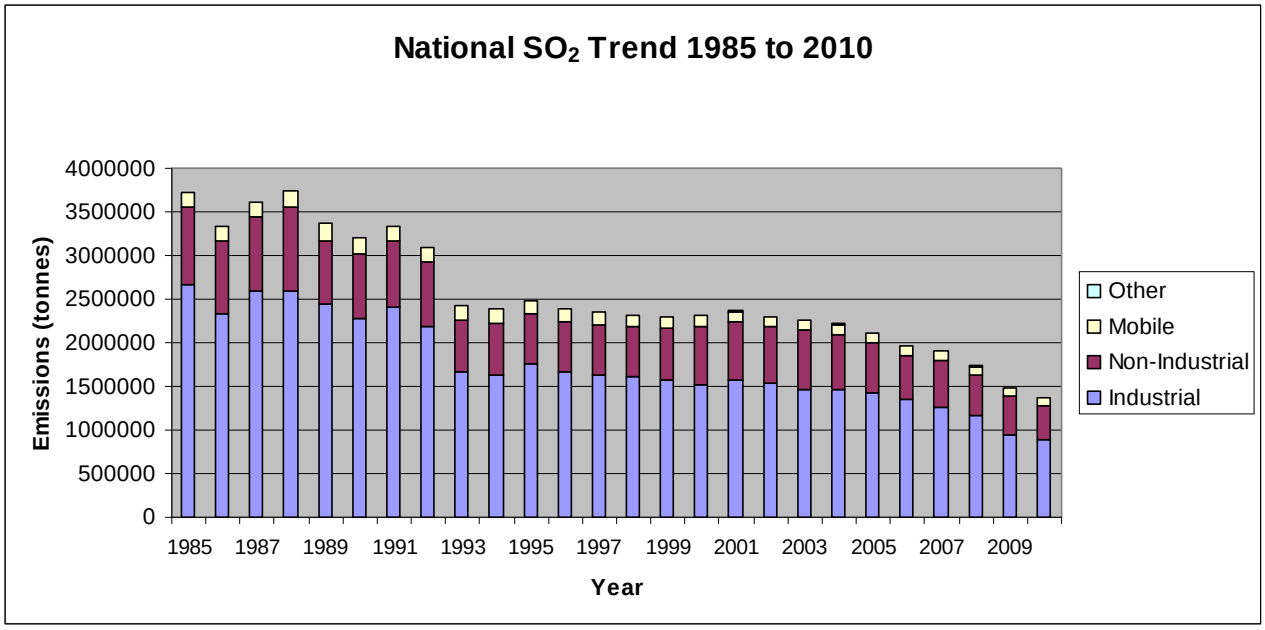


Figure 7 - Canadian National Emissions of SO_2 over the time period 1985-2010[5]
Source: 2010 National Pollutant Release Inventory – Air Pollutant Emission Summaries and Trends, March 2012

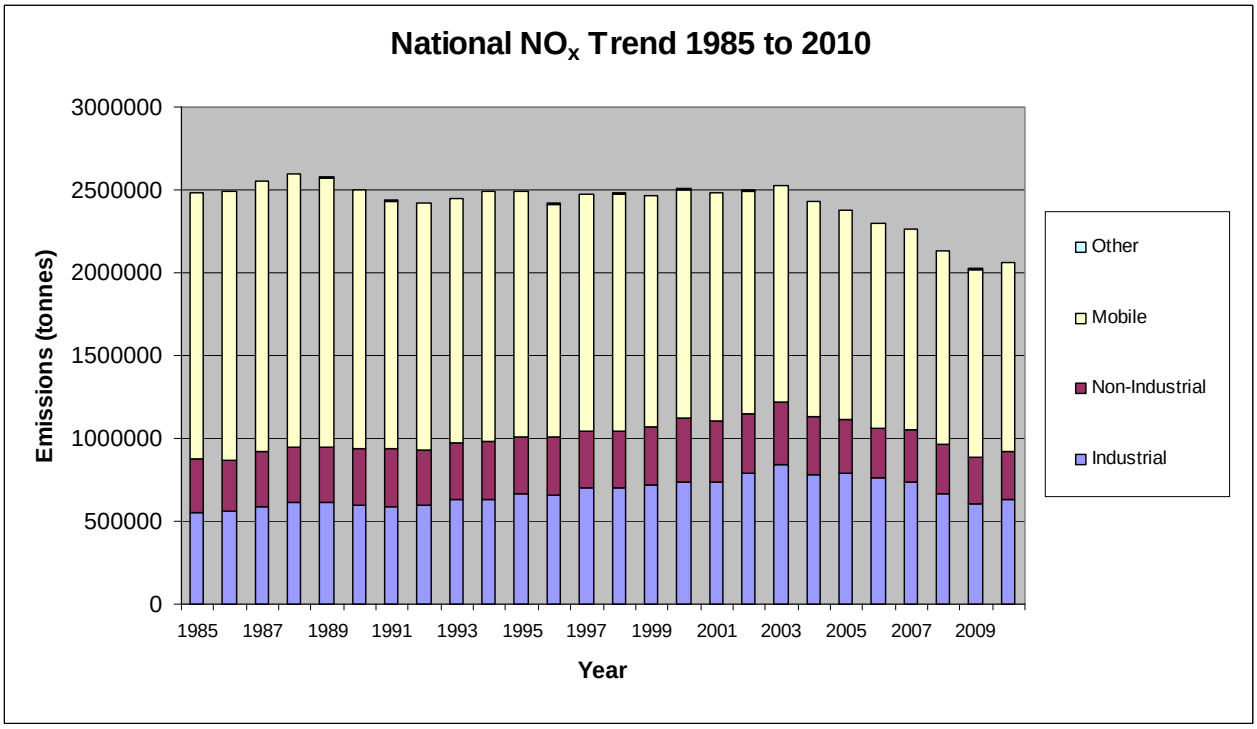


Figure 8 - Canadian National Emissions of NO_x over the time period 1985-2010[5]
Source: 2010 National Pollutant Release Inventory – Air Pollutant Emission Summaries and Trends, March 2012

[5] "Other" includes incineration (e.g. industrial, commercial, municipal, crematorium) and miscellaneous sources (e.g. printing, surface coatings, general solvent use, dry cleaning, structural fires). "Other" excludes open sources (e.g. agriculture, prescribed burning, construction operations, dust from roads, mine tailings) and natural sources (e.g. forest fires). Due to the relatively small contribution made by "Other" sources, they are barely visible on the bar graphs.

Emissions by Province and Sector

Tables 1 and 2 below provide the 2008 to 2010 emissions data of SO_2 and NO_x for various source sectors for each of the provinces, the Yukon, Nunavut, and the Northwest Territories.

Table 1 indicates that emissions of SO_2 at the national level continue to decrease. Between 2008 and 2010, they fell by almost 21% and continue to be well below the national cap of 3.2 Mt. In fact, the total national emissions of SO_2 (1.37 Mt) are even below the established SOMA cap of 1.75 Mt. Overall, SO_2 emissions in Canada continue to come mostly from non-ferrous smelting and refining (27.2%) and from the petroleum industry (24.3%).

Table 1: Total SO_2 Emissions by Province and Sector

British Columbia (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Upstream oil and gas				46	43	44
Non-ferrous mining and smelting				5	4	5
Pulp and Paper				11	9	10
Transportation (Mobile)*				22	22	23
Other				15	14	11
Total	**n/a**	**n/a**	**n/a**	**99**	**92**	**93**
Alberta (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Upstream oil and gas				107	99	104
Oil Sands				116	131	113
Electric Power Generation				124	115	120
Other				30	29	28
Total	**n/a**	**n/a**	**n/a**	**377**	**374**	**365**
Saskatchewan (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Electric Power Generation				91	100	97
Upstream oil and gas				21	20	6
Other				11	9	9
Total	**n/a**	**n/a**	**n/a**	**123**	**129**	**112**
Manitoba (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Non-ferrous mining and smelting				346	286	193
Other				4	3	4
Total	**550**	**n/a**	**n/a**	**350**	**289**	**197**
Ontario (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Non-ferrous mining and smelting				192	84	140
Petroleum Refining				34	31	23
Other industrial sources				54	42	42
Electric Power Generation				76	31	38
Other*				26	25	25
Total	**885**	**n/a**	**442.5**	**382**	**213**	**268**

Québec (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Non-ferrous mining and smelting				21	19	26
Aluminum Industry				57	53	54
Petroleum Refining				12	12	9
Pulp and Paper				10	7	7
Other*				71	69	69
Total	**500**	**300**	**250**	**171**	**160**	**165**
New Brunswick (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Non-ferrous mining and smelting				7	8	9
Pulp and Paper				7	4	4
Electric Power Generation				23	30	10
Other				12	12	10
Total	**175**	**122.5**	**87.5**	**49**	**54**	**33**
Nova Scotia (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Electric Power Generation				108	101	64
Other				29	28	27
Total	**189**	**142**	**142**	**137**	**129**	**91**
Prince Edward Island (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Electric Power Generation				<0.5	<0.5	<0.5
Other				2	1	1
Total	**5**	**n/a**	**n/a**	**2**	<1.5	<1.5
Newfoundland and Labrador (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Petroleum Refining				18	15	16
Iron Ore Mining				8	4	8
Electric Power Generation				5	4	3
Other*				17	18	18
Total	**n/a**	**60**	**60**	**48**	**41**	**45**
Yukon (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Total	**n/a**	**n/a**	**n/a**	**1**	**<1**	**<1**
Northwest Territories (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Mining and Rock quarrying				<0.5	<0.5	<0.5
Upstream oil and gas				<0.5	<0.5	<0.5
Other				<0.5	<0.5	<0.5
Total	**n/a**	**n/a**	**n/a**	**<0.5**	**<1**	**<1**
Nunavut (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Total	**n/a**	**n/a**	**n/a**	**<0.5**	**<0.5**	**<0.5**

SOMA						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Total	**1750**	**1750**	**1750**	**673**	**492**	**494**
Canada (SO_2)						
		Caps		(kt)	(kt)	(kt)
	1994/99	2005	2010/15	2008	2009	2010
Total	**3200**	**3200**	**3200**	**1738**	**1484**	**1370**

* Includes emissions from the Marine Transportation Sector, in particular, emissions from innocent passage, which are not sourced in the province but are attributed to the province by Environment Canada in its emissions inventory compilation. In 2010, emissions from Marine Transportation accounted for 85% of the SO_2 emissions in the "Other" category in NL, for 26% of the "Other" category in QC, for 42% of the "Other" category in ON and for 91% of the "Mobile Sources" category in BC.

Note: - Summing provincial sector values may not equal provincial totals and summing provincial totals may not equal Canada total due to rounding.
- N/A = Not applicable
- The emission summaries exclude emissions from open (e.g., landfills) and natural (e.g., forest fires) sources.

Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012). National, provincial and territorial emissions inventories were developed collaboratively by Environment Canada, the provinces and the territories using information and statistics compiled through voluntary and mandatory surveys, permits and models.

