

Chapter 3

Department of Environment and Local Government & NB Power

Climate Change

Contents

Introduction.....	81
Results in Brief.....	81
Recommendations.....	81
Background.....	87
Audit Objectives and Scope.....	91
Detailed Audit Observations.....	92
Mitigation.....	92
Adaptation.....	107
Coordination.....	115
Appendix I – Glossary.....	119
Appendix II – Status Report Generated From CCAP Progress Tracking System on May 2, 2017.....	122

Department of Environment and Local Government & NB Power

Climate Change

Introduction

3.1 In April 2016 all Auditors General across Canada agreed to undertake work on their provinces' and territories' **climate change** initiatives. This work will then be summarized in a report to the Parliament in early 2018. The overall objective of this initiative was to work together to determine the extent to which federal, provincial and territorial governments in Canada are meeting commitments to reduce greenhouse gas (GHG) emissions and to adapt to climate change.

3.2 We assessed whether New Brunswick has made progress towards its commitments to reduce GHG emissions.

3.3 We assessed whether New Brunswick has made progress towards adapting to climate change.

3.4 We also assessed whether New Brunswick has established internal governance and coordination arrangements to achieve GHG reduction targets and adapt to climate change.

Results in Brief

3.5 Results in brief are presented in Exhibit 3.1. A glossary of terms can be found in Appendix I.

Recommendations

3.6 A summary of recommendations can be found in Exhibit 3.2.

Exhibit 3.1 – Results in Brief

Climate Change

Why Is This Important?

- Canada has experienced larger temperature changes than the global average
 - New Brunswick has been experiencing extreme weather events, an elevated risk of rising sea levels and related coastal erosion
-

What We Found

Overall Conclusions

- Both the Province & NB Power have made progress towards commitments to reduce GHG emissions and adapting to climate change
- However, many action items do not have a timeline, allocated funding or implementation plans

NB's Greenhouse Gas Emissions (GHG)

- Electricity generation, industry and transportation are the three dominant contributors to NB's GHG emissions
- GHG emissions peaked in 2001, but are now trending downward
- NB's GHG emissions were 14.1 Mt in 2015

NB emissions compared to the rest of Canada:

- (No. 1 rank is largest polluter and 13 is the least)*
- 8th in total emissions
 - 7th in emissions per capita (17.5 tonnes / person)

Uncertainty around Belledune Generation Station

- Federal government's plan to phase-out coal-fired electricity by 2030 poses risks to NB Power's future operations
- NB is the only province that has not reached an agreement or agreement in principle with the Federal government to operate a coal-fired plant beyond 2030 deadline

Commitments and Targets

- GHG emissions targets set for the Province are in the Climate Change Action Plan (CCAP)
- NB on track to meet 2020 target of 14.8 Mt
- However, significant actions are required to meet both 2030 and 2050 targets
- GHG emission targets should be legislated in NB as specified in its CCAP
- Specific GHG emission reduction targets should be set for NB Power

Adapting to Climate Change

- Vulnerability assessments completed in 46 NB communities
- However, there is no documented comprehensive risk assessment for the Province
- CCAP includes a fairly comprehensive list of adaptation activities
- However, detail of how each activity will be achieved, timelines and allocated funding are lacking

Exhibit 3.2 - Summary of Recommendations

Recommendation	Department's response	Target date for implementation
3.41 We recommend the Department propose to Cabinet that Greenhouse Gas emission targets, as specified in its Climate Change Action Plan be legislated, similar to other Canadian provinces.	<i>The Department will consider this recommendation further as greater certainty emerges on carbon pricing mechanisms and their impact on GHG reduction and economic growth.</i>	<i>Within two years.</i>
3.48 We recommend the Department set specific GHG emission reduction targets for NB Power to ensure the provincial targets set in the Climate Change Action Plan are achievable.	<i>The province has committed to regulating GHG emissions from electricity generation in a manner that will ensure provincial targets are achieved.</i>	<i>Within two years</i>
3.55 We recommend NB Power: <ul style="list-style-type: none"> • perform a comprehensive analysis on the potential impact of phase-out of Belledune Generating Station; • consult with the Department of Environment and Local Government on a proposed solution regarding the Belledune Generating Station; and • integrate the Belledune Generating Station phase-out analysis in its Integrated Resource Plan process to ensure it has the capacity to meet New Brunswick's future electricity requirements, while respecting energy efficiency and demand reduction programs. 	<p><i>New Brunswick Power is working with the Department of Environment and Local Government on various greenhouse gas scenarios and analysis related to potential reductions, including the phase out of coal in 2030 and 2040.</i></p> <p><i>New Brunswick Power will plan to include greenhouse gas emission sensitivities in the next version of the Integrated Resource Plan. Once a decision is made on the path forward for New Brunswick's greenhouse gas targets and how this may affect the Belledune Generating Station NB Power will incorporate this information in next version of the Integrated Resource Plan.</i></p>	<i>Pending Shareholder's direction on carbon policy.</i>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
<p>3.63 We recommend the Department finalize an implementation plan that describes:</p> <ul style="list-style-type: none"> • how and when the actions identified in the Climate Change Action Plan will be implemented; and • how the Department intends to monitor and report on the progress. 	<p><i>The Climate Change Secretariat has commenced developing an implementation plan including how and when each of the actions in the 2016 climate change action plan will be implemented, a part of which is the substantive range of accountability and reporting commitments in the Action Plan.</i></p>	<p><i>End of 2017</i></p>
<p>3.108 We recommend the Department develop a provincial climate change risk assessment. The assessment should include:</p> <ul style="list-style-type: none"> • Risk identification; • Risk analysis; • Risk evaluation; • Risk treatment and adaptation measures; and • Implementation plan and monitoring. 	<p><i>Adaptation planning efforts in the province are guided by key risk assessments completed by Environment Canada (sea level rise), Natural Resources Canada (national/regional assessment), the province (regional adaptation collaborative) and various municipalities. Although, there is not a single comprehensive provincial climate change risk assessment, the assessments completed to date cover the elements outlined in the recommendation. The Climate Change Action Plan commits to developing vulnerability and risk assessments for critical infrastructure, municipalities, regional service commissions and natural resources. These actions remain the priority in the short term. The province will evaluate the need for a provincial climate change risk assessment.</i></p>	<p><i>Within 2 years</i></p>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
<p>3.120 We recommend NB Power conduct a corporate level climate change vulnerability assessment.</p>	<p><i>A vulnerability assessment is a component of New Brunswick Power's Climate Change Management Strategy. NB Power will conduct this vulnerability assessment considering the effects of changes in key climate parameters on its operation and infrastructure by June 30, 2018. This assessment will provide insight on opportunities as well as vulnerabilities, and will be an iterative process as our understanding of climate change evolves, as the infrastructure is updated, and as the energy industry evolves.</i></p> <p><i>There may be a number of different options for managing the effects of climate change. Opportunities might be identified for increased loads (related to increased heating and / or cooling requirements, or increased supply options (hydro, solar, wind).</i></p> <p><i>NB Power will identify potential adaptation options, taking into account:</i></p> <ul style="list-style-type: none"> <i>• costs and benefits</i> <i>• risks</i> <i>• implications on rates</i> 	<p><i>June 30, 2018</i></p>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
3.121 We recommend NB Power develop an implementation plan for adapting to climate change after the completion of its vulnerability assessment.	<i>After the vulnerability assessment is completed, an implementation plan will be developed including funding requirements and timeline. The implementation plan will be developed involving key internal and external stakeholders with a target date of December 31, 2018.</i>	<i>December 31, 2018</i>
3.134 We recommend the Department update the CCAP Progress Tracking System to reflect the changes in the most current Climate Change Action Plan.	<i>The Department is preparing to update the CCAP progress tracking system to both improve the system itself and to cover all actions in the 2016 climate change action plan.</i>	<i>End of 2017</i>

Background

Climate change

- 3.7 In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded there is a more than 95 percent probability that human activities over the past 50 years have warmed our planet.¹ Increased concentrations of **greenhouse gases** in the Earth's atmosphere have contributed to an increase in the planet's surface temperature.
- 3.8 Average temperature in Canada has increased 1.6 °C or twice the global average since 1948. In northern Canada, the average temperature has gone up 2.2 °C. This is about three times the global average.²
- 3.9 New Brunswick has been experiencing the impacts of climate change. *“In general temperatures are going up, precipitation increasing and sea levels rising. The province can expect an elevated risk of heat-related health concerns, new pests and invasive species, flood damage, impacts from extreme winds, and icing of trees and power lines. Rising sea levels have also increased the risk of flooding and coastal erosion.”*³



Aerial images of a flooding event of the Saint John River basin on Thursday, May 1, 2008 in Fredericton, Source: CNB

¹ IPCC Fifth Assessment Report, 2014

² Key Issues - Climate Change, Environment and Climate Change Canada, <https://www.canada.ca/en/environment-climate-change/briefing/key-issues-climate-change.html>

³ Transitioning to a Low-Carbon Economy - New Brunswick's Climate Change Action Plan, December 2016

