



**An Approach to Regulating
Electricity Sector Greenhouse Gas
and Air Pollutant Emissions in Nova Scotia**

A Discussion Paper

February 2009



Acronym Guide

CCAP	Climate Change Action Plan
EGSPA	Environmental Goals and Sustainable Prosperity Act
AP	Air Pollutants
GHG	Greenhouse Gas
NSPI	Nova Scotia Power Incorporated
SO₂	Sulphur Dioxide
NO_x	Nitrogen Oxides
CO₂e	Carbon Dioxide Equivalents
RES	Renewable Energy Standard



I.

Overview

The Climate Change Action Plan (CCAP), released in January 2009, forms part of the Nova Scotia government's strategy to meet the requirements of the Environmental Goals and Sustainable Prosperity Act (EGSPA). This landmark legislation requires the province to reduce greenhouse gas (GHG) emissions to at least 10% below 1990 levels by 2020.

Nova Scotia's electricity sector is responsible for close to 50% of our GHG emissions, and a large portion of our sulphur dioxide (SO₂) and nitrogen oxides (NO_x) emissions.

This is one of the reasons why the CCAP includes the following actions, which will cap provincial GHG emissions from electricity generation:

GREENHOUSE GAS EMISSIONS

Action 1

Impose increasingly stringent absolute caps on Nova Scotia Power Inc's (NSPI) GHG emissions for 2010, 2015, and 2020.

AIR POLLUTANT EMISSIONS

Action 30

In addition to the cap, reductions already planned for 2010 set new, tighter limits on NSPI's SO₂ emissions for 2015 and 2020.

Action 32

In addition to the cap already in place for 2009, set new, tighter limits on NSPI's NO_x emissions for 2015 and 2020.

PURPOSE

Nova Scotia Environment is seeking input on the following:

- A new process for implementing GHG emissions regulations. This process would entail a phased approach, with reduction requirements starting January 1, 2010. Reductions would then continue in stages through 2020, with a final emissions cap established for that year.
- Amendments to the existing Air Quality Regulations. These amendments would set new NSPI emission caps for SO₂ and NO_x for 2015 and 2020. They would also set a proportionally equal adjustment for the provincial SO₂ cap.

CONTEXT

Across North America and Europe, industrial facilities that emit large quantities of GHG's (typically over 100,000 tonnes CO₂e* annually) are, or will be, mandated to reduce their GHG

* GHGs are measured in carbon dioxide equivalents based on their global warming potentials.

emissions. While most provinces in Canada have a wide variety of industrial facilities that emit more than 100,000 tonnes of GHG's each year, Nova Scotia has comparatively few. Provincially, almost 50% of our GHG emissions are from electricity generation – equivalent to about 90% of total GHG emissions from large industrial facilities in the province. There are currently no regulated GHG emission caps in Nova Scotia.

Other air pollutants, such as NO_x and SO₂, have been regulated for a number of years in some jurisdictions. These regulations will tighten over time. Nova Scotia's Air Quality Regulations impose emission caps up to 2010 on emissions of SO₂ and NO_x from electricity generation. In 2007, 92% of SO₂ and 83% of NO_x emissions that Nova Scotia reported to the National Pollutant Release Inventory arose from electricity generation.

By regulating the electricity sector, Nova Scotia will effectively and efficiently manage the majority of provincial emissions.

Percent of NS Emissions*

Sector	CO ₂ e	SO ₂	NO _x
Electricity	90 %	92 %	83 %
Pulp and paper	0 %	1 %	3 %
Cement	2 %	1 %	2 %
Refining	6 %	4 %	6 %
Manufacturing / other	2 %	2 %	6 %

* Facilities that emit more than 100,000 tonnes of CO₂e annually are required to report to the National Greenhouse Gas Inventory. Facilities that emit more than 20 tonnes of SO₂ or NO_x annually must report their emissions to the National Pollutant Release Inventory. Data represented is for 2007.



Our Nova Scotia Solution

Nova Scotia's Climate Change Action Plan commits to managing air emissions from the electricity sector in a coordinated manner. Simultaneously introducing new regulations for GHG emissions and amending current Air Quality Regulations could lead to lower costs and more productive investments.