Table 2 below shows that total NO_x emissions in Canada have been decreasing – from 2,135 Kt in 2008 to 2,061 Kt in 2010 – a decrease of 74 Kt, or almost 3.5%. The 2.06 Mt total is also below the national cap of 2.5 Mt. Proportionally, in 2010, NO_x emissions in Canada continued to come mostly from the transportation sector (55%) and from the upstream oil and gas sector (21%) – these proportions are basically unchanged from the 2008 figures published in the previous Acid Rain Progress Report.

Table 2: Total NO_x Emissions by Province and Sector

British Columbia (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		92	80	90
Transportation* (Mobile)		163	159	156
Total	**n/a**	**255**	**239**	**246**
Alberta (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		517	494	509
Transportation		237	239	278
Total	**n/a**	**754**	**733**	**787**
Saskatchewan (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		65	66	63
Transportation		100	96	92
Total	**n/a**	**165**	**162**	**155**
Manitoba (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		8	6	6
Transportation		59	56	54
Total	**n/a**	**67**	**62**	**60**
Ontario (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		138	107	111
Transportation		297	284	272
Total	**n/a**	**435**	**391**	**383**
Québec (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		63	63	65
Transportation*		195	187	179
Total	**n/a**	**258**	**250**	**244**
New Brunswick (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		26	22	18
Transportation		27	26	24
Total	**n/a**	**53**	**48**	**42**
Nova Scotia (NOx)				
	Caps	(kt)	(kt)	(kt)
	1994 and beyond	2008	2009	2010
Stationary Sources		29	24	25
Transportation*		43	42	41
Total	**n/a**	**72**	**66**	**66**

Prince Edward Island (NOx)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Stationary Sources		1	1	>1
Transportation		5	5	5
Total	**n/a**	**6**	**6**	**5**
Newfoundland and Labrador (NOx)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Stationary Sources		20	16	18
Transportation*		34	34	34
Total	**n/a**	**54**	**50**	**52**
Yukon (NOx)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Stationary Sources		<0.5	<0.5	<0.5
Transportation		1	1	1
Total	**n/a**	**1**	**1**	**1**
Northwest Territories (NOx)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Stationary Sources		7	9	10
Transportation		2	2	2
Total	**n/a**	**9**	**11**	**12**
Nunavut (Nox)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Stationary Sources		3	3	5
Transportation		1	1	1
Total	**n/a**	**4**	**4**	**6**
Canada (NOx)				
Caps		(kt)	(kt)	(kt)
1994 and beyond		2008	2009	2010
Total	**2514**	**2135**	**2024**	**2061**

* Includes emissions from Marine Transportation, in particular, emissions from innocent passage, which are not sourced in the province but are attributed to the province by Environment Canada in its emissions inventory compilation. In 2010, emissions from Marine Transportation (as a percentage of total N0x emissions from the "Transportation" sector) equaled 23% in BC, 14% in QC, 54% in NS and 62% in NL.

Note: - Summing provincial sector values may not equal provincial totals and summing provincial totals may not equal Canada total, due to rounding.
- N/A = Not applicable
- The emission summaries exclude emissions from open (e.g., landfills) and natural (e.g., forest fires) sources.

Source: National Pollutant Release Inventory (NPRI), Pollutant Inventories and Reporting Division, Environment Canada (March, 2012). National, provincial and territorial emissions inventories were developed collaboratively by Environment Canada, the provinces and the territories using information and statistics compiled through voluntary and mandatory surveys, permits and models

2.2. *Deposition of acidifying pollutants*

Acidifying emissions (namely SO_2 and NO_x) from point and area sources are deposited on the Earth's surface (namely as sulphate (SO_4^{2-}) and nitrate (NO_3^-)) in rain and snow, particles and gases and/or in cloud water and fog. Temporal and spatial information on the total deposition of these pollutants is essential to determine what areas of the country are susceptible to acid rain

damage, as well as what changes can be observed based on past and proposed emission control actions.

In Canada, wet deposition data are currently collected at over 70 sites across the country by the Canadian Air and Precipitation Monitoring Network (CAPMoN) and several provincial monitoring networks[6]. Data from these networks as well as networks in the U.S. are stored in and analyzed by the Canadian National Atmospheric Chemistry (NAtChem) Database and Analysis Facility. The maps below provide a geographical comparison of wet deposition levels (kg/ha/yr) in North America from 1990 to 2010 for both non-sea salt sulphate and nitrate deposition. Large areas of Canada were not being monitored as some monitoring sites in Canada have been shut down over the years as indicated by a decrease in the number of sites. Given the paucity of the data it is not possible to draw contour lines across Canada north of 49^{o} N latitude; therefore, dots are plotted instead.

The highest levels of wet non-sea-salt sulphate deposition have consistently occurred in eastern North America along a southwest to northeast axis (Figure 9). Non-sea-salt sulphate refers to sulphate that is attributed only to anthropogenic sources. The maps illustrate that there have been significant reductions in wet non-sea-salt sulphate deposition in much of eastern Canada and the eastern United States over the last two decades resulting from SO_2 emission reductions from the implementation of the *Eastern Canadian Acid Rain Program*, the *Canada-wide Acid Rain Strategy* and the *U.S. Clean Air Act*. In 2010, the acid-sensitive areas of the Canadian Shield in Ontario, Québec, Nova Scotia and New Brunswick received less than 15 kg S/ha/yr.

Similar to the wet sulphate deposition pattern, the highest levels of wet nitrate deposition occur in eastern North America (Figure 10). The maps clearly show a significant decline in wet nitrate deposition, particularly since 2000. In 2010, wet nitrate deposition over eastern Canada was below 14 kg/ha/yr. Generally speaking wet sulphate and wet nitrate deposition levels in western Canada are currently lower than in eastern Canada.

Dry deposition constitutes an important part of total sulphur and total nitrogen deposition, especially in western Canada. But because the data for the country is sparse, the dry deposition patterns are not shown. In addition, dry deposition is modelled over large spatial scales but with the understanding that there are limited measurements available for model verification, resulting in uncertainties in modelled dry deposition values.

[6] For more information (in French) about the precipitation quality monitoring program of the Québec Ministry of Sustainable Development, Environment, Wildlife and Parks (MDDEFP), see: http://www.mddefp.gouv.qc.ca/climat/qualite-precipitation/index.htm

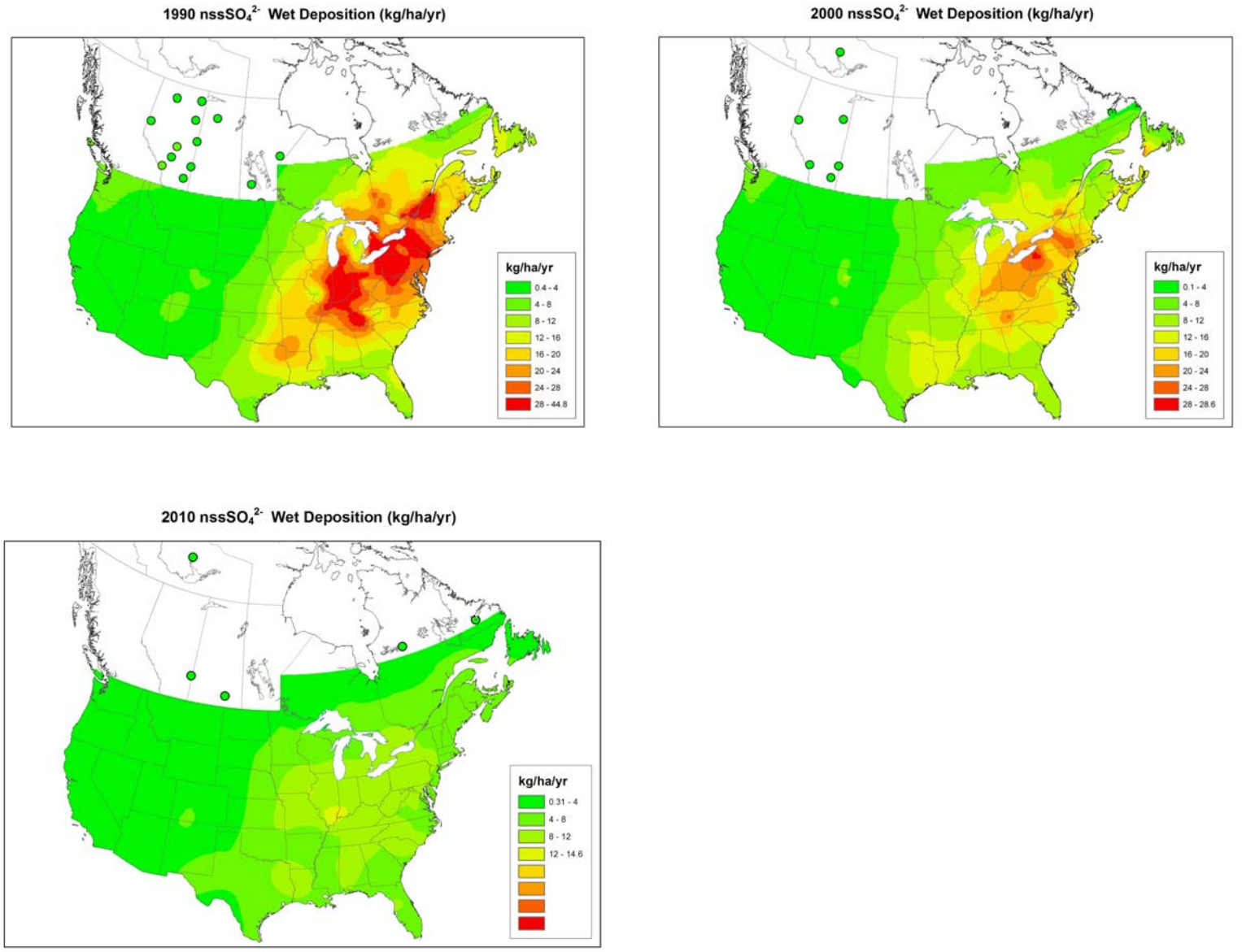


Figure 9 –Wet Deposition maps indicating the gradual decrease in non-sea salt sulphate (SO_4^-) deposition from 1990 to 2010
Source: Environment Canada, 2012