Exhibit 3.3 - 2015 Greenhouse Gas Emissions by Jurisdictions in Canada

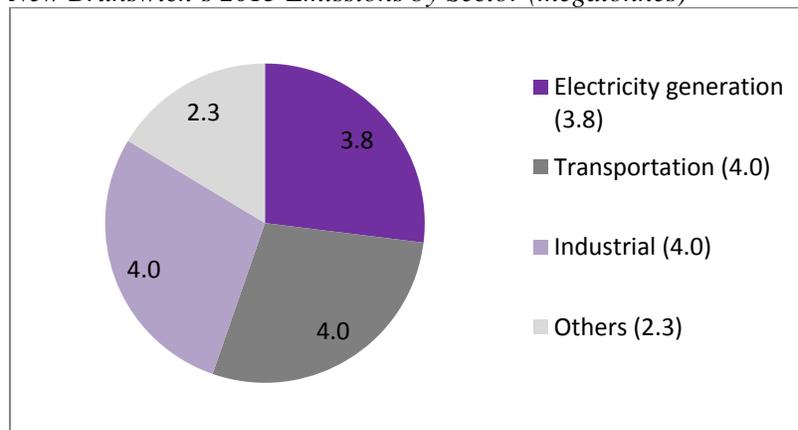
	<i>Total emissions* (megatonnes)</i>	<i>Emissions per capita** (tonnes)</i>
Alberta	274	65.2
Ontario	166	12.0
Quebec	80	9.6
Saskatchewan	75	68.2
British Columbia	61	13
Manitoba	21	16.2
Nova Scotia	16	17.8
New Brunswick	14	17.5
Newfoundland and Labrador	10.3	20.6
Prince Edward Island	1.8	18.0
Northwest Territories	1.4	35.0
Nunavut	0.6	15.0
Yukon	0.3	7.5
Canada in Total	721.4	20.1

Sources: *National Inventory Report, 2017

**Calculated by AGNB based on the data from National Inventory Report, 2017 and Statistics Canada

Notes: Amounts do not account for inter-provincial transfers.
There could be slight differences due to rounding.

Exhibit 3.4 - New Brunswick's 2015 Emissions by Sector (megatonnes)



Source: the Department of Environment of Local Government and National Inventory Report, 2017

New Brunswick's GHG emissions

3.10 As Exhibit 3.3 shows, New Brunswick is not a significant emitter in terms of total volume, however, the province's GHG emissions per capita ranked seventh among 13 provinces and territories. It is recognized that New Brunswick is very dependent on energy intensive exports, such as refined petroleum products, electricity and forestry products which include lumber, pulp and paper products.

3.11 Exhibit 3.4 shows New Brunswick's 2015 GHG emissions by sector. These figures use the most recent data from Environment and Climate Change Canada, a department of the Federal government, which compiles all GHG emissions information for Canada through its National Inventory Report. New Brunswick relies on the National Inventory Report for historical emissions. Electricity generation, industry and transportation are the three dominant contributors to New Brunswick's GHG emissions. Almost 90% of emissions in New Brunswick were energy related in 2015.

3.12 Irving Refinery and Belledune Generating Station are the two largest GHG emitters in New Brunswick. They emitted roughly 2.97 and 2.12 Mt of CO₂e in 2015, respectively. The other large GHG emitting operations are listed in Exhibit 3.5.

Exhibit 3.5- Large GHG Emitting Operations in New Brunswick – emissions (CO₂e) in 2015

Facility name	Tonnes CO₂e
Refinery – Irving Oil Commercial G.P.	2,966,931
Belledune Generating Station – New Brunswick Power Corporation	2,123,832
Coleson Cove Generating Station – New Brunswick Power Corporation	798,797
Bayside Power – Bayside Power L.P.	683,190
Brunswick Smelter – Glencore Canada Corporation	192,829
Irving Pulp & Paper – Irving Pulp & Paper Ltd.	119,695
AV Nackawic - AV Nackawic Inc.	106,522
Irving Paper – Irving Paper Limited	96,582
Edmundston Pulp Mill – Twin Rivers Paper Company Inc.	57,535
New Brunswick Division – PotashCorp	57,014
Lake Utopia Paper - a Division of J.D. Irving, Limited	56,327
Total	7,259,254

Source: GHG Facility Reporting, Environment and Climate Change Canada

Responses to climate change

3.13 Overall, there are two types of strategies to address climate change:

- **mitigation** focuses on lessening the extent of global warming by reducing greenhouse gas emissions, and
- **adaptation** focuses on reducing the potential harm caused by the effects of climate change.

There have been three Climate Change Action Plans since 2007

3.14 The Province published its first Climate Change Action Plan (2007 – 2012) in 2007. The second version of the action plan which covered from 2014 to 2020 was released in 2014. An additional document “*Building a Stronger New Brunswick Response to Climate Change - Discussion Guide*” was issued in May 2016. This was followed by the latest version of the action plan called “*Transitioning to a Low-Carbon Economy*” which dated December 2016. We noticed there is no time period specified for the current version of the action plan.

3.15 These plans have been an important step to address the many broad and interrelated aspects of climate change in this province. The common goals of these plans were to reduce provincial GHG emissions and manage adaptation to climate change impacts through a series of targets and policy actions.

3.16 The Climate Change Secretariat under the Department of Environment and Local Government (the Department) is mandated “*to develop, implement, and report, in cooperation with other departments, on actions that address GHG emission reductions and adaptation. It is also responsible to manage continued engagement with provincial stakeholders, federal, provincial, territorial, and international jurisdictions and the New England Governors and Eastern Canadian Premiers (NEG/ECP) region, on climate change matters, and the development of public awareness and education programs.*”

3.17 One of the key roles of the Climate Change Secretariat is coordination. Direct implementation of most of the actions rests with key departments such as Department of Energy and Resource Development for energy policies and Department of Transportation and Infrastructure for transportation and infrastructure related actions.

3.18 Given the Federal government recently announced climate change policies, the Province must consider the impacts in conjunction with the implementation of its own CCAP. Examples of these polices include the Federal Benchmark on Carbon Pricing released in October 2016, which requires the

province to implement carbon pricing mechanism by 2018 with specific conditions that must be met. Another example is the intention to regulate in 2018 GHG emissions from coal-fired generation such that it will be phased out by 2030.

Audit Objectives and Scope

3.19 Our audit objectives were to determine if:

- the Province of New Brunswick has made progress towards commitments to reduce greenhouse gas emissions;
- the Province of New Brunswick has made progress towards adapting to climate change; and
- the Province of New Brunswick has established effective internal governance and coordination arrangements to achieve greenhouse gas emissions reduction targets and adapt to climate change.

3.20 We communicated the audit objectives and criteria to the management at Department of Environment and Local Government (Department) as well as NB Power. They agreed on the suitability of our audit objectives and criteria.

3.21 We conducted our audit work mainly at the Department and NB Power. The Department is coordinating the actions of a range of key government departments that have the authority to implement the province's climate change policies. We decided to include NB Power in this audit because:

- GHG emissions from electricity generation accounts for almost 30% of New Brunswick's total emissions; and
- The utility sector including NB Power has some unique challenges in terms of adapting to climate change.

3.22 There are two other major sectors in terms of total GHG emissions: industrial and transportation. We did not conduct audit work on these sectors at this time as they are largely driven by the private sector.

3.23 We reviewed the Province's past and current climate change action plans, NB Power's climate change management strategy and its climate adaptation vulnerability assessment framework.

3.24 We interviewed staff members at both organizations. We compared the past climate change action plans with the current one to see how they have evolved. We analyzed the implementation efforts of those plans.

- 3.25** We also conducted jurisdictional scans to evaluate how New Brunswick compares to other jurisdictions in Canada.
- 3.26** Our audit was performed in accordance with standards for assurance engagements, encompassing value-for-money and compliance, established by the Chartered Professional Accountants of Canada, and accordingly included such tests and other procedures as we considered necessary in the circumstances.
- 3.27** Certain financial and statistical information presented in this chapter was compiled from information provided by the Department and NB Power. It has not been audited or otherwise verified. Readers are cautioned that this financial and statistical information may not be appropriate for their purposes.
- Detailed Audit Observations**
- 3.28** Our first audit objective was *to determine if the Province of New Brunswick has made progress towards commitments to reduce greenhouse gas emissions.*
- Mitigation**
- 3.29** There are four audit criteria under this objective. We gathered audit evidence to assess whether:
- The Province has established short and long term greenhouse gas (GHG) emissions reduction targets;
 - The Province has an implementation plan that describes how the New Brunswick’s entities will contribute to achieving the emissions reduction target;
 - The Province is on track to meet its GHG reduction target, and;
 - The Province regularly reports to the public on progress towards GHG reduction target.
- GHG emissions targets**
- 3.30** We believe setting emission targets is a very important first step in reducing GHG emissions.
- Emissions targets of the Province**
- 3.31** In 2001, New England Governors and Eastern Canadian Premiers (NEG/ECP) adopted a Climate Change Action Plan for the region. The plan recommends stabilizing the GHG emissions at 1990 levels by 2010 and reducing 10% by 2020. Furthermore, the 2001 plan established a long-term target of 75-85% reduction from 2001 levels. Resolution 31-1 (2007) established a target date of 2050 for achieving the reductions.
- 3.32** As a member of the NEG/ECP, New Brunswick has based its reduction targets primarily on the reduction guideline set in the NEG/ECP plans. Exhibit 3.6 shows the emission targets set by the Province in its three action plans including the current one.