Nova Scotia's dependence on fossil fuel for electricity generation leaves us with per capita emissions levels that are, in some cases, much greater than those of other provinces. This creates an opportunity to focus on this sector and move quickly to make reductions.

The GHG and air pollutant (AP) regulations outlined in the CCAP have been structured to facilitate electricity sector investments that put the province on a path to long-term reductions. The reductions will encourage investments in transmission, renewable energy, and energy efficiency. Eventually, domestic renewable energy production and imports of cleaner energy will result in cleaner and greener electricity supply for the province.

The electricity sector has a number of options for meeting these GHG emission targets, including:

- Increased production of renewable energy from Nova Scotia-based sources;
- Increased investment in energy efficiency and conservation;
- Investment in new transmission capacity that enables more renewable energy development and/or increased imports of electricity from non-emitting sources;
- Generation of more electricity from natural gas;
- Increased purchasing of electricity from non-emitting energy imports;
- Decentralized generation and/or co-generation; and
- Emerging technologies such as capture and storage of power plant emissions.

OBJECTIVE

The objective of the caps is to reduce electricity sector emissions in a manner that produces the greatest benefit to the environment over the long term and has the least effect on power rates.

In addition to this overarching objective, the following outcomes are expected:

- Investment in Nova Scotia;
- Positioning for further reductions after 2020;
- Lower overall compliance costs to energy users by maintaining regulatory authority in Nova Scotia and ensuring coordination with federal initiatives;
- Increased energy security and diversity of electricity supplies.

GHG EMISSION CAPS

The GHG emission caps proposed in the CCAP will apply to all generating units that emit more than 10,000 tonnes CO₂e annually and that produce electricity for sale in Nova Scotia.

According to data reported to Environment Canada, NSPI accounts for about 99% of electricity sector emissions from these facilities in the Province, while Brooklyn Energy accounts for about 1%.

NSPI's GHG emissions were about 10.15 million tonnes of CO₂e in 2007. To reach the GHG reduction goal mandated by the Environmental Goals and Sustainable Prosperity Act (EGSPA), total annual provincial emissions must be about five million tonnes lower by 2020 than they are today.

The GHG emission cap regulations outlined in the CCAP are designed to achieve 50% of this aggressive reduction goal – or about 2.5 million tonnes annually – by December 31, 2020. Requirements for reductions will begin January 1, 2010.

The caps will require gradual emission reductions. This will allow the sector to add new renewable energy sources, increase energy efficiency, and avail itself of other GHG reduction opportunities in a phased approach.

How will the new GHG Emission Regulations work?

The recommended approach to achieve GHG emission targets for the electricity sector is based on accountability, flexibility, investment, and transformation.

ACCOUNTABILITY

The regulations will establish a series of annual GHG emissions caps ranging from 2010 to 2020. Five compliance dates, called “compliance periods,” are scheduled for this timeframe, with the first running from 2010 to 2011. If the electricity sector fails to meet the emissions cap for any individual compliance period, it will be considered to be in non-compliance with regulations – an offence punishable under the Nova Scotia Environment Act.

Table 1 (below) presents the “Emissions Reduction Schedule,” outlining compliance obligations through 2020, including caps and compliance periods. For example, for the years 2010 and 2011, the electricity sector can emit up to 19.22 million tonnes of GHGs – this number was derived by adding the annual caps for 2010 and 2011.

Each year, the sector must submit a report quantifying emissions for that year so that progress can be tracked. At the end of each compliance period, the sector must demonstrate compliance.

The sector may emit more than its cap in any single year of a compliance period, but must never exceed its multi-year compliance limit. For example, if 10 million tonnes were emitted in 2010, 2011 emissions must not exceed 9.22 million tonnes in order to meet the aggregate 2010-2011 cap of 19.22 million tonnes. Under the Environment Act, failure to meet a compliance period limit could result in financial penalties of up to \$500,000 per day of non-compliance.

The 2020 cap cannot be exceeded in that, or subsequent years.

Electricity Sector GHG Emissions Reduction Schedule

Calendar Year	Annual Sector GHG Cap [million tonnes CO ₂ e]	Compliance Period Limit [million tonnes CO ₂ e] [cumulative]
*		
2010	9.7	19.22
2011	9.52	
2012	9.34	18.5
2013	9.16	
2014	8.98	26.32
2015	8.8	
2016	8.54	
2017	8.28	24.06
2018	8.02	
2019	7.76	
2020	7.5	7.5

* NSPI's GHG emissions were about 10.15 million tonnes of CO₂e in 2007.