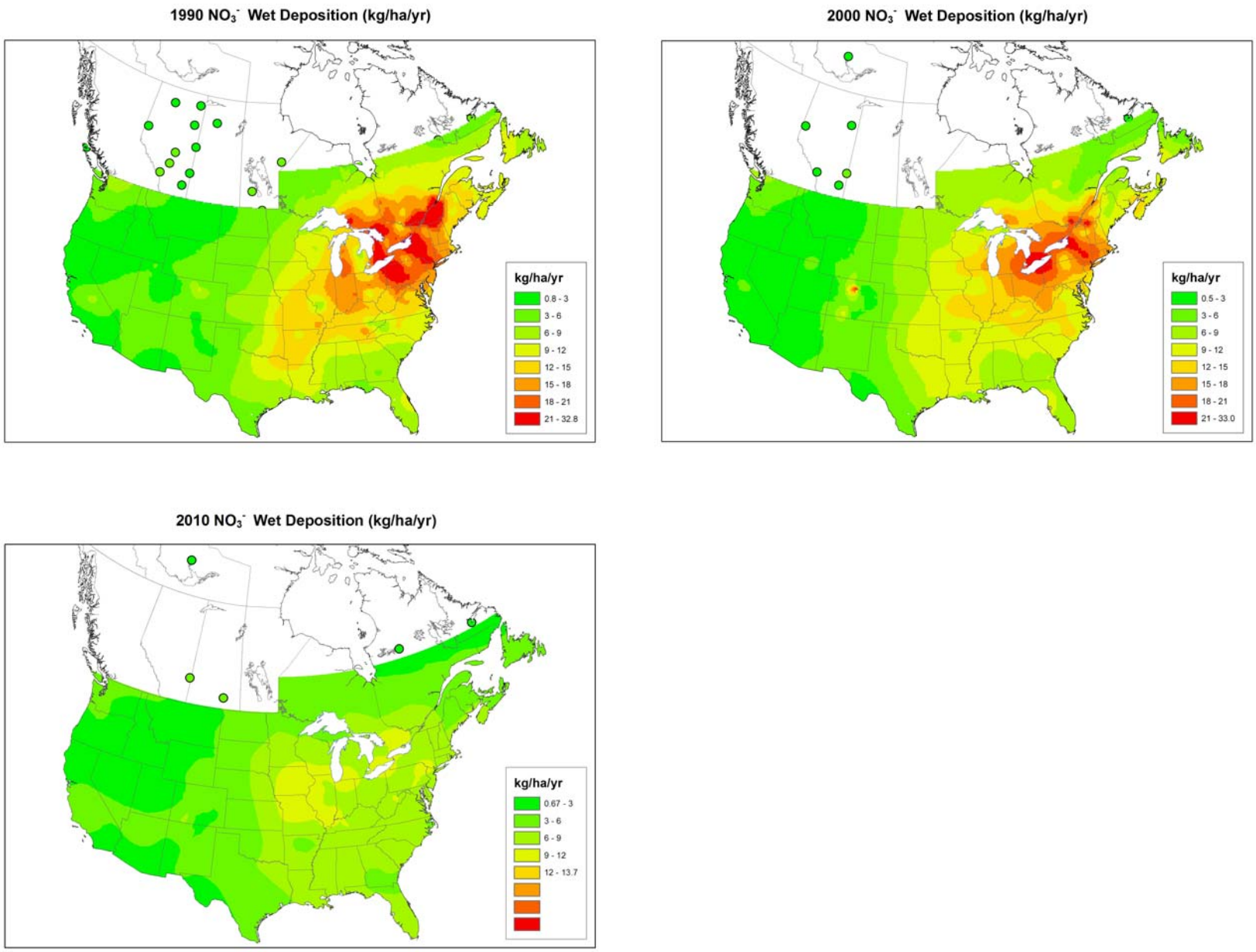


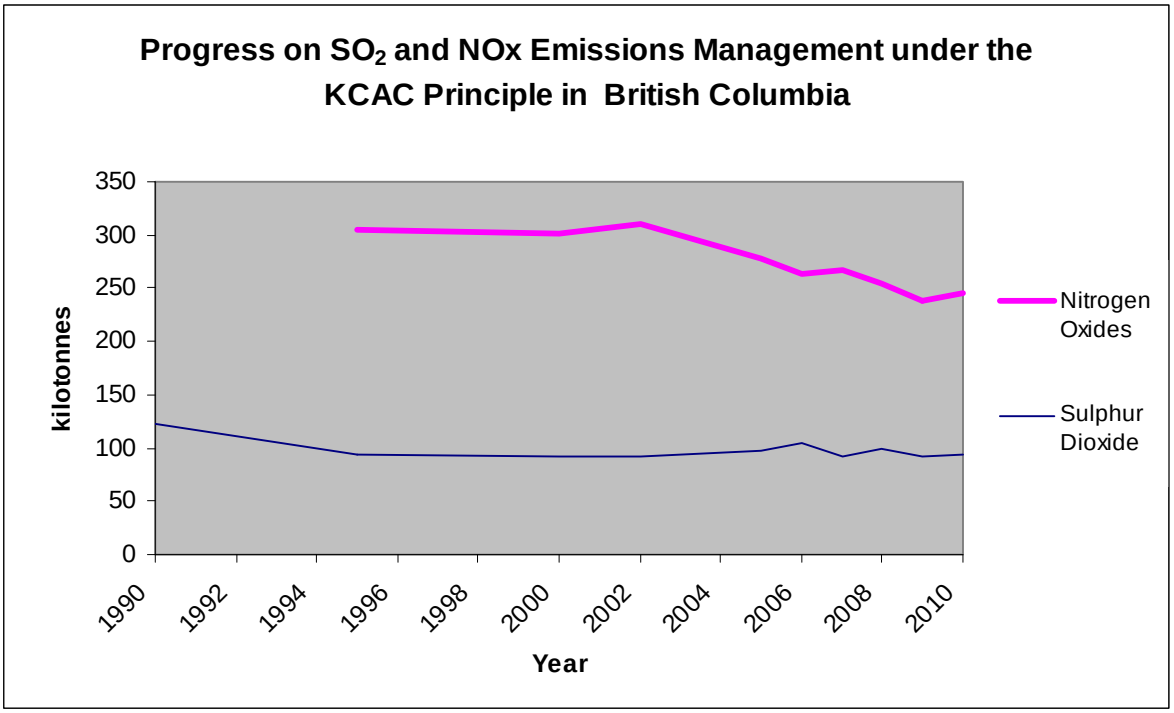
Figure 10 –Wet Deposition maps indicating the change in nitrate (NO_3^-) concentrations from 1990 to 2010
Source: Environment Canada, 2012

3. Domestic Emission Reduction Efforts and Efforts to Keep Clean Areas Clean and Prevent Pollution

3.1. *Provincial efforts*

Under the aegis of CCME, all the provinces have agreed to pursue a "keeping clean areas clean" (KCAC) principle and to take steps to ensure the pollution prevention approach is applied to new sources. Pollution prevention is defined as the use of processes, practices, materials and energy that avoid or minimize the creation of pollutants. Jurisdictions are to take steps necessary to ensure that all parts of Canada do not exceed critical loads in the future by managing emissions of SO_2 and NO_x and that areas that at present do not exceed the critical loads remain clean.

British Columbia



Emissions status

Emissions of SO_2 in British Columbia have been relatively consistent for the past 15 years – mostly remaining within a typical range of 90 to 100 kt per year. Compared to the 2008 data published in the previous Progress Report, emissions of SO_2 in British Columbia decreased by 7% in 2010 (falling from 99 kt to 93 kt). The upstream oil and gas sector remains the largest contributor of SO_2 emissions in the province (44 kt or 47% of the total), followed by the transportation sector (23 kt or 25% of the total) and the pulp and paper industry (10 kt or 11% of the total).

Emissions of NO_x in British Columbia also decreased between 2008 and 2010 -- falling from 255 kt to 246 kt (a decrease of 3.5%). In 2010, the transportation sector was again the largest

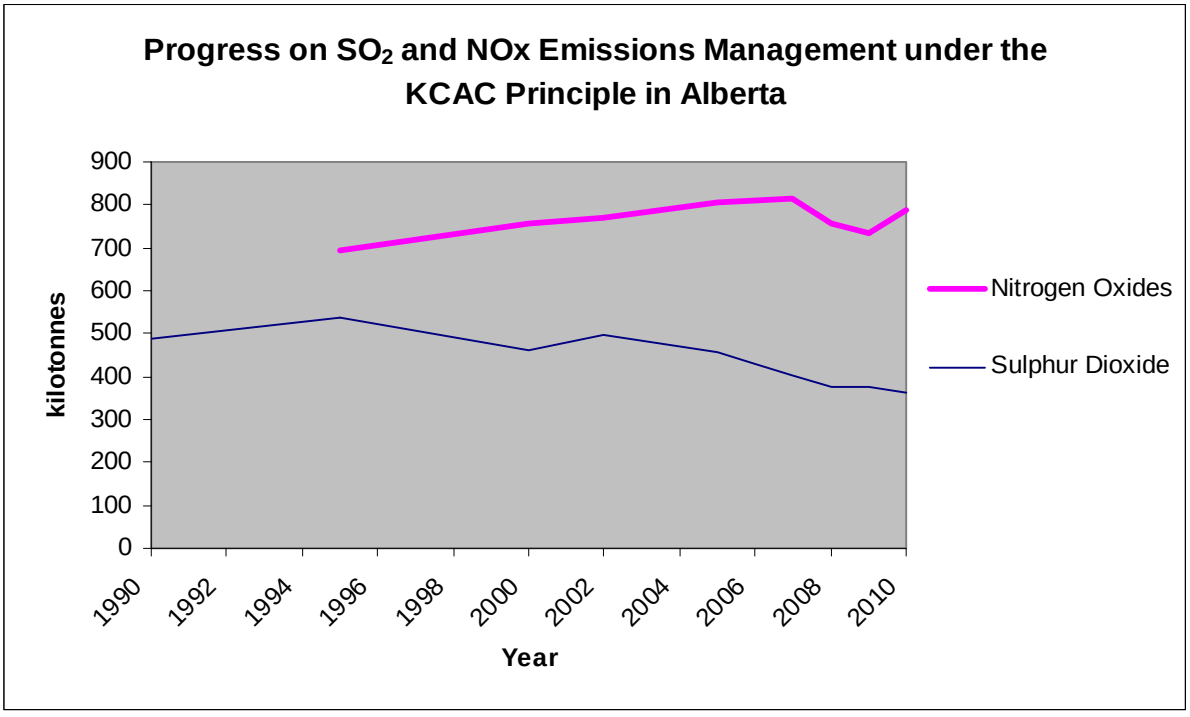
contributor of NO_x emissions (156 kt or 63% of the total). This sector also was where most of the decreases were recorded – down 7 kt, which equaled 78% of the total NO_x reductions in the province.

Actions and Policies
British Columbia continues to implement a broad range of initiatives to reduce pollution from all sources and to improve air quality in the province. Industry, Transportation and Communities have all been targeted as critical avenues for these reductions and the resulting initiatives address SO_2 and NO_x emissions either directly or as a co-benefit of reducing fine particulate matter and ground level ozone. The 2008 BC Air Action Plan included initiatives like anti-idling campaigns, greening vehicle fleets and enhancements to Scrap-It, a program that accelerates the removal of older, higher polluting vehicles from the road. In 2007, the Energy Plan included guidelines to reduce unnecessary SO_2 emissions from oil and gas producing wells and facilities and in 1989 the province introduced the Sulphur Content of Fuel Regulation to further reduce SO_2 emissions from the combustion of fuels.

New initiatives include the 2010 Municipal Solid Waste Combustion Guidelines that will help reduce emissions of SO_2 and NO_x and the Small Electric Power Generation Code of Practice (which, at this time, has been posted as an intention paper).