Exhibit 3.6 - Emission Targets Set by the Province in Past and Current Climate Change Action Plans

New Brunswick's CCAP	Targets	Status	Quotes from CCAPs
Climate Change Action Plan 2007-2012	Return to 1990 levels by 2012	Not Achieved 1990: 16.4 Mt 2012: 16.9 Mt	<i>The New Brunswick Climate Change Action Plan emission reductions are expressed in megatonnes (millions of tonnes) of CO2 equivalents. New Brunswick-led initiatives will result in greenhouse gas emission reductions of 5.5 Mt annually in 2012.⁴</i>
Climate Change Action Plan 2014-2020	10% below 1990 levels by 2020; and 75–85% below 2001 levels by 2050	Updated, see below	<i>New Brunswick's GHG emissions have decreased significantly over the past decade. While current actions are projected to stabilize GHG emissions, it is clear that additional actions must be taken in order for New Brunswick to meet its regional NEG-ECP commitments.⁵</i>
Climate Change Action Plan - Transitioning to a Low-Carbon Economy	14.8 Mt by 2020; 10.7 Mt by 2030; and 5 Mt by 2050.	The Department forecasted it is on track to meet 2020 (14.1Mt in 2015) and 2030 targets with the implementation of all initiatives listed in the 2016 CCAP and some federal initiatives, but is uncertain for 2050.	<i>Although New Brunswick's GHG emissions have declined in recent years, they are not projected to decline in the future under the status quo. This, along with increasingly stringent GHG reduction targets adopted by NEG-ECP and the provincial government, means that additional GHG emission reduction measures will be required.⁶</i>

Source: the Department of Environment and Local Government

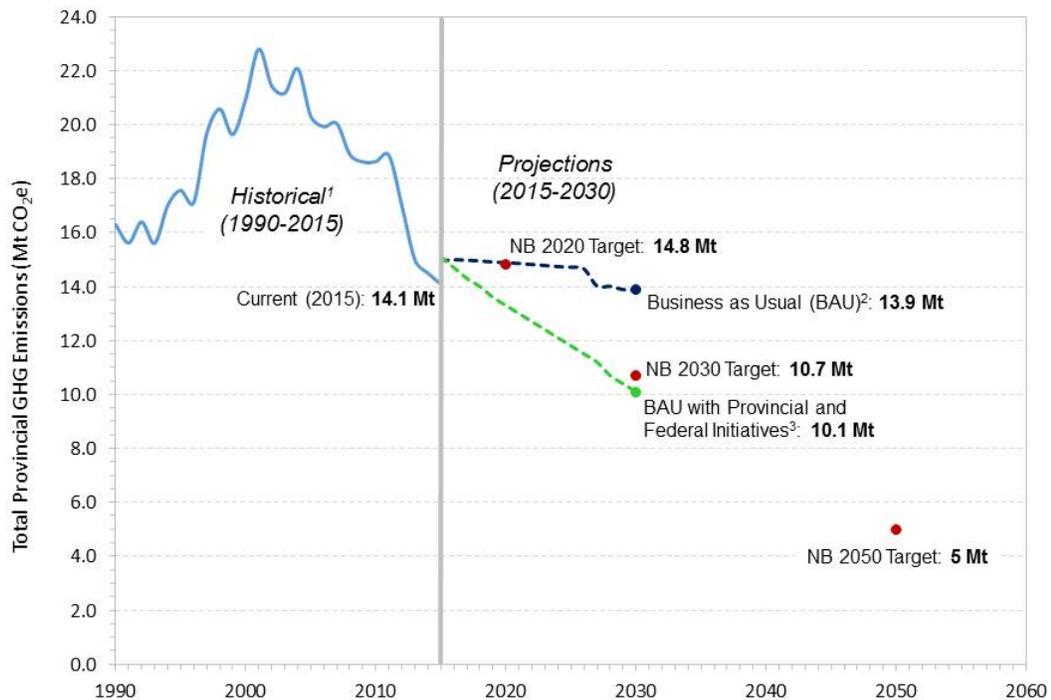
⁴ New Brunswick Climate Change Action Plan 2007-2012

⁵ New Brunswick Climate Change Action Plan 2014-2020

⁶ Transitioning to a Low-Carbon Economy - New Brunswick's Climate Change Action Plan, December 2016

- 3.33** The Province has committed to achieving GHG reduction targets since its first Climate Change Action Plan (CCAP). The short, medium and long term targets are clearly stated in the Province's CCAP. The targets are the same as the reduction levels suggested by the regional initiative NEG/ECP.
- 3.34** The Climate Change Secretariat is currently using the Long-range Energy Alternatives Planning (LEAP) model to track the Province's GHG emissions and to predict if New Brunswick will meet its GHG emission targets.
- 3.35** It has produced three provincial GHG emission projections analyses using the LEAP model in 2013, 2015, and 2016.
- 3.36** As shown in Exhibit 3.7, the Province predicted the 2020 and 2030 targets are achievable with provincial initiatives listed in the new CCAP and Federal ones such as plans to improve transportation vehicle (cars, trucks and heavy duty trucks) fuel efficiency.

Exhibit 3.7 - New Brunswick Greenhouse Gas Emissions and Target



¹ Environment and Climate Change Canada, 2017.

² Environment and Climate Change Canada, 2016. Note: Forecast will be updated to reference 2015 historical data.

³ Climate Change Secretariat, 2016. Note: Forecast will be updated to reference 2015 historical data.

Source: NB GHG Emission Projections, the Department of Environment and Local Government

3.37 Similarly, the Climate Change Secretariat conducted an analysis on 2030 and 2050 targets. Under certain assumptions, it estimates the Province, by implementing all the emission reduction actions identified in the CCAP, would be close in meeting the 2030 target but uncertain for its 2050 target.

3.38 We compared New Brunswick’s targets with the ones set by other jurisdictions in Canada. We found most jurisdictions have clearly identified targets, except Saskatchewan, PEI and Nunavut. Although some provinces have more aggressive reduction targets, New Brunswick has very similar targets with other Atlantic provinces.

Some provinces have legislated GHG emission reduction targets

3.39 We also noted that British Columbia, Quebec, Ontario, and Nova Scotia legislated their reduction targets. Alberta’s *Climate Change and Emissions Management Act (CCEMA)* and its key regulation – the *Specified Gas Emitters Regulation* have been in place since 2007. The Regulation created an intensity-based limit on industrial GHG emissions. We note that the measure chosen under the CCEMA is “emissions intensity”, measuring GHG emissions per unit output. As a result, the CCEMA does not place an absolute cap on Alberta’s aggregate emissions. In 2009 Nova Scotia released the *Greenhouse Gas Emissions Regulations* which established GHG emission caps on any facility located in Nova Scotia that emits greater than 10,000 metric tonnes of carbon dioxide equivalent (10 kt CO_{2e}) greenhouse gases in a calendar year.

3.40 Legislated targets show a government seriously commits to reduce GHG emissions. It also gives a government more authority to enforce actions intended to achieve legislated targets. However, it is recognized that it is important to limit GHG emissions without discouraging economic growth.

Recommendation

3.41 We recommend the Department propose to Cabinet that **Greenhouse Gas emission targets, as specified in its Climate Change Action Plan be legislated, similar to other Canadian provinces.**

Currently, there is no GHG emission targets set for NB Power

3.42 The Regulation under the *Electricity Act* requires NB Power to achieve by 2020 40% of in-province electricity sales being provided from **renewable energy**.

3.43 We realize the 40% goal is rather for renewable energy than GHG emission reduction. Achieving the target should have the benefit of significantly reducing GHG emissions.

3.44 According to NB Power, its GHG emissions in 2015 were 2.9 Mt, compared to 6.3 Mt in 1990. The reductions have

contributed to achieving New Brunswick's 2020 emission reduction target. Exhibit 3.8 shows NB Power's reduction compared to a variety of baseline emission years which exist within several international carbon dioxide emission reduction frameworks. We noticed these baseline years and reduction targets are specific to the particular framework shown. They are not NB Power's reduction targets, as NB Power is not a signing party of any of the frameworks.