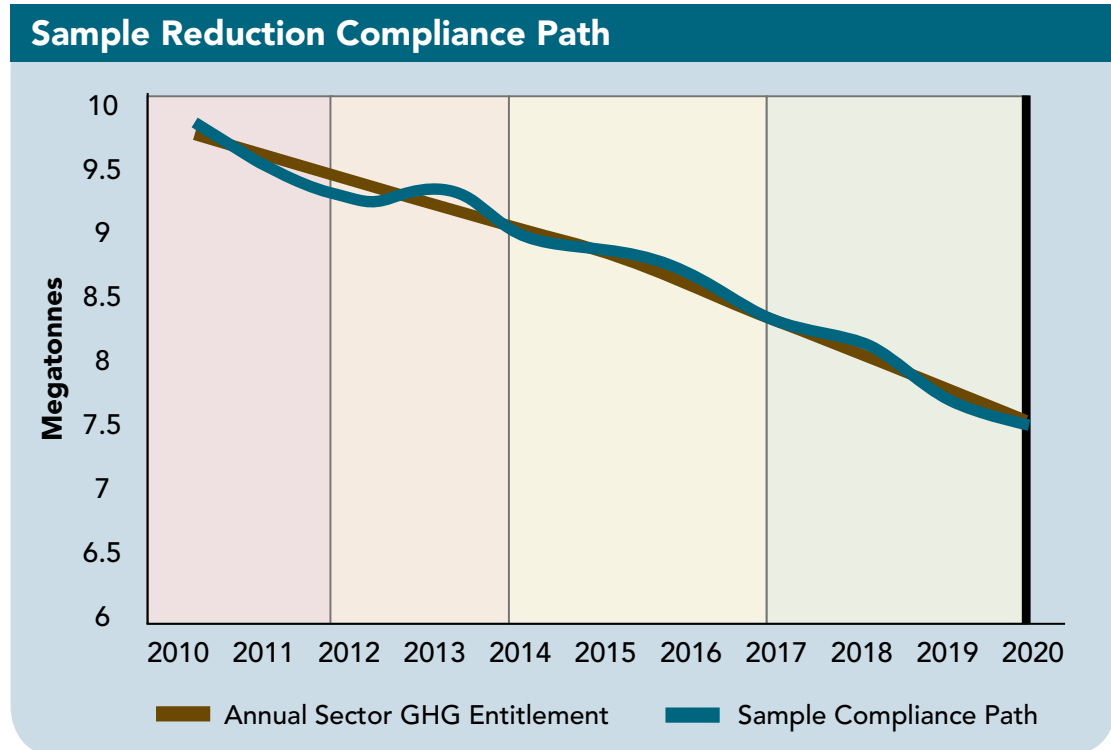
FLEXIBILITY

Electricity supply and demand depends on a number of variables that are not easy to predict on an annual basis. These variables include the weather (some years can be much colder than others, driving up heating and electricity demand), the state of the economy, and the amount of wind or hydro generation, which also varies on a year-to-year basis.

In order to manage this variability, we have combined annual GHG emission caps into flexible multi-year “compliance period limits.” For example, if NSPI finds that more wind or hydropower is available in one year of a compliance period, they may choose to emit less than their annual cap. In another year, they may choose to emit more than their cap because new business has come to Nova Scotia or because the heating load was higher due to weather.

The electricity sector must meet the aggregate GHG emissions cap for each compliance period. The following chart illustrates how the annual emission caps combine to meet compliance period limits.

INVESTMENT



Transforming our electricity sector to increase the portion of cleaner energy will require significant investment. Part of this investment may include imported energy such as hydroelectric power from the Lower Churchill facility, a 2800-megawatt hydroelectric project proposed for Newfoundland and Labrador. However, investment will also be required to strengthen our electricity transmission system and to facilitate the development of local renewable energy sources. This investment will reduce GHG and AP emissions, while also contributing to lowering future energy costs.

The proposed GHG emission regulations would allow the utility to exceed its emissions cap by up to 3% in exchange for investment in new transmission infrastructure that increases the grid's capacity to handle electricity generated locally from renewable sources.