Finally, SO_2 and NO_x reductions also will be realized from the closure of several major facilities. Eurocan Pulp&Paper, Western Pulp and Catalyst Elk Falls all closed mills during the 2009-10 period. Based on recent NPRI facility reports, the SO_2 reductions are estimated at 1,390 t/yr and the NO_x reductions are estimated at 1,700 t/yr.

Alberta



Emissions status
Overall, emissions of SO_2 in Alberta continued to decrease. Compared to 2008 data published in the previous Progress Report, 2010 emissions of SO_2 in Alberta decreased by 12 Kt, or 3%. Within this overall decrease however, SO_2 emissions from the "Oil Sands" (which includes In-Situ Extraction and Processing, Mining Extraction and Processing, and Bitumen and Heavy Oil Upgrading) were marked by fluctuations. As reported by the facilities to the NPRI – SO_2 emissions increased from 116 kt in 2008 to 131 kt in 2009, then decreased to 113 kt in 2010. The largest contributors of SO_2 in Alberta were the petroleum industry (59%) and electric power generation (32%).

In 2010, emissions of NO_x in Alberta began to increase again following a downward trend that took place between 2007 and 2009. Overall, since the 2008 data published in the last Progress Report, emissions of NO_x in Alberta rose over 4%. This increase is attributed mostly to the transportation sector where NO_x emissions grew from 237 kt in 2008 to 278 kt in 2010 – an increase of 17%.

Actions and Policies
Alberta continues to build on its policy to Keep Clean Areas Clean, encouraging new and older facilities to continuously improve their emission control technologies.

At a policy level, ongoing work on the AQMS BLIERs will affect Alberta's future SO_2 and NO_x emissions in multiple industry sectors. As well, the Tier 4 NO_x emissions requirements for heavy haul mine vehicles will reduce NO_x emissions when the new diesel engines become commercially available. Current actions include construction of the Syncrude Main Boiler Stack FGD in the Oil Sands (for SO_2 reductions), the shutdown of TransAlta Wabamun Unit 4 in 2010 and the shutdown of TransAlta Sundance Units 1 & 2 in 2011. Total emission reductions from these closures are estimated to be 8,300 t/yr for SO_2 and 10,400 t/yr for NO_x.

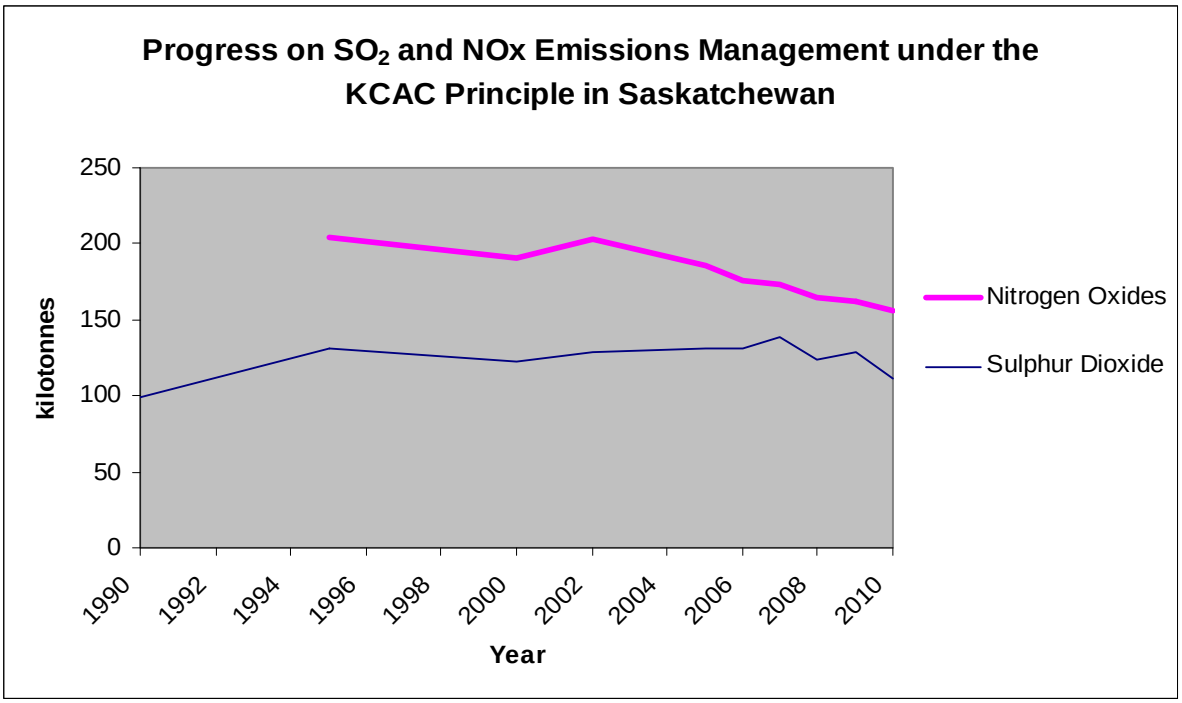
2007 saw the launch of the Interim Emission Guidelines for Oxides of Nitrogen for New Boilers, Heaters and Turbines Using Gaseous Fuels for the Oilsands Region in the Regional Municipality of Wood Buffalo North of Fort McMurray Based on a Review of Best Available Technology Economically Achievable (BATEA). The information used to establish this guideline was crucial to the AQMS BLIERs process.

Since 2006, the Alberta Air Emission Standards for Electricity Generation and Alberta Air Emission Guidelines for Electricity Generation have lowered SO_2 and NO_x emissions at existing plants and generated credits that will be applied at a later date.

In 2001, the Alberta Energy Resources Conservation Board (ECRB) issued the Interim Directive (ID) 2001-03: Sulphur Recovery Guidelines for the Province of Alberta (ID 2001-03). The Guidelines established stringent requirements for sulphur emissions from all existing and new sour gas plants, they provided a schedule for existing plants to meet the same sulphur recovery requirements for new plants, and they encouraged operators to take early action to improve performance. Though the guidelines were based on improving technology rather than setting specific reduction targets, there have been substantial emission reductions of SO_2 from the affected plants. Please see ECRB ST 101 for actual emission data.

Two long-standing initiatives, the 1996 *Code of Practice for Compressor and Pumping Stations and Sweet Gas Processing Plants* and the 1998 *National Emission Guidelines for Commercial and Industrial Heaters and Boilers* have helped reduce acidifying emissions for about a decade and half.

Saskatchewan



Emissions status

Overall, compared to the 2008 data published in the previous Progress Report, emissions of SO_2 in Saskatchewan in 2010 decreased by approximately 9%. Electric power generation continued to be the largest emitter of SO_2 (87% of the total) and was the main sector showing an increase (up by 6.5% since 2008). As reported by the facilities to the NPRI, the largest decrease in SO_2 emissions came from the upstream oil and gas sector which fell from 21 kt in 2008 to 6 kt in 2010 – a reduction of about 71%.

Emissions of NOx in Saskatchewan continued to show an overall decrease, a trend that began in 2002. In 2010 total NOx emissions were 155kt – a decrease of 7kt (or over 4%) since 2008. Fifty-nine percent of Saskatchewan's NOx emissions came from the transportation sector.

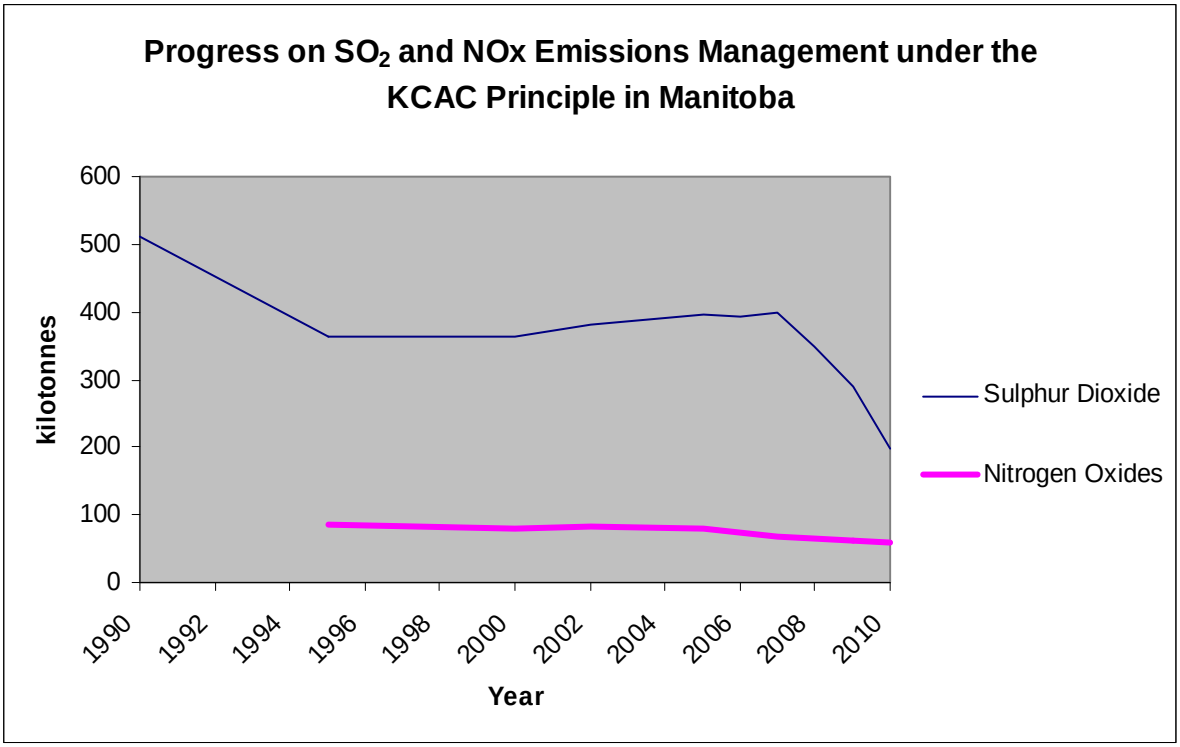
Actions and Policies

To achieve its emission reduction targets, the Government of Saskatchewan knows that energy use must be reduced and that low-emitting or non-emitting forms of electrical power generation need to be transitioned into their current system. These energy-based changes are expected to achieve significant reductions in carbon dioxide (CO_2), SO_2, NOx, mercury and particulate matter.

Since 2008, SaskPower (SK Power) has refocused its efforts on identifying environmentally and economically viable paths forward for its coal-fired generating fleet. SK Power's SO_2 capture with limestone injection project (initiated in 2011) will result in a 75 ng/J drop by 2013 and its carbon-capture and storage initiative for Boundary generator 3 will result in a 99% SO_2 capture in 2014.

Since 2001, Stage 1 of the Cameco Acid Plant Replacement project has resulted in a 200kg/day SO_2 reduction for almost a decade.