3.45 NB Power projected its GHG emissions to remain similar to current levels by 2020.

Exhibit 3.8 - NB Power's Reduction Compared to a Variety of Baseline Emission Years

Framework for Comparison Purpose	Baseline year	Reduction target	NB Power's emissions in the baseline year (Mt)	NB Power's Emissions in 2015 (Mt)	Reduction (2015) relative to baseline (%)	Emission Lower than Baseline year?
Kyoto Protocol	1990	6%	6.3	2.9	54	Yes
NEG/ECP	1990	10% by 2020	6.3	2.9	54	Yes
	1990	35 to 45% by 2030	6.3	2.9	54	Yes
	2001	75 to 85% by 2050	10.0	2.9	71	No
Canada's Copenhagen Target	2005	17% by 2020	8.8	2.9	67	Yes
Canada's INDC* Submission to UNFCCC**	2005	30% by 2030	8.8	2.9	67	Yes

Source: Greenhouse Gas Management Plan, NB Power, October 2016, modified by AGNB (unaudited)

* intended nationally determined contribution

** United Nations Framework Convention on Climate Change

- 3.46** The data in Exhibit 3.8 shows NB Power's emissions in 2015 are significantly lower than in the baseline years. However, we found there are no specific GHG reduction targets set for NB Power to guide the reduction efforts in the future.
- 3.47** It is unclear what level of GHG reduction will be achieved by reaching the 40% renewable target. This is because the 40% renewable target is only applicable to in-province electricity sales and not affecting export sales. Additionally, the GHG reduction as a result of increased renewable energy totally depends on what sources of electricity generation the renewable is offsetting. For example, there would be no GHG emission reduction achieved if the renewable energy is offsetting nuclear generation as nuclear is a non-emitting source. Assuming renewable energy directly offsets 135 GWh of thermal generation and the average emission intensity for thermal generation ranges from 500 to 800 tonnes per GWh, NB Power estimated it could reduce in a range of 65,000 to 110,000 tonnes of GHG per year by increasing 1% renewable energy. This is based on in-province sales of 13,500 GWh. An increase in the renewable energy sources of 1% equates to 135 GWh in extra electricity generated from renewable sources.

Recommendation

- 3.48 We recommend the Department set specific GHG emission reduction targets for NB Power to ensure the provincial targets set in the Climate Change Action Plan are achievable.**

Federal government's plan to phase-out coal-fired electricity by 2030 poses potential risks to NB Power's future operations

- 3.49** In November 2016, the Federal government announced its plan to eliminate the use of traditional coal-fired electricity by 2030, but will offer some flexibility to the provinces. Currently, four provinces have coal-fired plants in operations, Alberta, Saskatchewan, New Brunswick and Nova Scotia.
- 3.50** Alberta has already announced its plan to shut down coal-fired power plants by 2030. On November 28, 2016, the Governments of Saskatchewan and Canada reached an agreement in principle to finalize the equivalency agreement for Canada's existing coal-fired electricity generation power

plant regulation.⁷ Once finalized, the federal/provincial equivalency agreement on coal-fired electricity generation regulation (coal equivalency agreement) is expected to provide Saskatchewan more flexibility in transitioning to additional renewable energy, including evaluating future opportunities for carbon capture and storage to trap carbon dioxide and store it.⁸

3.51 Nova Scotia and the federal government have also reached an agreement in principle that will allow Nova Scotia to keep its coal-fired electricity plants open beyond 2030.



NB Power's coal-fired generating plant in Belledune is one of the province's major sources of carbon emissions.

Source: CBC News, <http://www.cbc.ca/news/canada/new-brunswick/nb-power-carbon-tax-planning-1.3924685>

3.52 Currently NB Power operates one major coal-fired power plant -Belledune station with 467 megawatt generating capacity. It accounts for 13% of NB Power's total capacity. According to the Department and NB Power, they have been in discussion with the Federal government to continue the

⁷ Under the *Canadian Environmental Protection Act, 1999* the Federal Government may enter into an equivalency agreement with provinces and territories provided that the provincial approach delivers equivalent or better outcomes than the federal *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations*

⁸ www.saskatchewan.ca/government/news-and-media/2016/november/28/equivalency-agreement (16 December 2016).

operation at the plant beyond 2030. However, there was still no agreement reached at the time when we conducted our audit.

3.53 Moreover, the Province’s new CCAP states “*the provincial government will work with the federal government, our neighbouring provinces, local stakeholders and the electric utility toward eliminating coal-fueled electricity generation as quickly as possible. If adequate support can be found to minimize impacts on energy costs and the local economy, eliminate coal by 2030. Alternatively, phase out coal by the status quo date of 2040 with interim emission reductions aligned with new federal regulations.*”⁹

3.54 The plan to phase out coal-fired plants by the Federal government will have a significant impact on NB Power’s operation, as NB Power believes the Belledune station is an important and integral part of its electricity generation assets. NB Power uses an Integrated Resource Planning (IRP) process to ensure the Province’s long term electricity supply needs are met. This uncertainty creates a significant risk to NB Power’s future operations as well as New Brunswick’s ability to meet GHG emissions targets.

Recommendation

3.55 We recommend NB Power:

- **perform a comprehensive analysis on the potential impact of phase-out of Belledune Generating Station;**
- **consult with the Department of Environment and Local Government on a proposed solution regarding the Belledune Generating Station; and**
- **integrate the Belledune Generating Station phase-out analysis in its Integrated Resource Plan process to ensure it has the capacity to meet New Brunswick’s future electricity requirements, while respecting energy efficiency and demand reduction programs.**

⁹ Transitioning to a Low-Carbon Economy – New Brunswick’s Climate Change Action Plan, December 2016

***Implementation
plan of the Province
is not finalized***

3.56 An implementation plan is an essential part of overall climate change strategy. It is important to map out the key steps to ensure the GHG reduction targets can be achieved.

3.57 Compared to previous versions of the Province's CCAP, the 2016 plan has many important updates and enhanced action items. It intends to intensify the efforts to combat climate change.

3.58 There are 118 actions identified in the Province's CCAP. All the actions are linked to seven areas:

- Provincial government leadership;
- Collaboration with First Nations;
- GHG emission reductions;
- Adaptation to the impacts of climate change;
- Economic opportunities;
- Accountability and reporting, and
- Funding for climate change.

3.59 There are 35 action items related to GHG emissions reductions. One very important policy instrument was introduced in this CCAP – a price on carbon¹⁰. In October 2016, the federal government announced its intention to establish a price on carbon emissions of \$10 per tonne in 2018, rising to \$50 per tonne by 2022. Provinces and territories will have a choice in how they implement this pricing. Should any province or territory not establish a price on carbon by 2018, the federal government will implement carbon pricing in that jurisdiction.

¹⁰ There are two main types of carbon pricing: emissions trading systems and carbon taxes

3.60 According to the 2016 CCAP, the Province will implement a carbon pricing mechanism that addresses the requirements of the Federal government by 2018. This is a good example of an action item with a clear timeline. The CCAP also describes what the key considerations should be in setting the pricing mechanism and how the proceeds from carbon emissions pricing will be administered.

3.61 Unfortunately, very few action items have timelines attached to them as yet. For example, the CCAP states the Province “*will work to have 2,500 electric vehicles on the road in New Brunswick by 2020 and 20,000 by 2030*” and an electric vehicle strategy will be implemented. However, there are no details regarding when the strategy will be implemented and how infrastructure will be developed to accommodate that many electric vehicles on the road.

3.62 The staff members at the Secretariat have been working with other departments to draft an overall implementation plan after the new CCAP was published, but it is unclear when an implementation plan will be finalized. Without clear timelines and implementation plans, it is difficult to measure the Province’s progress toward achieving the goals it set in the new CCAP.

Recommendation

3.63 We recommend the Department finalize an implementation plan that describes:

- **how and when the actions identified in the Climate Change Action Plan will be implemented; and**
- **how the Department intends to monitor and report on the progress.**

There is a plan at NB Power to respond to its “regulatory requirement of supplying 40% of in-province sales from renewable sources by 2020”

3.64 The main focus of NB Power’s Integrated Resource Planning (IRP) process is to ensure the Province’s long term electricity supply needs are met. In addition to this load requirement, the IRP also seeks to establish a development plan that responds to the *Electricity Act* and operate under the following policy objectives:

- *To provide low and stable rates;*
- *To ensure a reliable power system; and*
- *To meet the requirements of a Renewable Portfolio Standard (RPS)*

The RPS requires NB Power to supply 40% of its in-province sales from renewable sources by 2020. The result is a “*combination of initiatives designed to reduce and shift energy*”

demand, encourage efficiency, foster locally owned, small-scale renewable projects and add new resources to ensure the utility meets its” renewable target.

3.65 NB Power updates the plan every three years to reflect new technology, changes in customer demand and updated fuel price forecasts.

3.66 As required by New Brunswick Regulation 2015-60 under the *Electricity Act*, NB Power “*shall file a progress report to the Minister of Energy within three months after the end of each fiscal year*”. NB Power reported 42% of its in-province electricity sales were generated from renewables in 2015-2016. NB Power believes the IRP process is effective in terms of achieving NB Power’s renewable target.