The investment needed per tonne of transmission incentive would begin at \$15 and rise to \$60 over time. It is important to note that these adjustments would only affect the timing of overall GHG emission reductions, not the total amount. There is no infrastructure investment incentive available in the final compliance period. Emissions for 2020 will not exceed 7.5 million tonnes.

Over the course of the first four compliance periods, from 2010 to 2019, NSPI could exceed its cumulative caps by about 2.6 million tonnes, or less than 3% of total emissions for the 2010-2019 timeframe. If fully utilized, this incentive has the potential to generate up to \$100 million in investment in Nova Scotia's electricity transmission infrastructure.

The table below represents a potential scenario for quantity and cost of adjustments:

Compliance period	Cost of transmission incentive per tonne	Maximum transmission incentive [million tonnes CO₂e]
1 (2010-2011)	\$15	0.58
2 (2012-2013)	\$25	0.56
3 (2014-2016)	\$40	0.79
4 (2017-2019)	\$60	0.72

Will there be penalties for non-compliance?

Failure to comply with the requirements of the regulations is an offence under the Environment Act. Any party found guilty of such an offence could face daily fines of up to \$500,000. Any fine imposed by the Court under these regulations will be paid to the Nova Scotia Environmental Trust Fund.

How will the air pollutant caps work?

The caps outlined in the Air Quality Regulations were designed in co-operation with other provinces and the federal government in order to reduce the region's acid deposition and air pollution. They have already measurably reduced emissions and environmental harm. However, further reductions are necessary in order to reduce the amount of acid deposition and smog affecting the province.

In addition to the caps already in place for NSPI's AP emissions, the Air Quality Regulations will be amended to include additional hard caps for SO₂ and NO_x for the years 2015 and 2020. The provincial cap on SO₂ will also be proportionally adjusted to close any gap that would otherwise open up for other sources as a result of NSPI's reductions.

The same actions taken to reduce GHG emissions (increased use of renewable energy, increased energy efficiency, cleaner fuels, and clean imports via a more robust transmission grid) are expected to enable NSPI to achieve the following proposed caps for air pollutants:

		Period	NSPI Cap	%<base year
Sulphur Dioxide (tonnes)	1995 SO ₂ Cap (base year)	1995	145,000	(Not Applicable)
	2005 SO ₂ Cap	2005	108,750	25%
	2010 SO ₂ Cap	2010	72,500	50%
	2015 SO ₂ Cap (proposed)	2015	60,900	58%
	2020 SO ₂ Cap (proposed)	2020	36,250	75%

Chart continued on next page...

		Period	NSPI Cap	%<base year
Nitrogen Oxides (tonnes)	2000 NO _x emissions (base year)	2000	26,706	(Not Applicable)
	2009 NO _x Cap	2009	21,365	20%
	2015 NO _x Cap (proposed)	2015	19,228	28%
	2020 NO _x Cap (proposed)	2020	14,955	44%

Failure to comply with the requirements of the regulations is an offence under the Environment Act. Any person found guilty of such an offence could be liable for a daily fine of up to \$500,000.

POTENTIAL EFFECTS ON RATES: 2010-2013

From 2010 to 2013, NSPI should be able to comply with GHG and AP caps by investing in energy efficiency and conservation, renewable energy (as required by the province's Renewable Energy Standard (RES) regulation), and, if necessary, by utilizing the transmission investment incentive for GHG's.

2010-2013 Compliance Period Analysis (CO₂e, million tonnes)

Emissions under "business as usual"	42.7	(load forecast without energy efficiency upgrades and conservation)
Aggregate emissions cap for 2010-2013	37.7	
NSPI emissions gap	5.0	
Reduction via renewable energy	3.0	(via RES compliance)
Reduction from Demand Side Management (DSM)	1.5	(forecast load reduction via energy efficiency and conservation)
Transmission incentive	1.1	
Reductions available	5.6	

Prior to 2013, NSPI rates will reflect increased investment in energy efficiency and conservation. Those rates may also reflect a price differential between new renewable energy required to meet the RES and the fossil fuel generation it displaces. The rates will also reflect any investment in transmission necessary to increase the use of Nova Scotia-based renewable energy sources.

How will power rates be affected in 2014-2020?