Manitoba



Emissions status
In 2010, Manitoba's emissions of SO_2 (197kt) were almost 44% below 2008 levels (350kt). Essentially all the SO_2 emissions in the province originated from the nonferrous mining and smelting sector (98%) and this decrease is largely attributed to the closure of the HudBay Minerals Inc. base metal copper smelter in Flin Flon. Manitoba's emissions of NO_x, also decreased between 2008 (67kt) and 2010 (60kt) – a drop of 10%. Most of Manitoba's NO_x emissions (90%) came from the transportation sector,

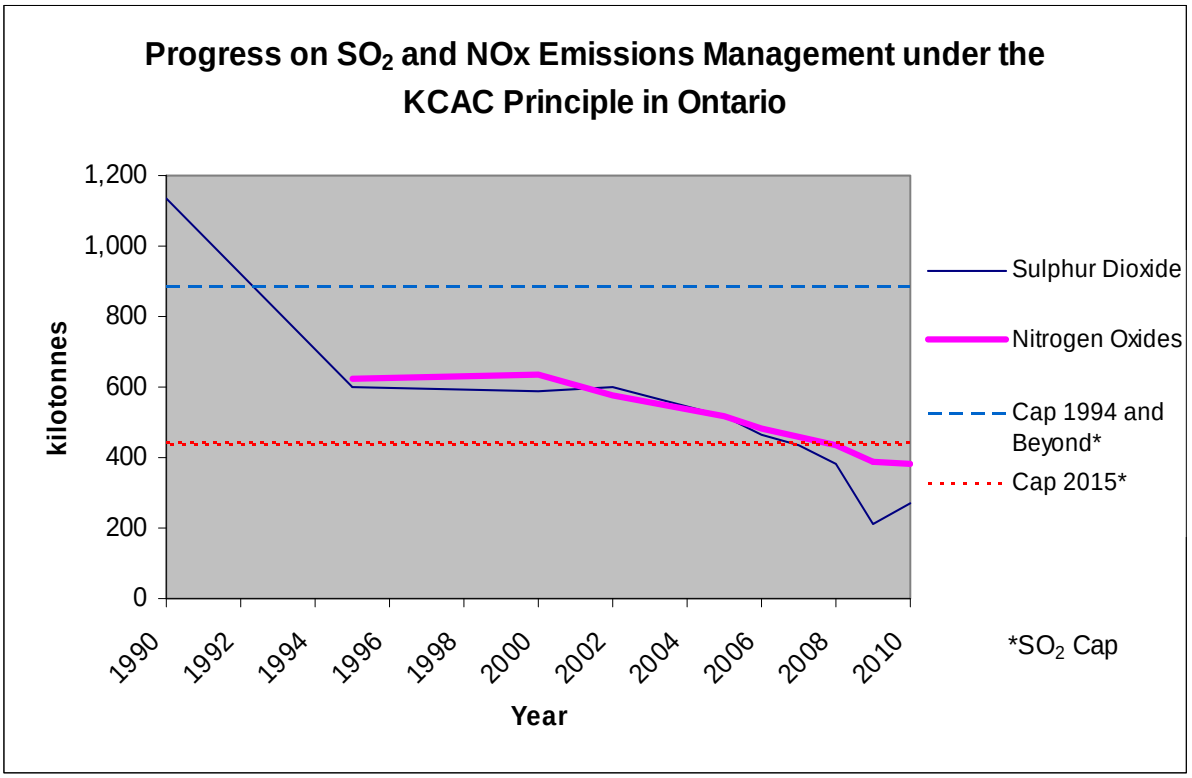
Actions and policies
Manitoba's two base metal smelters account for the majority of its SO_2 emissions and the releases from these facilities vary from year to year due to factors such as operating schedules, shutdowns, etc. In Manitoba, emissions from industrial developments are regulated under *The Environment*

Act and the Government's continuous work with the base metal industry has helped ensure protection of local community air quality and of natural systems downwind from the facilities.

Following the passing of the *Climate Change and Emissions Reductions Act* in 2008, Manitoba Hydro began the process of phasing-out coal power generation by 2010 (except in support of emergency operations). Manitoba Hydro accomplished this goal on schedule and annual SO_2 emissions are forecast to be reduced by approximately 700 tons annually.

Additional SO_2 reductions also came from the closure of the HudBay Minerals Inc. base metal copper smelter in Flin Flon. The facility closed in June 2010 and SO_2 emission reductions are estimated at 185 kt per year. In November 2010, Vale Inco announced the 2015 closure of their Thompson nickel smelter and refinery; another 185 kt/year of SO_2 emissions should be achieved.

Ontario



Emissions status

Ontario achieved its 2015 SO_2 emissions reduction target in 2007 and, overall, continues to make further reductions. Between 2008 and 2010 Ontario decreased SO_2 emissions by another 30% (from 382 kt to 268 kt). This period was also marked by fluctuations; SO_2 emissions fell 44% from 2008 (382 kt) to 2009 (213 kt) and then rose to 26% between 2009 and 2010 (268 kt). These changes are mostly attributed to nonferrous mining and smelting and electric power generation which are still the province's largest contributors (52% and 14 % respectively) and are also where most of the overall SO_2 reductions occurred. 2010 emissions from the nonferrous mining and

smelting sector were 27% lower than those reported in 2008; emissions from electric power generation were 50% lower (mostly due to fewer coal emissions).

Emissions of NO_x also continue to decrease in Ontario. Since 2008 there has been a 12% reduction —from 435kt to 383kt in 2010. The transportation sector contributes 71% (or 272kt) of Ontario's 383 kt total. The transportation sector is also where most of the NO_x decreases occurred.

Actions and Policies
Under the *Canada-Wide Acid Rain Strategy* Ontario has committed to reducing its sulphur dioxide (SO_2) emissions by 50% from its 1994 Countdown Acid Rain cap of 885 kt by 2015. In 2007 Ontario reached this goal and has continued to demonstrate a decline in emissions.

Regulatory action has been a key driver for Ontario's SO_2 emission reductions and applies to various industrial sectors, including: cement, base metal smelting, iron and steel, pulp and paper, petroleum and electric power generation. The Coal-Fired Electricity Generators regulation (O.Reg. 496/07) has helped make Ontario's electricity grid among the cleanest in North America. To date, Ontario has reduced the use of coal by 70% and is on track to meet its commitment to eliminate the use of coal-fired electricity generation by 2014. Not only will sulphur dioxide emissions be significantly reduced but this initiative will also be the single largest greenhouse gas emission reduction initiative in North America. In 2009, more than 80% of Ontario's energy generation came from emissions-free sources like wind, water, solar, biogas and nuclear.

The 2009 Green Energy Act affected renewable energy suppliers of solar, wind and thermal power. As a result Ontario has increased its energy capacity by adding over 20% of renewable energy supply to the system. In 2003, Ontario had only 10 wind turbines. Today, the province has more than 900 turbines and has Canada's four largest wind farms.

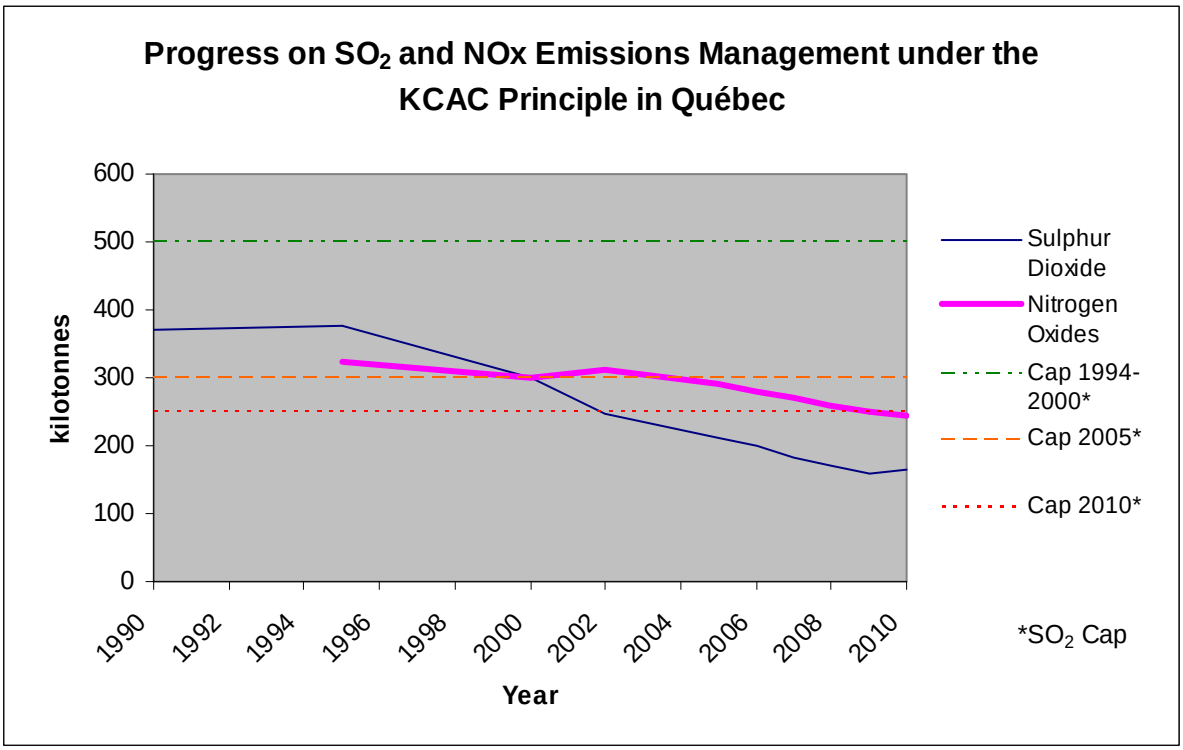
Other initiatives contributing to SO_2 reductions include: various energy conservation programs that have conserved more than 1700 MW of electricity since 2005; ongoing emission reductions at smelter operations (Vale, Copper Cliff and Xstrata Nickel in Sudbury), and the closure of the Xstrata Kidd Creek smelter in 2010.

Emissions of NO_x in Ontario have been declining annually since 2006 and are largely the result of regulations affecting Ontario's main industrial sectors, coal-fired electricity generation and programs such as Drive Clean that address transportation based sources. Ontario also continues to meet Canada's obligations for the Ozone Annex under the Canada-US Air Quality Agreement – Pollutant Emission Management Area (PEMA) by keeping fossil fuel-fired power plant NO_x emissions under the 39 kt annual cap. Emissions of NO_x and SO_2 have also been affected by other factors including lower economic activity in the province and some facility and mobile source operating improvements.

In the future, Ontario's Long-Term Energy Plan (released in November 2010) confirmed government support for conversion of OPG's Atikokan Generating Station to sustainable biomass and conversion of Thunder Bay Generating Station to natural gas. Using biomass for wood pellet production as a substitute fuel for coal and natural gas will lead to meaningful reductions in SO_2, NO_x and greenhouse gases. Co-firing biomass and natural gas is also proposed for some former

coal units in order to maintain system flexibility and capacity. This initiative is under development; the anticipated date of effect is 2013.

Québec



Emissions status

In 2002 Québec surpassed its 2010 SO_2 emissions reduction target and, since then, has continued to work toward further reductions. From 2008 to 2010, an additional 3.5% decrease in SO_2 emissions was achieved – from 171 kt (2008) to 165 kt (2010). The aluminum industry was again the largest contributor of SO_2 in the province (33% of the total). The next largest contributors were nonferrous mining and smelting (16%) and petroleum refining (5%). Emissions of NO_x in Québec have also continued to decline – in 2010 they were 14 kt lower than they were in 2008, a decrease of almost 6%. Transportation related NO_x emissions accounted for 73% of the province's total.