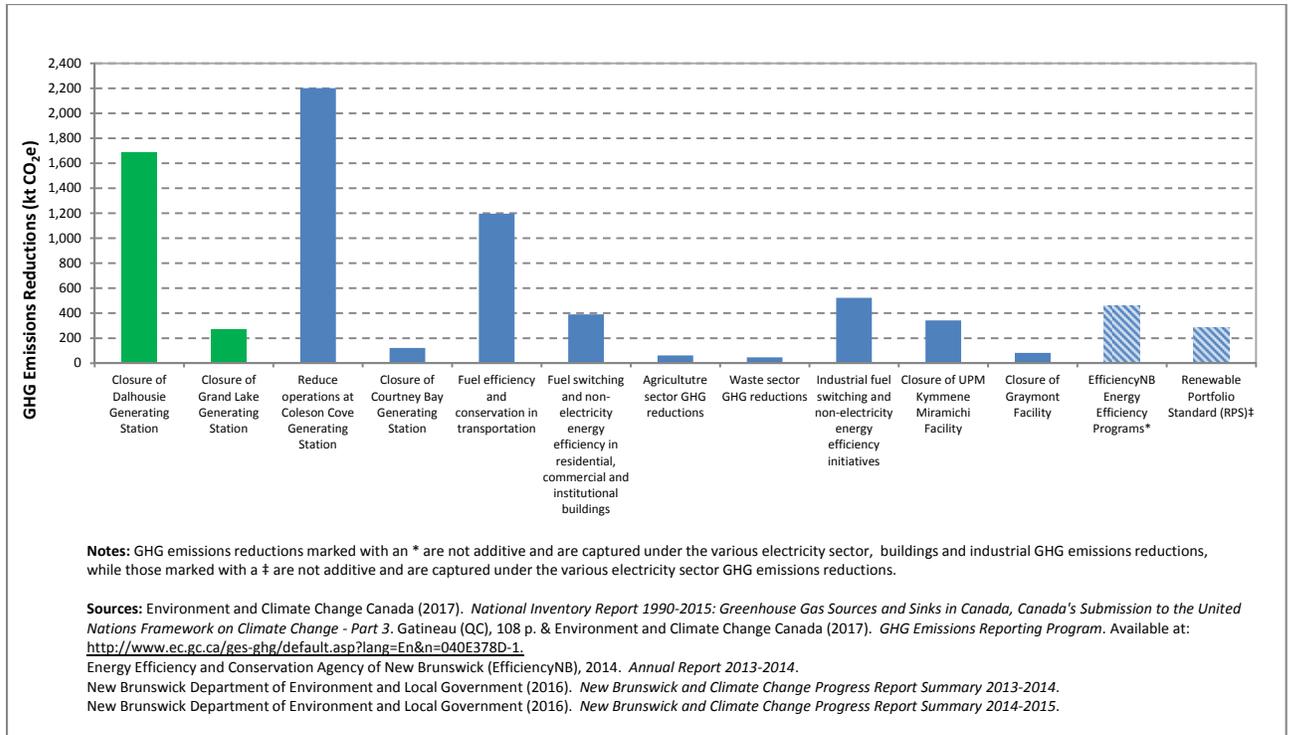
If all actions are funded and implemented, the Department forecasts the Province is on track to meet its 2020 and 2030 GHG reduction targets, but is uncertain for 2050

3.67 As shown in Exhibit 3.7, current New Brunswick GHG emissions are down significantly from their peak in 2001. As per the Department, this can be attributed to several significant factors including: market penetration of natural gas, substantial energy efficiency programs, 300 megawatts of wind power development as a result of government regulation, increased biomass use in industry with government support, capping of all solid waste landfills with biogas capture, closure of two fossil fueled electricity generation plants, and some restructuring of the forest processing industry. Exhibit 3.9 shows in detail the areas that contributed to reductions in New Brunswick’s GHG emissions.

3.68 The Climate Change Secretariat is currently using the Long-range Energy Alternatives Planning (LEAP) model to track the province’s GHG emissions and to determine if New Brunswick will meet its GHG emission targets. A detailed description of the LEAP model can be found in Appendix I. The Secretariat relies on GHG emission data published by Environment Canada to feed into its analysis.

3.69 The Climate Change Secretariat has produced three provincial GHG emission projections analysis using the LEAP model (2013, 2015, and 2016).

Exhibit 3.9 - *Attributions of Total Provincial GHG Emissions Reductions from 2004 to 2015*



Source: *NB GHG Emission Projections, the Department of Environment and Local Government (unaudited)*

3.70 The 2015 Report presents the results of an analysis related to the GHG mitigation actions identified in the CCAP 2014-2020, related to three action areas: Energy Efficiency; Fuel Switching and Behavioural Change. The LEAP model was used to estimate the emission reductions achieved in 2020 from the implementation of the mitigation actions identified. The analysis showed the province can meet its 2020 GHG emission target by properly funding and implementing all 2014-2020 Climate Change Action Plan GHG mitigation action items.

3.71 Similarly, results from latest analysis (2016) show the province can meet its 2030 GHG emission target by properly funding and implementing all Climate Change Action Plan GHG mitigation action items identified in the study.

- 3.72** In 2015-2016, 42% of NB Power's in-province electricity sales were generated from renewable energy sources.
- 3.73** NB Power states that it has already made significant GHG reductions to help the Province meet its 2020 target. As previously mentioned, NB Power's 2015 GHG emissions were 2.9 Mts, which is significantly lower than 6.3 Mts it emitted in 1990.
- 3.74** NB Power projected its total GHG emissions will remain similar to current levels up to 2020. It appears NB Power is on track to meet its 2020 renewable energy target.

The Province regularly reports to the public on progress towards GHG reduction targets

- 3.75** The Province has produced summary GHG progress reports on an annual basis since fiscal 2007-2008. The Department is in the process of finalizing the latest 2015-2016 progress report. As of May 2017, the report has not been published.
- 3.76** The Province always uses the most recent data from Environment Canada. Normally, there is a two year gap. For example, the 2012-2013 progress report contained data from 2011.
- 3.77** The progress report includes data for total NB annual GHG emissions and emissions by sector. A chart in the report clearly shows the emission levels from 1990 to the most recent year for which data is available. It also highlights some key actions taken in the most recent year in areas such as energy efficiency, transportation, industry, electricity generation, etc.
- 3.78** A website has been developed for the Government of New Brunswick by the Canadian Standards Association to track and report the Province's efforts to reduce GHG emissions through actions undertaken. It also offers viewers interactive graphs and data tables of the Province's GHG emissions.
- 3.79** Through the above publicly available information, the Province reports in a consistent way its progress toward GHG reduction targets.

NB Power regularly reports to the public on progress towards renewable energy target

- 3.80** Starting in 2016, NB Power is required by the Department to submit its annual Greenhouse Gas Management Plan to Government. The intention of this initiative was to ask the Crown agency to document a framework to properly address GHG emissions and identify potential reductions. A guideline document published by the Department requires the plan to include such key elements as:
- GHG reduction targets;
 - GHG reduction strategy;

- Continual improvement; and,
- GHG monitoring and reporting.

3.81 NB Power submitted the plan in November 2016. The plan was assessed and accepted by the Department.

3.82 All industrial facilities in Canada emitting 50,000 tonnes of CO₂ or more per year are required to report on their annual GHG emissions under Environment Canada's GHG Emissions Reporting Program (GHGRP). NB Power continues to monitor and report to Environment Canada on its GHG emissions as required.

3.83 NB Power also publishes its carbon dioxide emissions and intensity rates in its annual report.

3.84 NB Power's emissions data can also be found at the Department's website. The website contains information on large industrial emitters in New Brunswick including NB Power. Currently the website lists the emissions data from 11 large industrial emitters in 2014. The emissions data in 2015 can be found in Exhibit 3.5.

Conclusions

3.85 We have concluded the Province has made progress towards commitments to reduce GHG emissions since it published the first CCAP in 2007.

3.86 The Province has committed to achieving GHG reduction targets since its first CCAP. The short, medium and long term targets are clearly stated in the Province's CCAP. The targets are the same as the reduction levels suggested by the regional initiative NEG/ECP. If all actions are funded and implemented, the Department forecasts the Province is on track to meet its GHG reduction 2020 and 2030 targets, but is uncertain whether the 2050 target can be met or not.

3.87 The current versions of the Province's CCAP listed many important and enhanced action items. It intends to intensify the efforts to combat climate change. However, very few action items have timelines attached. It is not specified how they will be implemented.

3.88 Through an interactive web portal and annually published progress report, the Province reports in a consistent way its progress toward GHG reduction targets.

- 3.89** We have concluded NB Power has made progress towards commitments to reduce GHG emissions.
- 3.90** The Regulation under the *Electricity Act* requires NB Power to achieve by 2020 40% of in-province electricity sales being provided from renewable energy.
- 3.91** The 40% goal is rather for renewable energy than GHG emission reduction. Achieving the target would have the benefit of significantly reducing GHG emissions.
- 3.92** The data shows NB Power's emissions in 2015 are significantly lower than in the baseline years of 2005 and prior. However, we found there is no specific GHG reduction targets set for NB Power to guide the reduction efforts in the future.
- 3.93** The Province's "*regulatory requirement of supplying 40% of in-province sales from renewable sources by 2020*" is included in NB Power's integrated resource planning process "*through a combination of initiatives designed to reduce and shift energy demand, encourage efficiency, foster locally owned, small-scale renewable projects and add new resources to ensure the utility meets its*" targets¹¹. NB Power appears to be on track to meet its renewable energy target by 2020.
- 3.94** Finally, NB Power regularly reports to the public on progress towards its renewable energy target.