The impact on electricity rates depends on a number of variables. Therefore, future costs cannot be accurately predicted. What is certain is that demand for electricity has grown in Nova Scotia. If this trend continues, a new power plant will be required in the near future – at significant cost. It is also very likely that a financial cost will be attached to carbon emissions in the near future. Increasing fuel costs and inflation are also expected to raise electricity rates.

Ultimately, rates will be affected by the choices we make to achieve our environmental goals. Future rates will be affected by the availability and cost of clean energy imports and new, Nova Scotia-based renewable energy supplies. Rates will also be affected by the future price differential between coal and natural gas generation, our success at achieving energy efficiency gains, and the availability and cost of carbon capture and storage.

Tidal power is anticipated as an option for achieving post-2013 GHG and AP emissions reductions in concert with the addition of wind, biomass, and other renewable energy sources over and above the RES. A tidal power pilot project is scheduled to begin in 2010 .

Clean energy imports, including hydroelectric power from the Lower Churchill project, could also reduce fossil fuel generation in Nova Scotia.

The federal government intends to engage the provinces and territories in developing a national approach to guide Canada's involvement in the establishment of new protocols at important United Nations discussions in Copenhagen in December, 2009. The federal government has recently expressed its interest in a North American cap and trade system. Nova Scotia will seek to have its approach to emissions reductions recognized within the context of those national discussions. That recognition will help ensure that we meet our goal to transform our electricity sector into one that relies more on cleaner energy solutions. A balanced and effective regulatory regime in Nova Scotia will allow us to demonstrate our ability to achieve, in a coordinated manner, real reductions in GHG and other air pollutants emissions.

Achieving our emissions goal by 2020 will require investments that will lead to the most cost-effective source of power in the new, carbon-constrained world. These investments will reduce our reliance on fossil fuels, achieve greater price stability for the future, and significantly improve the health of our environment.



III. Next Steps

By taking decisive action to limit electricity sector emissions, Nova Scotia will be well positioned to enjoy the benefits of cleaner air. However, this does not mean that our job is done. As we implement this first phase, we will be consulting on the best ways to get other industries, businesses, and individuals to reduce harmful air emissions.

Action 2 of our Climate Change Action Plan (CCAP) states that we will “Target GHG and air pollutant emissions from sources other than coal-generated electricity by working with stakeholders to develop policies and regulations.”

We plan to engage in these discussions in 2009-2010. This work will be coordinated with national and international directions on climate change to maximize benefits for Nova Scotia’s environment and economic success. This discussion could cover issues such as whether or not to include other fossil fuels under a GHG regulatory umbrella. It could address issues such as emissions trading, emissions credits, the role of technology investment, the development of a national cap and trade system, and links to a North America-wide system. A first step along this path is the establishment of a joint study with the Atlantic Canada Opportunities Agency to assess carbon reduction opportunities and costs in the region.

We will also be monitoring our emissions as a province and communicating the results of our reduction strategy publicly. This will ensure that Nova Scotia retains the flexibility necessary to incorporate any rapid changes that result from technological advances.

The province is also committed to working with other jurisdictions to ensure the protection of environmental and economic assets while working to maximize our opportunities for sustainable prosperity. This is why the Nova Scotia Government is joining the Western Climate Initiative as an observer, and will continue to monitor and consult on national and North American climate change cooperation.



IV.

We Want Your Ideas

We welcome your comments and questions on the topics and issues raised in this discussion paper. Of particular interest are your views on the effectiveness of the proposed approach to reducing GHG and air pollutant emissions, the integration of GHG and air pollutant emissions regulations, and the phased approach to transforming our electricity system to incorporate cleaner energy solutions.

Your comments and questions will help shape the regulations that will serve as a foundation for GHG and other air pollutant caps. The deadline for comments is March 31, 2009.

You can provide your feedback to us in a variety of ways: through the mail, via e-mail, by phone or fax.

You can also submit your feedback via [online form](#).

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Submission Deadline: March 31, 2009

Submissions received will be considered by Nova Scotia Environment as part of the public consultation process. Your submission may be made available to the public with the exception of your personal information, which will only be disclosed in keeping with the privacy provisions of the NS Freedom of Information & Protection of Privacy Act. Should you wish any of the information provided to be held in confidence, please clearly indicate this for consideration.