Actions and policies

The Heavy Oil Consumption Reduction Program of the Quebec Energy Efficiency Agency continued in 2010-2011. This program helps heavy oil consumers move toward sustainable development while improving their competitive position by reducing their consumption. Financial assistance is offered to carry out various analyses as well as implement energy efficient measures relating to heavy fuel oil or to switch to other forms of energy containing fewer pollutants, such as natural gas, forest biomass and electricity. This program is financed by the Green Fund and falls under Action 1 of the 2006-2012 Climate Change Action Plan. For details on the program, please visit:

(English version)
http://www.efficaciteenergetique.mrnf.gouv.qc.ca/en/business-clientele/industries/financial-assistance-programs-for-industries/heavy-oil-consumption-reduction-program/

(French version)
http://www.efficaciteenergetique.mrnf.gouv.qc.ca/clientele-affaires/industries/programmes-et-aide-financiere-destines-aux-industries/programme-de-reduction-de-consommation-de-mazout-lourd/

Québec has no new regulations or initiatives with respect to SO_2 and NO_x emissions for the 2010-2011 period.

Upcoming regulations and initiatives
For the subsequent period (2011-2012), Québec has adopted the Clean Air Regulation (in force since June 30, 2011). As a result, sulphur dioxide emissions will be reduced by gradually lowering the maximum sulphur content in heavy oil (first to 1.5%, then to 1% in areas where natural gas is available). Similarly, NO_x emissions will be reduced by the requirement to install efficient burners in new fuel-burning equipment and to replace them in existing equipment.

The Clean Air Regulation is available at the following web site:

(English version)
http://www.mddep.gouv.qc.ca/publications/lois-reglem-en.htm

(French version)
http://www.mddep.gouv.qc.ca/publications/lois_reglem.htm

In December 2011, the Ministry of Sustainable Development, Environment and Parks (MDDEP) announced the first phase of the introduction of a mandatory vehicle inspection and maintenance program, tabling Bill 48 to amend the Environment Quality Act with respect to vehicle inspections.

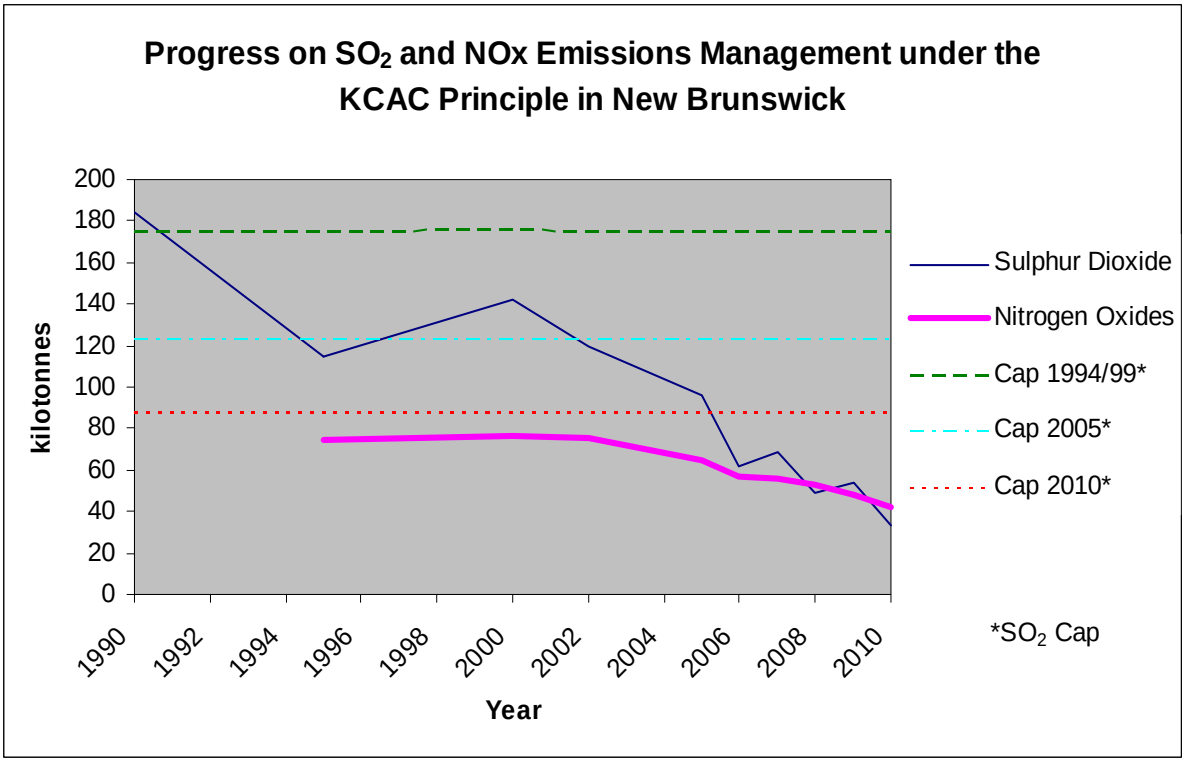
http://www.mddep.gouv.qc.ca/infuseur/communique.asp?no=2010

In December 2011, Hydro-Québec Distribution introduced a program to purchase 150 MW of electricity generated in Québec from forest biomass cogeneration.

Other Information
The Ministry of Sustainable Development, Environment and Parks (MDDEP) released a detailed report on air emissions for the year 2008. The 2008 report outlines the air emissions for principal contaminants and how they've changed in Québec since 1990.
http://www.mddep.gouv.qc.ca/air/inventaire/rapport2008.pdf

The MDDEFP also published an ambient air quality assessment showing that changes in concentrations of SO_2 and NO_x are comparable to changes in their emissions, as detailed in the report, which covers the period from 1975 to 2009.
http://www.mddefp.gouv.qc.ca/air/bilan/qualite1975-2009.htm

New Brunswick



Emissions status

In 2006 New Brunswick met its 2010 SO_2 emissions reduction target and has, in general, continued a downward trend. From 2008 to 2010 there was an additional 33% decrease in SO_2 emissions – from 49 kt to 33 kt. Electric power generation continued to be the province's largest contributor of SO_2, and was also where most (77.5%) of the total 2010 decreases occurred. Emissions of NO_x in New Brunswick also continued a downward trend, with a 21% reduction from 2008 (53 kt) to 2010 (42 kt). Most of the NO_x reductions came from stationary sources (a decrease of 8 kt) while mobile sources (which are also the largest emitter) saw a decrease of 3 kt.

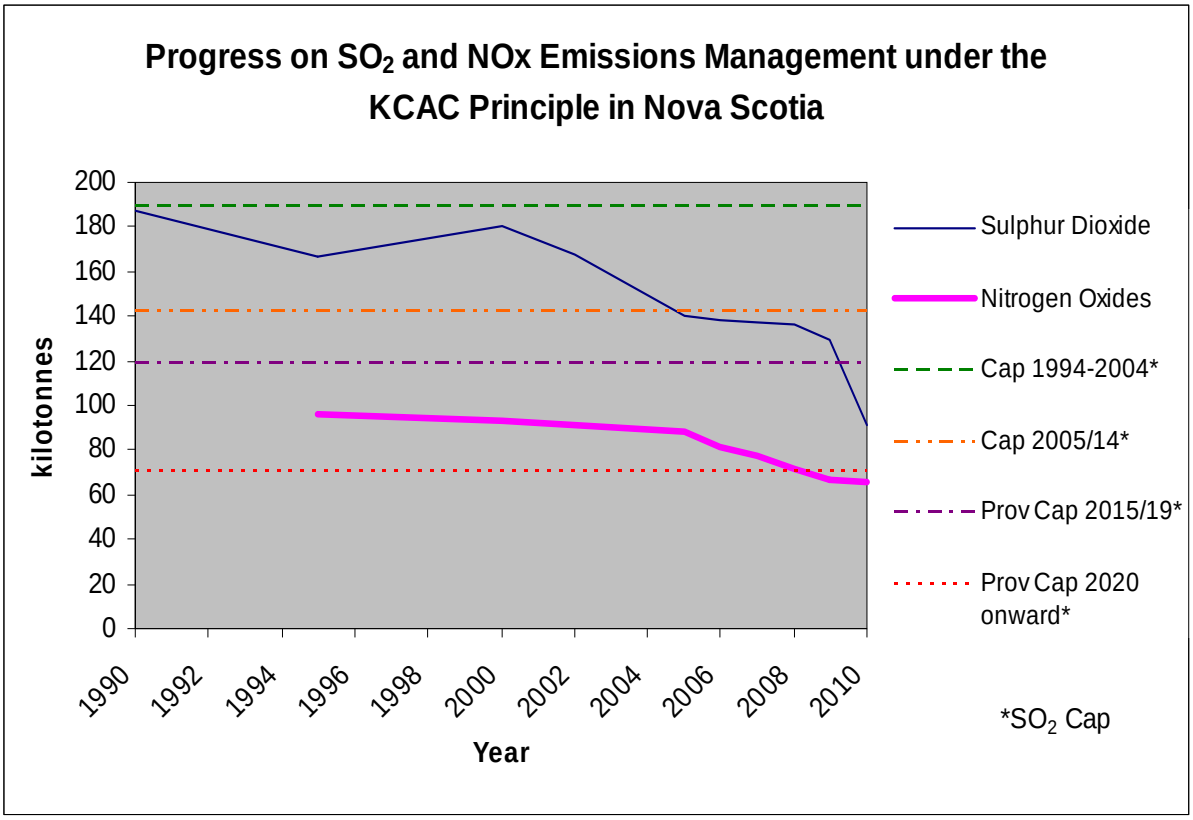
Actions and policies

The Canada Wide Acid Rain Strategy for Post-2000 affects all existing sources of SO_2 in New Brunswick. The provincial SO_2 cap of 87.5 kt by 2010 was a 50% reduction from the 1994 cap of 175 kt. Overall, since 2000, New Brunswick has achieved a 76% reduction in SO_2 emissions – from 141 kt in 2000 to 33.3 kt in 2010. In 2010, the most significant reduction came from the closure of the Grand Lake Generating Station (a coal fired power plant) which will reduce annual SO_2 emissions by about 20 kt (based on the station's annual average).

Although New Brunswick does not have a specific NO_x program, reductions have been achieved during refurbishment/upgrade projects at large industrial facilities (e.g. refurbishment of the

Coleson Cove Generating Station). Since 2000, New Brunswick has achieved a 44% reduction in NO_x emissions, from 76 kt in 2000 to 42.3 kt in 2010.

Nova Scotia



Emissions status

From 2008 to 2010, Nova Scotia's SO_2 emissions decreased by 34% – from 137 kt to 91 kt and, as a result, Nova Scotia surpassed its 2015 provincial emissions cap of 119 kt. Electric power generation continued to be the largest contributor of SO_2 in the province (70% in 2010) and also accounted for most of the reductions (96% of the overall decrease). Emissions of NO_x also continued a downward trend – dropping from 72 kt in 2008 to 66 kt in 2010, a decrease of 8%. Most of Nova Scotia's NO_x emissions (62%) came from the transportation sector.