Cottage on New Brunswick coastline (Cap-de-Cocagne on Route 530) in 2010 (Photo-Courtesy of Gilles Allain. Source: <http://www.cbc.ca/news/canada/new-brunswick/new-brunswick-coasts-are-at-risk-climate-change-report-says-1.2661881>)

¹¹ Greenhouse Gas Management Plan, NB Power, October 2016

Adaptation

3.95 Our second audit objective was to determine whether the Province of New Brunswick has made progress towards adapting to climate change.

Adaptation criteria

3.96 There were three audit criteria under this objective. We gathered audit evidence to determine whether:

- The Province has a comprehensive and coherent specific risk assessment;
- The Province has a plan for adapting to climate change; and
- The Province has implemented its actions in accordance with the timelines in its plan.

Assessment of risks

3.97 Adapting to climate change may be one of the greatest challenges for communities, governments and corporations in the coming decades.

A risk assessment is the first and very crucial step in developing an adaptation strategy

3.98 The impacts of a changing and more variable climate involve almost every aspect of society and create risks to the social, economic, cultural and environmental fabric of the Province. That is why a risk assessment is the first and very crucial step in developing an adaptation strategy. A brief description of risk management can be found in Appendix I.

3.99 There are certain key steps in conducting a climate change risk assessment:

- Engaging stakeholders (internal and external) throughout the risk assessment process;
- Recording the information / decisions / differences of opinion throughout the entire process;
- Establishing the context / scope of the risk assessment, including objectives, timeframe, clear accountabilities and appropriate resources;
- Identifying the climate change risks (present and future climate scenarios) using best available information;
- Estimating the risk level, which involves looking at the consequence of impacts, and determining their likelihood;
- Assessing the vulnerability of key systems to impacts, which should include a determination of the adaptive capacity of the organization (ie. how they can adapt to impacts) and how sensitive areas are to climate change (this can be based on existing and potential stress);

- Ranking the potential impacts – comparing risks to each other and discussing level of acceptability of risks; and
- Obtaining approval from senior management.

Identification of areas of risk in New Brunswick

3.100 The New Brunswick Climate Change Secretariat has several pieces of information that help identify:

- areas at risk to climate change impacts;
- the development and application of vulnerability assessments for these areas, and
- the creation of climate change adaptation plans identifying measures needed to adapt to the changing conditions and make landowners, homeowners, infrastructures, and whole communities more resilient to climate change impacts.

The Department believes coastal impact is a critical issue for New Brunswick

3.101 An awareness of the problems associated with a changing climate was first identified in the 2002 *Coastal Areas Protection Policy for New Brunswick*. This coastal land use document identified coastal ecosystems such as wetlands, dunes, beaches, etc. that were critical natural assets in need of regulatory protection. This was because they were known to provide protection to landowners, infrastructure, and whole communities from storm surges and severe meteorological events that cause flooding and erosion in coastal areas.

New Brunswick participated in some national and regional initiatives

3.102 In 2006, the Government of Canada published the study “*Impacts of Sea-Level Rise and Climate Change on the Coastal Zone of Southeastern New Brunswick*”. The report identified climate warming, through ocean thermal expansion and melting of ice on the continents, is expected to raise the mean sea level on a global basis over the coming century. This will accelerate historical rates of relative sea-level rise through a combination of earth surface shifting downward and rising sea level in the Northwest Atlantic. Analyses done by the study presented estimates of relative sea-level rise for the coming century (2000-2100) to be in the range of 50-59 centimeters plus or minus 35 centimeters.

3.103 In April 2007, Natural Resources Canada announced a program for the development of Regional Adaptation Collaborative (RAC) to support the advancement of climate change adaptation in six regions across Canada. RAC helped facilitate the integration of climate-related risks and opportunities into planning and decision-making in Canada.

3.104 The Regional Adaptation Collaborative (RAC) in Atlantic Canada is housed in the Atlantic Canada Adaptation Solutions Association (ACASA), a partnership among the governments of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. These jurisdictions are working with the Government of Canada to assist Atlantic Canadians in adapting to climate change. One of the key action items is to identify climate risks and vulnerabilities. Products developed on New Brunswick climate-related issues include:

- case studies on vulnerability assessment;
- technical studies on NB’s projected sea level rise and flooding estimates, coastal flooding and erosion,
- adaptation planning guidebooks and tools;
- website on future climate projections and climate change indicators of New Brunswick;
- economic evaluation of climate change impacts on New Brunswick and Nova Scotia; and
- adapting to climate change via land-use planning in the communities of the Acadian peninsula.

3.105 In 2014, Natural Resources Canada (NRCan) released its updated report “*Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*”. This document spoke to the vulnerabilities and implications for communities, infrastructure, and ecosystems in Canada, and discussed current and future risks and opportunities that climate change presents to Canada.

3.106 According to these NRCan studies, Atlantic Canada will experience more storm events, increased storm intensity, a rising sea level, storm surges, and coastal erosion and flooding. Anticipated higher temperatures and longer growing seasons could benefit agriculture and forestry, but increased storm frequency and water variability pose risks as well.

3.107 Although these above-mentioned regional and national initiatives do not comprise a comprehensive risk assessment, the Climate Change Secretariat has been using the results of that research to guide the province’s adaptation activities. The increased risk of flooding and erosion, both along the coasts and inland, has been one primary focus of research in the Province. According to the Department, vulnerability assessments have been completed in 46 communities in New Brunswick as of December 2016, including many coastal areas and the three biggest cities in the Province. These assessments

Vulnerability assessments have been completed in 46 communities in New Brunswick, however, no provincial comprehensive risk assessment conducted

covered 75% of the population of New Brunswick. However, we found there is no documented comprehensive risk assessment for the Province. Without an over-arching provincial risk assessment, it will be difficult for the Province to consistently:

- Identify key climate risks that have significant impacts;
- Prioritize the risks; and
- Assess the community perception of risks associated with past and current climate variability.

Recommendation 3.108 We recommend the Department develop a provincial climate change risk assessment. The assessment should include:

- Risk identification;
- Risk analysis;
- Risk evaluation;
- Risk treatment and adaptation measures; and
- Implementation plan and monitoring.

***Extreme Weather
Events in New
Brunswick***

3.109 Recent climate related extreme weather events have generated much investigation, planning exercises, tools and guidance development on adapting to new climate realities. These events include:

- Flooding damage and resulting evacuations in Perth-Andover and St. Stephen in 2012 and 2013;
- damages and power outages caused by post-tropical storm Arthur in 2014;
- a freezing rain event in the lower Saint John River valley in December 2013;
- a severe precipitation event of 125 + mm of rain that washed out roads, culverts, and bridges across the Province in September 2015; and
- an ice storm that led to widespread power outages in 2017.



One scene from New Brunswick's ice-coated Acadian Peninsula (Jerome Luc Paulin/Twitter)
Source: CBC News, <http://www.cbc.ca/news/canada/new-brunswick/new-brunswick-weather-brennan-allen-1.3954613>

***New Brunswick
Climate Change
Adaptation Projects***

3.110 A number of climate change adaptation projects funded by the New Brunswick Environmental Trust Fund have been administered by the New Brunswick Climate Change Secretariat. Besides flooding and erosion, research has also been carried out on climate scenarios and climate adaptation tools. The Province is continuing to collaborate with individuals, businesses and communities to better understand climate change risks and opportunities in New Brunswick, and how to manage them.

3.111 Other adaptation efforts facilitated by the Climate Change Secretariat include:

- Development of adaptation guidebooks for NB communities;
- the updated sea-level rise flooding estimates for New Brunswick coastal sections- based on IPCC 5th Assessment Report;
- Flood risk scenarios mapping for Acadian Peninsula communities, mapping of coastal erosion rates on the provincial GeoNB map viewer site;
- Production of erosion data and projections of the coastal shoreline evolution in the greater Tracadie area; and
- The enactment of a sea level rise regulation for all new development by the Regional Service Commission aimed at protecting new infrastructure from flooding by requiring the habitable area of any new construction be located at an elevation above projected sea levels in 2100.

3.112 The New Brunswick Legislature’s Select Committee on Climate Change Report, tabled in November 2016, proposed 85 recommendations to government in dealing with climate change issues. The majority of these recommendations have been adopted by the Province as part of its new CCAP.

3.113 The new CCAP identified six areas to focus its adaptation efforts on:

- *Understand climate change impacts;*
- *Build climate resilient infrastructure;*
- *Support community adaptation planning;*
- *Adapt natural resources and agriculture;*
- *Reduce climate-related hazards; and*
- *Reduce climate change impacts on public health.*

Most of the actions do not have timelines attached to them, making it difficult for the public to assess the progress made by the government and other participants

3.114 The adaptation plan is fairly comprehensive. It outlines many clear and important actions to be taken. It also recognizes the needs for cooperation and collaboration with municipalities, infrastructure owners (e.g., Department of Transportation and Infrastructure, NB Power, Bell Aliant etc.). However, what is lacking in the plan is the detail of how the targets will be achieved. Most of the actions do not have timelines attached to them, making it difficult for the public to assess the progress made by the government and other participants. The recommendation in paragraph 3.63 already addressed this issue.

NB Power climate change adaptation projects

3.115 NB Power has chaired the Climate Change Adaptation Working Group of Canadian Electricity Association (CEA) to develop CEA's *Climate Change Adaptation Management Planning Guide*. This document has been used by many utility companies in Canada to develop their adaptation strategy. Following the recommended adaptation process, NB Power drafted its first Climate Change Management Strategy in February 2015. The strategy identified six key elements for managing the effects of climate change on NB Power activities:

1. *improving our understanding of climate change (Research/Understanding);*
2. *continuing emission reduction strategies (mitigation against the causes of climate change), consistent with legislative and policy mandates (Mitigation through Emission Reduction);*
3. *defining a credible scenario for future conditions (Scenario Definition);*
4. *assessing the vulnerability of existing facilities and business strategies to the future conditions (Vulnerability Assessment);*
5. *identifying and selecting options for managing the impacts on existing facilities (Adaptation Options); and*
6. *incorporating climate change considerations into long term decision making (Decision Making).*

3.116 In 2015, NB Power engaged an environmental consulting firm to study the future climate scenarios. This study presented the projected change for a number of climate indices that will be used by NB Power in planning required changes in the company's operations. NB Power developed a high level vulnerability assessment framework after this study. It identified five priorities:

- *Extreme Precipitation Events;*
- *Changes to Spatial and Temporal Availability of Water;*
- *Vegetation Management;*
- *Rising Sea Level; and*
- *Lightning*

3.117 Individual projects, studies and initiatives related to vulnerability assessment and adaptation have been conducted. For example:

- A sea level rise assessment for Point Lepreau Generation Station;
- A water availability study for Mactaquac;
- A climate change adaptation options in Atlantic Canada - Chignecto Isthmus Case study;
- A preliminary discussion with University of Quebec on collaboration of freezing rain study; and
- A project piloting the use of **LiDAR** (see Appendix I for definition) technology and growth models to identify where trees have the potential to come into contact with power lines.

3.118 It is unclear, though, when NB Power will conduct a broad corporate level **vulnerability assessment**. Without such a vulnerability assessment, it will be difficult for NB Power to prioritize its adaptation efforts and analyze its adaptation options.

3.119 In fact, NB Power has not identified potential adaptation options taking into account costs and benefits, risks, and implications on the rates.

- Recommendations**
- 3.120** We recommend NB Power conduct a corporate level climate change vulnerability assessment.
- 3.121** We recommend NB Power develop an implementation plan for adapting to climate change after the completion of its vulnerability assessment.
- Conclusions**
- 3.122** We have concluded the Province has made some progress towards adapting to climate change, although many significant actions related to adaptation are still in their very early stage.
- 3.123** The New Brunswick Climate Change Secretariat has been working on identifying areas at risk to climate change impacts, the development and application of vulnerability assessments for these areas, and the creation of climate change adaptation plans. However, we found there is no documented province-wide comprehensive risk assessment.
- 3.124** The adaptation plan included in the CCAP is fairly comprehensive. It outlines many clear and important actions to be taken. It also recognizes the needs for cooperation and collaboration with municipalities, infrastructure owners (e.g., Department of Transportation and Infrastructure, NB Power, Bell Aliant etc.). However, what is lacking in the plan is the detail of how the actions will be achieved. Most of the actions did not have timelines attached to them.
- 3.125** We have concluded NB Power has made progress towards adapting to climate change.
- 3.126** NB Power drafted its first Climate Change Management Strategy in February 2015. The strategy identified six key elements for managing the effects of climate change on NB Power activities. Individual projects, studies and initiatives related to vulnerability assessment and adaptation have been conducted throughout the years.
- 3.127** It is unclear though when NB Power will conduct a broad corporate level vulnerability assessment. Without a vulnerability assessment, it will be difficult for NB Power to prioritize its adaptation efforts and analyze its adaptation options.
- Coordination**
- 3.128** Our third audit objective was to determine if the Province of New Brunswick has established effective internal governance and coordination arrangements to achieve GHG emissions reduction targets and adapt to climate change.

- 3.129** There were two audit criteria under this objective:
- Roles and responsibilities to implement greenhouse gas emissions mitigation strategies and climate change adaptation strategies should be clearly assigned to accountable entities; and
 - Mitigation and adaptation efforts should be coordinated across government departments and Crown agencies.
- 3.130** One of the key roles of the Climate Change Secretariat is coordination. A new tracking tool called CCAP Progress Tracking System was created by the Climate Change Secretariat to track all the efforts by each department and agency in implementing the four goals found in New Brunswick's CCAP (2014-2020):
- *Enhanced Resilience to the Impacts of Climate Change;*
 - *Reduced Greenhouse Gas Emissions with Sustained Economic Growth;*
 - *Demonstrated Leadership by the Provincial Government; and*
 - *Measured and Reported Progress.*
- 3.131** Currently there are 20 projects in the system. Eight were completed, 10 are on track and two are proposed. It clearly shows the department responsible, the status of the project (proposed, on track, or completed), and key action of the project. This makes it easier for the Secretariat to coordinate the projects across the government. A status report generated by the system can be found in Appendix II.
- 3.132** This tool simplifies the way the data is gathered internally. It also serves as a useful method for individuals and departments to track and monitor their own climate change activities.
- 3.133** We found the projects tracked in this system were still categorized using the four goals listed in the previous version of the CCAP. The system has not been updated to reflect the goals in the recent December 2016 CCAP.

Recommendation 3.134 We recommend the Department update the CCAP Progress Tracking System to reflect the changes in the most current Climate Change Action Plan.

3.135 The new CCAP lists a few action items that, if implemented, would result in stronger leadership from the government and better coordination across government entities:

- Climate change Cabinet Committee chaired by the Premier to oversee the implementation of the action plan;
- Climate change included in the mandate letter to all Ministers; and
- Enhance the Climate Change Secretariat to coordinate, measure and report on climate change.

Coordination between departments and agencies

3.136 The Climate Change Interdepartmental Committee (CCIC) was established in 2001. The overall objective of CCIC is to successfully complete activities which increase New Brunswick's GHG reductions and resilience to climate change. The CCIC is comprised of all key departments and agencies with a responsibility for acting on climate change. The Committee's intention was to work collaboratively to achieve the targets, goals and actions consistent with the CCAP.

3.137 The CCIC is chaired, coordinated and administered by the Climate Change Secretariat. According to its terms of reference, the CCIC meets biannually. We found the committee had been relatively inactive, but activities increased in 2016. Meanwhile, there have been many bilateral meetings between the Climate Change Secretariat and departments and agencies to discuss and coordinate climate change activities.

Coordination between departments and NB Power

3.138 Coordination between the government and NB Power at various levels is evident. NB Power is also part of the CCIC. Besides participating in the regular committee meetings, NB Power has had many b-lateral meetings with the Climate Change Secretariat to discuss issues particular to NB Power.

3.139 NB Power has been evaluating the impacts of all the key actions proposed in the new provincial CCAP that are related to NB Power such as carbon pricing and the planned phase out of coal by 2030. There is active communication between the government and NB Power to ensure both parties are well informed.

3.140 NB Power is working co-operatively with the Climate Change Secretariat to develop relevant scenarios for use across New Brunswick such as those related to sea-level rise. The NB

government and NB Power also purchase weather data needed to plan adaptation activities such as projection of temperature and precipitation level in future years. They share the data and the costs.

Conclusion

3.141 We have concluded the Province of New Brunswick has made efforts to establish internal governance and coordination arrangements to achieve GHG emissions reduction targets and adapt to climate change. Some of the action items proposed in the new CCAP, if implemented, would result in greater coordination across government entities.



Aerial images of the Saint John River basin on Thursday, May 1, 2008.

Source: <http://www1.gnb.ca/cnb/multimedia/display-e.asp?ID=1465&num=2>

Appendix I – Glossary

Climate Change

In the United Nation’s Framework Convention on Climate Change (UNFCCC), Article 1, Climate Change is defined as:

“...a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”

From the federal government (climatechange.gc.ca):

“Climate change is a long-term shift in weather conditions identified by changes in temperature, precipitation, winds, and other indicators. Climate change can involve both changes in average conditions and changes in variability, including, for example, extreme events.”

Greenhouse Gas

From the Glossary of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change:

“Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth’s surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and ozone (O₃) are the primary greenhouse gases in the Earth’s atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO₂, N₂O and CH₄, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).”