Actions and policies

Since 1995, air emissions in Nova Scotia have been guided and regulated by ongoing Air Quality Regulations and, since 2009, by the new Climate Change Action Plan.

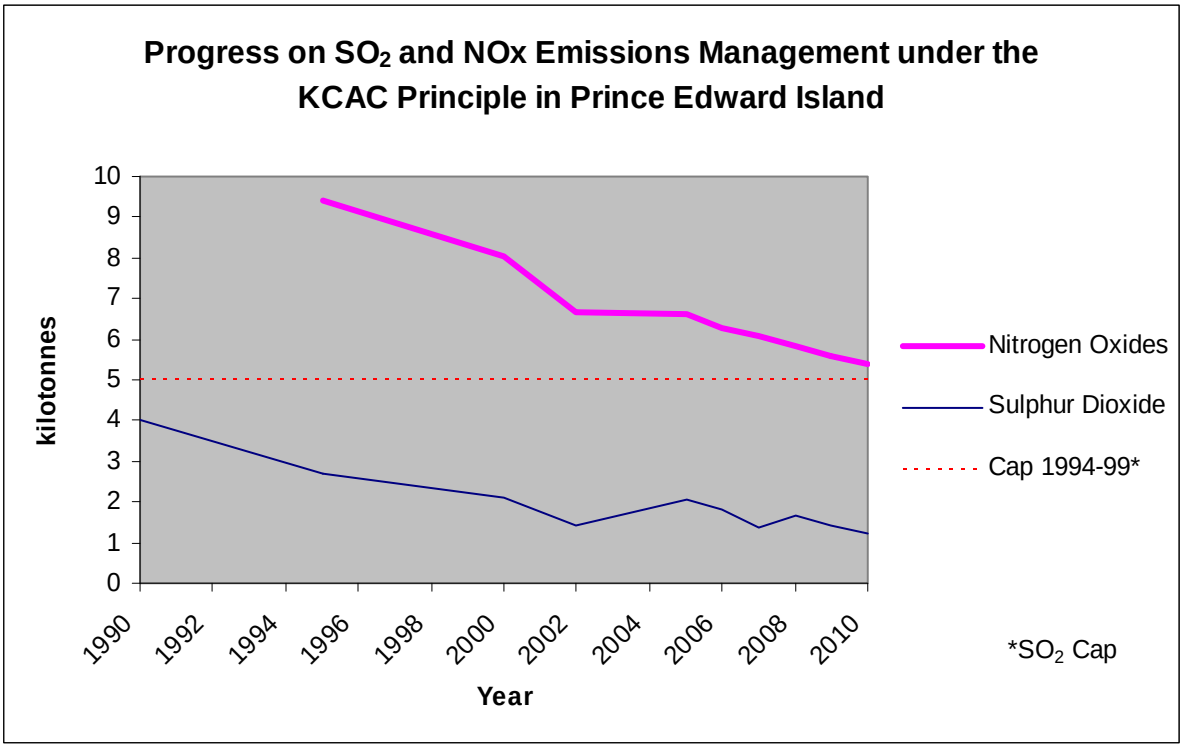
At the provincial level, caps for SO_2 emissions have been an important part of Nova Scotia's path forward. The first cap addressing all provincial sources of SO_2, was set at 189 kt and was in place from 1995 to 2004. An updated cap for the 2005-2014 period was set at 142 kt (which was a 47 kt reduction). For the 2015-2019 period, the cap was lowered to 119 kt (another 23 kt reduction) and for 2020 and beyond, the cap was lowered to 71 kt tonnes (adding another 48 kt reduction).

Overall, from 1995 to 2020, Nova Scotia's SO_2 emissions cap has been lowered by 118 kt or 62%.

Emission caps have also been set for Nova Scotia's fossil-fuel thermal power generating stations. In 1995, the first SO_2 cap for Nova Scotia Power was set at 145 kt. The cap for 2005-2009 was 109 kt. For 2010-2014, the cap was 72.5kt. For 2015-2019, the cap was reduced to 61 kt. And for 2020 onwards the cap has been set at 36 kt.

Emissions of NO_x from Nova Scotia Power's generating stations are also being addressed. The first cap of 21,365 tonnes was introduced for the 2009-2014 period and was meant to achieve a 20% reduction compared to 2000 levels (from 26,706 t. to 21,365 t.) The cap for 2015-2019 is set at 19,228 t and for 2020 onwards it is 14,955 t.

Prince Edward Island

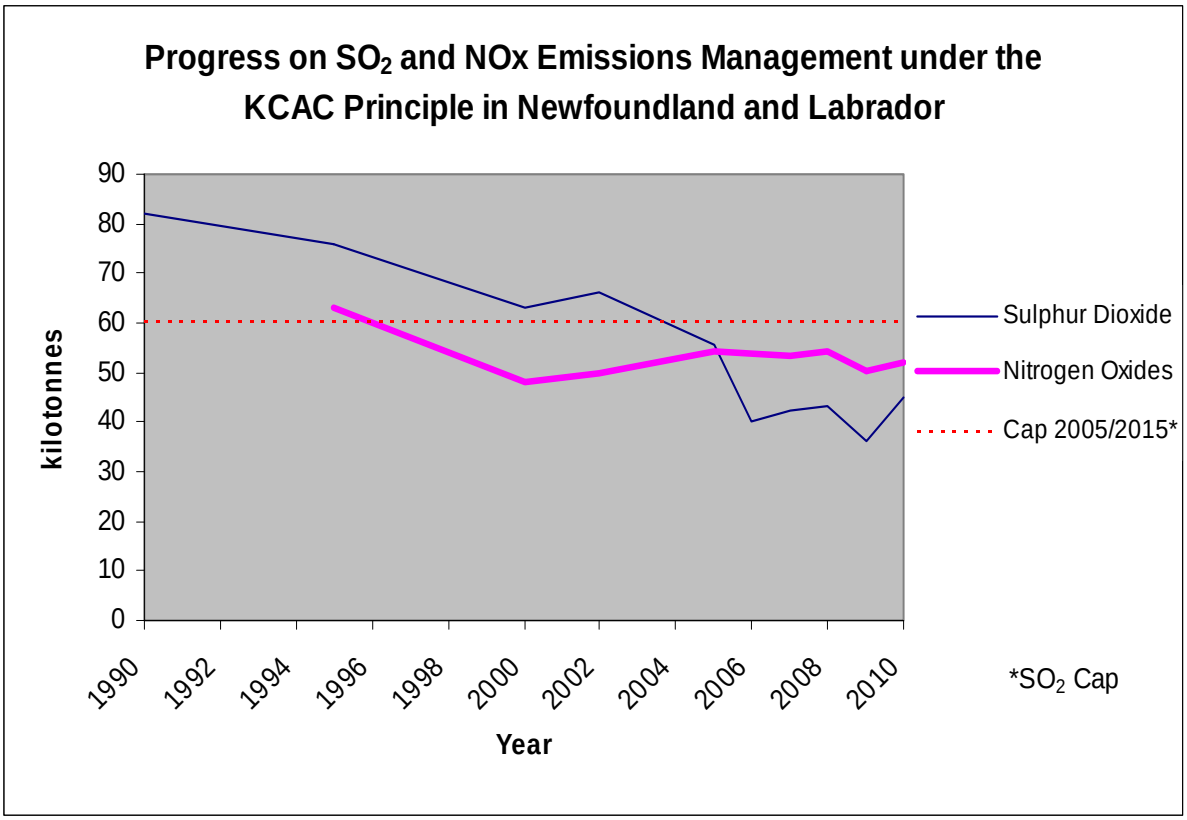


Emissions status

Efforts to reduce emissions of SO_2 and NO_x in Prince Edward Island have been succeeding over the long term. Between 2008 and 2010 emissions of SO_2 decreased by 28% (by 464 kt) and emissions of NO_x decreased by 7% (by 418 kt). Industrial food preparation was the province's largest contributor of SO_2 emissions (58%) and the transportation sector contributed most of the NO_x emissions (86%). Overall, at the national level, PEI contributed 0.09% of Canada's SO_2 emissions and 0.26% of its NO_x emissions.

Actions and policies
In 2009, a fuel replacement initiative began at a potato processing plant in Prince Edward Island. In June of that year, the company opened a plant to convert potato waste to bio-methane gas via an anaerobic digestion process. Over the next 12 months, 8.5M litres of Bunker C oil were displaced and approximately 310 tonnes of SO_2 generation eliminated. In 2012, the company plans to replace the remaining Bunker C oil with compressed natural gas. This will produce an additional SO_2 reduction of approximately 650 tonnes annually.

Newfoundland and Labrador



Emissions status
Overall, emissions of SO_2 and NO_x in Newfoundland and Labrador have declined over time. In 2004, with the establishment of a provincial SO_2 cap of 60 kt, reductions of SO_2 were further advanced. Between 2008 and 2010 total provincial SO_2 emissions were reduced by about 6%. This was due to reductions from the petroleum refining industry (which fell from 18 kt to 16 kt – down 11%) and from electric power generation (which fell from 5 kt to 3 kt – down 40%). The main contributors of SO_2 emissions in the province are the petroleum refining sector and marine transportation, each contributing 35% of the total emissions. It is important to note that marine transportation emissions from innocent passages are not sourced in the province but are attributed to the province by Environment Canada in its emission inventory compilation. NO_x emissions in Newfoundland and Labrador remained relatively stable during the 2008-2010 period, decreasing

from 54 kt to 52 kt (a decrease of 4%). The transportation sector continues to be the largest contributor of NO_x emissions in the province, contributing 65% of the total emissions.

Actions and policies
In Newfoundland and Labrador efforts to abate acidifying emissions are largely focused on SO_2 emissions from the largest land-based sources under provincial jurisdiction; these include electric power generation, petroleum refining and the iron ore mining industry. Since 1990, SO_2 emissions have been reduced from 82 kt to about 45 kt in 2010.

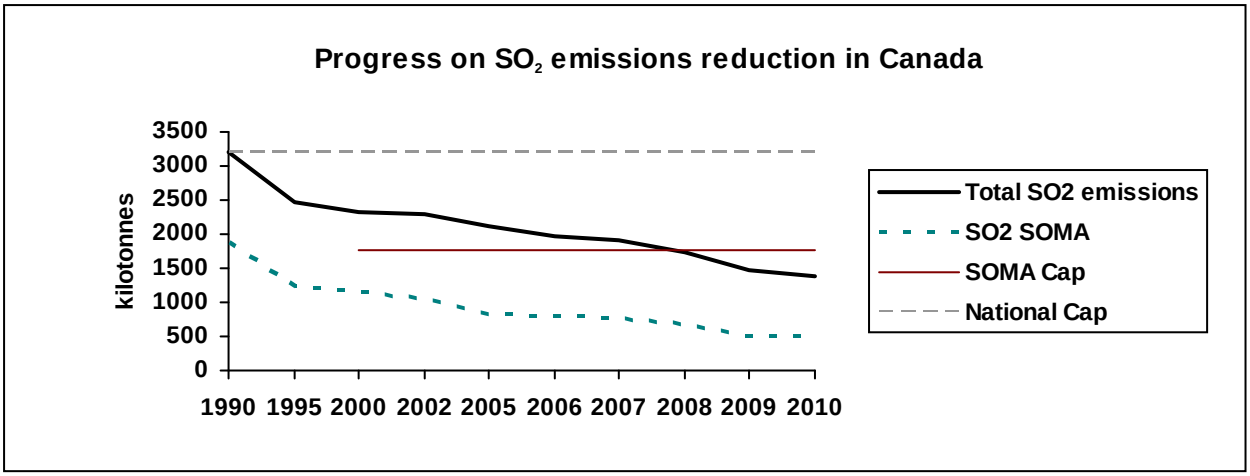
Under the provincial Air Pollution Control Regulations, three initiatives were in effect during the 2010/11 reporting period. The Sulfur Dioxide Emission Cap (2004) set a limit of 60 kt/yr from all existing sources beginning in 2005. The cap has been achieved. The Percent Sulphur Limitation in Heavy Oil (2004) also addressed all existing sources, and the Emission Standards for New and Modified Boilers and Heaters (2004) addressed NO_x emissions. The province is currently reviewing the SO_2 emissions cap based on fuel markets, BLIERs development and international directives.

In other initiatives, the North Atlantic Refining Continued Emission Reduction Schedule estimates an annual 500 tonne reduction of SO_2. The reduction schedule is under negotiation pending potential BLIERs. And the Iron Ore Co. of Canada has a corporate commitment to meet the most stringent North American ambient air quality standard (currently US EPA 1-hour of 75ppb). The SO_2 reductions from this commitment are to be determined.

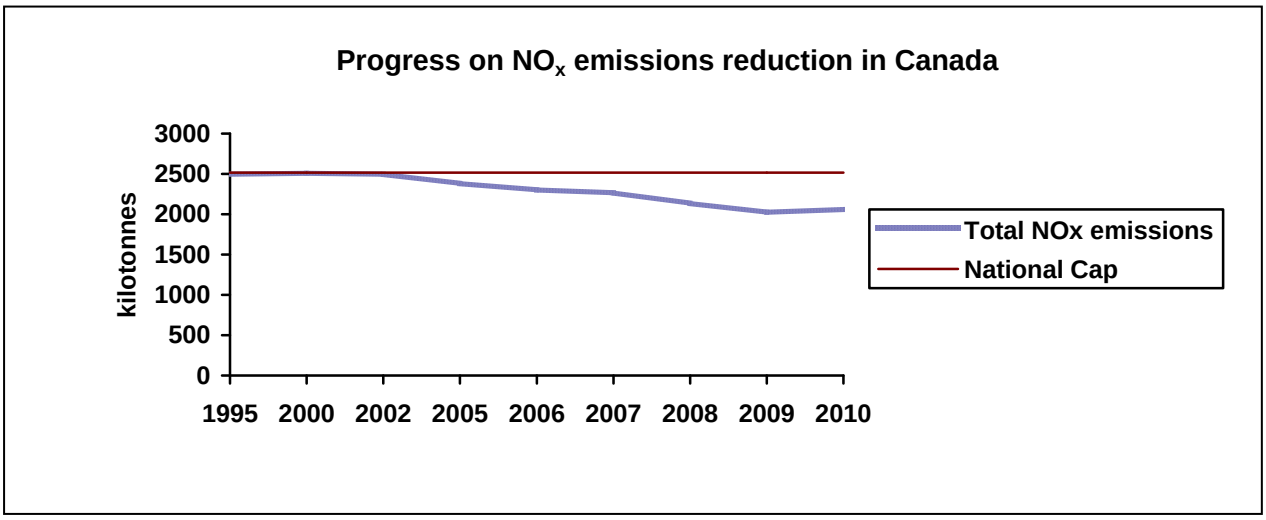
3.2. *Federal Commitment*

National emissions status
The federal government gathers national emissions data to monitor air quality and to better tailor domestic and international air policies.

As shown by the following figures, national emissions of SO_2 and NO_x have been steadily decreasing. Canada has been below its national SO_2 cap since 1990 and its national NO_x cap since 1995. Compared to the 2008 emission data published in the last Progress Report, national emissions of SO_2 have decreased an additional 21% – down from 1733 kt in 2008 to 1370 kt in 2010. As a result, Canada's total SO_2 emissions in 2010 were 57% below the national cap of 3200 kt and even 22% below the 1750 kt cap established for the Sulphur Oxide Management Area or SOMA (an area that includes the southern parts of Ontario and Québec, and all of New Brunswick, Nova Scotia and Prince Edward Island). In the SOMA itself emissions of SO_2 were 494 kt, or 72% below the SOMA cap. National emissions of NO_x were also down -- falling from 2135 kt in 2008 to 2061 kt in 2010, a decrease of almost 3.5%. This is approximately 18% below the national cap of 2,514 kt.



SOMA SO_2 Cap = 1750 kt, National SO_2 Cap – 3,200 kt



National NOx Cap = 2514 kt

Actions and policies

The federal government continues to make progress in the development and implementation of regulatory approaches to reduce greenhouse gases and air pollutant emissions in Canada.

In 2008, the federal government initiated the development of a comprehensive air management system which is intended to be a major step toward more effective management of air quality across Canada. In that context, the federal government has worked intensively with provincial and territorial governments, various industrial sectors and non-government organizations to develop an air quality management system that will include the establishment of nationally applied ambient air quality standards and minimum requirements for industrial emissions of air pollutants including NO_x and SO_2. A major outcome from this work was the release (in April, 2010) of the *Comprehensive Air Management System* (CAMS) which proposed a path forward for addressing all sources of air pollutants in Canada. Then in October 2010, building on the work done under CAMS, CCME agreed to move forward with a new collaborative Air Quality

Management System (AQMS) to better protect human health and the environment. It is anticipated that standards and requirements from the AQMS will be entrenched in provincial and territorial regimes and the *Canadian Environmental Protection Act, 1999* (CEPA 1999) where appropriate.

On August 27, 2011 Environment Canada published proposed regulations to reduce greenhouse gas emissions from the coal-fired electricity sector in the Canada Gazette, Part I. The proposed regulations would apply a stringent performance standard to new coal-fired electricity generation units and to coal-fired units that have reached the end of their economic life. Anticipated co-benefits from these proposed regulations for acid rain reduction would include a decrease in SO_2 and NO_x emissions.

On March 26, 2010 International Marine Organization (IMO) Member States formally adopted the North American Emission Control Area (ECA) proposal. Large ships within the waters of Canada, the United States and France (Saint-Pierre and Miquelon), south of 60 degrees north, extending 200 nautical miles offshore, will be subject to strict air pollutant standards. Ships will be required to significantly reduce their air pollutant emissions of sulphur oxides (SOx), particulate matter (PM), and nitrogen oxides (NOx) within the ECA by August 1, 2012. Environment Canada supports Transport Canada in developing regulations to implement Canada's portion of the North American ECA. The ECA will help reduce emissions of harmful pollutants and will contribute to improve air quality, reduce acid rain and decrease adverse health effects.

In 2006 Transport Canada committed, as part of the Government's Clean Air Regulatory Agenda, to develop and implement new regulations to limit the release of air pollutants from the rail sector, under the *Railway Safety Act*. Preliminary stakeholder consultations on the proposed regulatory approach were held from December 1, 2010 to February 14, 2011. The regulations are aligned with U.S. standards and will take effect in 2012.

Other initiatives have contributed indirectly to the reduction of acidifying emissions in Canada. Across the federal government, a suite of initiatives has been designed to complement the regulatory aspects of the Clean Air Agenda (like the ecoEnergy initiatives of Natural Resources Canada and Aboriginal Affairs and Northern Development Canada). Results from these horizontal initiatives are included in Environment Canada Performance Reports publicly accessible at: http://www.tbs-sct.gc.ca/dpr-rmr/index-eng.asp. As well, in October 2010, Environment Canada announced final regulations that establish progressively more stringent greenhouse gas emission standards for new passenger automobiles and light trucks for the 2011-2016 model years. Fuel-efficiency gains that indirectly come from these new standards will also reduce acidifying emissions.

Reducing transboundary flows of acidifying emissions

Since particulate matter (PM) shares common precursor emissions (SO_2 and NO_x) with acid deposition, it is likely that any new, more stringent targets or objectives would contribute further to efforts to reduce transboundary flows (and impacts) of acidifying pollutants.

Canada and the United States have committed to reducing cross-border air pollution and recognize the significant human health and ecosystem effects (including acid rain) associated with $PM_{2.5}$ and its precursors. Under the Canada-U.S. Regulatory Cooperation Council Joint Action Plan, announced in December 2011, Canada and the U.S. are working toward the completion of the necessary foundational work required to support the expansion of the Canada-U.S. Air Quality Agreement (AQA) to address transboundary particulate matter (PM). Under the existing Agreement, addressing acid rain and ground level ozone has resulted in a 34% reduction of PM; however, there is no safe level of PM. Therefore addressing transboundary movement of PM in the AQA is an important step toward safeguarding human health on both sides of the border.

In addition, although not part of the AQA, the U.S. Environmental Protection Agency (EPA) finalized the *Cross-State Air Pollution Rule*[7] (CSAPR) on July 6, 2011, that will require 27 states to significantly improve air quality by reducing power plant emissions that contribute to ozone and $PM_{2.5}$. The CSAPR replaces EPA's 2005 Clean Air Interstate Rule (CAIR). Since some regions of Canada are affected by the transport of air pollutants emitted in many of the states formerly covered by CAIR and now by CSAPR, it is expected that the continued implementation of CSAPR will have significant air quality benefits for those regions.

Canada is also an active participant in the Convention on Long-range Transboundary Air Pollution under the United Nations Economic Commission for Europe and in negotiations for revisions to the Gothenburg Protocol, a multi-pollutant agreement which considers emissions of SO_2, NO_x and PM.

4. Next steps

For over a decade, CCME has supported the efforts of jurisdictions in Canada to address acid rain and has shown that through a concerted effort, significant progress can be made even beyond our national and international commitments. Continued research, however, has also increased our knowledge of this issue to the extent that we now know the scope of acid deposition may have a larger impact than originally thought. In fact, despite the significant efforts by jurisdictions, there are still areas receiving levels of acid deposition that exceed the long-term capacity of their ecosystems to process these influxes and to recover to their natural state.

Under the auspices of CCME, federal, provincial and territorial governments are now moving forward into finalizing a new Air Quality Management System (AQMS) for implementation beginning in 2013. This may present an opportunity to integrate the current and emerging issues of acid rain into the broader management of air pollution in Canada.

[7] The U.S. Cross State Air Pollution Rule was stayed on December 30, 2011, by the U.S. Court of Appeals, pending the outcome of litigation. The U.S. anticipates having a final court decision on the future of CSAPR by fall of 2012.