Mitigation

From the Glossary of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change:

“A human intervention to reduce the sources or enhance the sinks of greenhouse gases.”

Adaptation

From Natural Resources Canada:

“Adaptation to climate change is any activity that reduces the negative impacts of climate change and/or takes advantage of new opportunities that may be presented. Adaptation includes activities that are taken before impacts are observed (anticipatory) and after impacts have been felt (reactive). Both anticipatory and

reactive adaptation can be planned (i.e. the result of deliberate policy decisions), and reactive adaptation can also occur spontaneously.”

Renewable/Non-emitting/Clean Energy

Renewable energy can be defined by the International Energy Agency as:

“Energy derived from natural processes (e.g. sunlight and wind) that are replenished at a faster rate than they are consumed. Solar, wind, geothermal, hydro, and some forms of biomass are common sources of renewable energy.”

Biomass is an emitting energy source, but it is still renewable as the carbon emitted is simply being returned to the atmosphere.

A definition of Clean Energy is more difficult to pin down, as “Clean” could mean different things to different actors. For instance, the BC government considers natural gas as a type of “Clean Energy,” while there is increasing concern that a surge in renewable energy will deplete the decidedly non-renewable supply of some rare earth elements. The Draft audit on Clean Technology by OAG Canada provides the following definition (which could change prior to publication):

“Clean energy technologies include technologies that bring about production, transmission, distribution and use of energy with low or no greenhouse gas and other air emissions. Examples of such technologies include

- solar photovoltaics, a technology that uses solar cells to convert sunlight into electricity without producing greenhouse gas emissions;
- wind turbines, a non-emitting technology that uses turbines with large propellers to capture wind energy and produce electricity;
- tidal turbines, a non-emitting technology that uses turbines in the ocean to capture the energy from ocean tides and produce electricity; and
- fuel cells, which use the chemical energy of hydrogen or another fuel to create electricity with zero emissions”.

Clean energy technologies also include innovations that reduce energy use, improve environmental performance, or support other low- or non-emitting energy technologies. For example, smart grids use information technologies to monitor, control, and optimize the usage of the electricity system. These technologies are designed to increase efficiency, reduce outages, and integrate more renewable electricity.

Long-range Energy Alternatives Planning (LEAP) Model

The LEAP model is an energy analysis and estimation model and has been used internationally including Canada, the United States, throughout Europe, and in many developing countries for climate change action planning. It is an integrated model that includes analysis of both energy demand and energy supply. Being a “bottom-up” model, it can be used to understand the unique details of New Brunswick’s

economy and society that contribute to emissions and which are attributed to the province. While LEAP is a model whose structure and formulations are geared largely to energy end use, it can be used to examine and project emissions in non-energy sectors, such as from agricultural production, waste disposal, and industrial processes.

More specifically, LEAP considers the details of each economic sector in terms of: (i) activities that lead to energy consumption; (ii) direct emissions, such as with agricultural production and waste; (iii) technical details of the energy end-use technologies used; and (iv) energy supply mix. Ultimately, the trend in GHG emissions is a function of changes in activity, energy efficiency, and the fuel mix used to provide energy services.

Risk Management

Risk management is a process for selecting the best course of action in uncertain situations involving risk. It does this by helping to identify, understand, analyze and treat risks and to communicate to others about them.

Risk management offers a practical and credible approach in the face of uncertainties for prioritizing complex risk issues and for selecting optimal risk reduction strategies in order to achieve acceptable levels of remaining risk. It also provides a means for balancing a range of considerations, for using predictive information and for dealing with uncertainties.

Vulnerability Assessment

Canadian Electricity Association provides an assessment of climate change risks and opportunities for Canada's electricity sector from three perspectives:

- A. An inventory of significant risks and opportunities for the electricity sector in Canada arising from climate change impacts, which is grouped into three areas: electricity demand; electricity generation; and electricity transmission, distribution and infrastructure;
- B. A discussion of high impact weather events over the last decade and their impacts, in order to highlight the importance of building a system that is as resilient as possible; and
- C. An examination of the increasing likelihood of high impact scenarios, and the need for the electricity sector to incorporate the risk of high impact, low frequency events in investment planning and operations management.

LiDAR

LiDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

Appendix II – Status Report Generated from CCAP Progress Tracking System on May 2, 2017

Generate Report

Status Report
 Planning Report
 GHG Report
 Financial Report

Action Plans

Goals

Key Actions

Categories

Note: To Filter: Click to select any of the above options to filter the report results. Leave blank to select all. Hold Ctrl on your keyboard and click to unselect options. To Print: Right-click on the report (outside of the graph images) and click "Print Preview".

Status Report

Activity Statuses

Activities are organized by CCAP Goals, Key Action Areas, and Key Actions. The activity name, lead department, ID number, and status are provided.

GOAL 1: ENHANCED RESILIENCE TO THE IMPACTS OF CLIMATE CHANGE					
Activity ID	Key Action Area	Key Action	Lead Department/Agency	Activity Name	Activity Status
99	Data collection and Research into Climate Change Impacts	Establish research priorities and greater collaboration between academics and jurisdictions	Environment and Local Government	test	Proposed
81	Risk and Opportunity Assessments	Evaluate and Address Resilience of Provincial Infrastructure	Transportation and Infrastructure	AM – Adaptation Strategies	On Track
92	Risk and Opportunity Assessments	Evaluate and Address Resilience of Provincial Infrastructure	Transportation and Infrastructure	Chignecto Isthmus Project	Proposed
73	Mainstreaming Adaptation	Foster Collaboration Amongst Government Departments on Climate Change	Health	Heat Alert Response System	Completed
82	Mainstreaming Adaptation	Integrate Climate Change Considerations into Infrastructure management	Environment and Local Government	Improvement of the Balmoral Storm Sewer System	On Track

GOAL 2: REDUCED GREENHOUSE GAS EMISSIONS WITH SUSTAINED ECONOMIC GROWTH					
Activity ID	Key Action Area	Key Action	Lead Department/Agency	Activity Name	Activity Status
91	Renewable and Low Emissions Energy	Encourage Local Renewable Energy Projects	Natural Resources	LORESS Program	On Track
90	Reduced Industrial Emissions	Develop and Implement GHG Management Planning for Industry	Environment and Local Government	Development of GHG Management Plan Guidelines for Industry	Completed
80	Reduced Industrial Emissions	Develop and Implement GHG Management Planning for Industry	Transportation and Infrastructure	Warm Mix Asphalt (WMA)	On Track
77	Reduced Emissions from Other Sectors	Support Sustainable Farming Practices	Agriculture, Aquaculture and Fisheries	Agroenvironmental Clubs	On Track

GOAL 3: DEMONSTRATED LEADERSHIP BY THE PROVINCIAL GOVERNMENT					
Activity ID	Key Action Area	Key Action	Lead Department/Agency	Activity Name	Activity Status
98	Public Buildings	Conduct Energy Audits to Further Reduce GHG Emissions	Tourism, Heritage and Culture	Mount Carleton Provincial Park - Campground solar array	Completed
97	Public Buildings	Conduct Energy Audits to Further Reduce GHG Emissions	Tourism, Heritage and Culture	Provincial Parks - Campground solar hot water	Completed
96	Public Buildings	Conduct Energy Audits to Further Reduce GHG Emissions	Tourism, Heritage and Culture	Mactaquac Provincial Park – Lighting Waste Walk	Completed
96	Public Buildings	Conduct Energy Audits to Further Reduce GHG Emissions	Tourism, Heritage and Culture	Mactaquac Provincial Parks – PowerShift Atlantic	Completed
79	Public Buildings	Conduct Energy Audits to Further Reduce GHG Emissions	Transportation and Infrastructure	Energy Retrofitting and Renewable Energy	On Track
93	Vehicle Fleet and Employee Travel	Explore Alternative Fuels and Fuel Efficiency in Provincial Fleets	Transportation and Infrastructure	Fleetcarma -Electric Vehicle Feasibility Project	Completed
94	Vehicle Fleet and Employee Travel	Promote Minimized and Efficient Travel by Public Servants	Transportation and Infrastructure	Assess current GPS technology in government fleet for potential expansion	On Track
86	Inter-jurisdictional Partnerships	Contribute Actively to the Implementation of Climate-Related Action Plans	Environment and Local Government	NEG-ECP Resolution 39-1: Establishing a 2030 Regional Target	On Track

GOAL 4: MEASURED AND REPORTED PROGRESS					
Activity ID	Key Action Area	Key Action	Lead Department/Agency	Activity Name	Activity Status
87	Government Energy Use and Emissions Inventory	Use LEAP to Ensure Accountability with GHG Reduction Targets	Environment and Local Government	Long Range Energy Alternative Planning (LEAP) Model	On Track
88	Reporting Progress	Continue to Release Annual Progress Reports	Environment and Local Government	CCAP Progress Tracking System	Completed
89	Reporting Progress	Continue to Release Annual Progress Reports	Environment and Local	Climate Change Annual Progress	On Track

Source: CCAP Progress Tracking System, the Department of Environment and Local Government