Responding to Climate Change in Newfoundland and Labrador

Public Discussion Document

Office of Climate Change, Energy Efficiency and Emissions Trading
P.O. Box 8700
St. John’s, NL A1B 4J6
LETTER FROM THE PREMIER

Our government believes that Newfoundland and Labrador can be a global leader in how to respond to climate change. We understand that climate change is not just an environmental issue. It is equally an economic and social issue that can impact the province and its people, and can also present opportunities for clean energy development, job growth and the application of innovative technologies.

The centerpiece of the global response to climate change must be reducing greenhouse gas emissions. Newfoundland and Labrador’s energy warehouse has vast clean energy resources that can substantially reduce greenhouse gas emissions in this province and elsewhere. From existing clean energy exports, the 3000 megawatt Lower Churchill project and our vast wind resource to the innovative wind-hydrogen-diesel project in Ramea, we have the resources and technical abilities to support a low carbon global economy.

As a large coastal province, we must also prepare for the impacts of climate change such as adverse weather events, sea level rise and coastal erosion. Our province is well positioned to adapt to climate change with globally recognized expertise in oceans and environmental technologies and world-class climate change experts at our academic institutions.

As a government, we are committed to respond to climate change and ensure that the province is a model of economic and environmental sustainability. We have already taken important steps under our 2005 Climate Change Action Plan and 2007 Energy Plan. Indeed, a stated goal of our government is to use our non-renewable resource revenues to fund a clean, renewable energy future.

Through our new and updated strategies, we will build on our approach and capitalize on the opportunities it presents. I encourage you to study this document and directly engage government to inform our future directions.

Honourable
Danny Williams, Q.C.
Premier of Newfoundland and Labrador
MINISTERIAL FOREWORD

Our government believes that climate change is one of the greatest long-term challenges facing the planet, and one that presents both opportunities and potential impacts for jurisdictions such as Newfoundland and Labrador.

There is strong and indisputable evidence that climate change is happening and is mainly caused by human activity. If left unchecked, climate change could result in sea level rise and coastal erosion, more intense weather systems and storm surges, and increased frequency of floods. These impacts can affect wildlife, the marine environment, communities and our economies.

Our government has already taken steps to play its part in meeting this challenge. We released the province’s first-ever Climate Change Action Plan in 2005, committed to developing the province’s clean, renewable energy resources in the 2007 Energy Plan, and collaborated extensively with other provinces, territories and U.S. states on initiatives to address climate change, such as the Atlantic Adaptation Strategy, released in 2008. The Province is also supporting important climate change initiatives through the $25 million Green Fund, which is leading to greenhouse gas (GHG) reductions in many sectors across the province.

The Government of Newfoundland and Labrador wants to go further to meet its commitments and is releasing this discussion document to inform the development of the province’s updated Climate Change Plan, a Greenhouse Gas Strategy for the Energy-Intensive Sector and an Energy Efficiency Strategy. This discussion document seeks your input into the actions that this province should take to reduce emissions, promote energy efficiency and adapt to unavoidable impacts and I invite you to contribute to this important debate.

Honourable
Charlene Johnson
Minister of Environment and Conservation
MINISTERIAL FOREWORD

Newfoundland and Labrador is well positioned to support Canada, the United States and the international community in their efforts to address climate change. Newfoundland and Labrador is an energy warehouse that can help the province and other jurisdictions grow their economies and reduce greenhouse gas emissions.

Through our Energy Plan, *Focusing our Energy*, our government is pursuing the development of our clean and renewable energy resources. The Lower Churchill project alone can produce 3000 megawatts of clean and renewable energy – enough clean energy to reduce greenhouse gas emissions by 16 million tonnes if it were used to replace coal-fired electricity generation. When you further consider the vast potential for wind and other renewable energy sources in the province, our ability to reduce greenhouse gases in our province and elsewhere is quite significant.

The Government of Newfoundland and Labrador is also committed to strengthening energy conservation and efficiency efforts in this province. Energy conservation and efficiency can generate multiple benefits, namely, reducing costs for households and businesses, enhancing energy security, and reducing greenhouse gas emissions. Using energy efficiency as one means to reduce greenhouse gas emissions is consistent with the province’s commitment in the Energy Plan to take actions that are both environmentally progressive and economically prudent.

This discussion paper is designed to stimulate your thoughts on how we can best move forward in our efforts on climate change and energy conservation and efficiency. I encourage you to become involved and to share your expertise and comments with us.

**Honourable**

**Kathy Dunderdale**

Minister of Natural Resources
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INTRODUCTION

The Government of Newfoundland and Labrador recognizes the seriousness of climate change and has implemented many initiatives to respond. Through strategies such as the 2005 Climate Change Action Plan and 2007 Energy Plan, the Provincial Government has implemented measures from clean energy development and energy efficiency programming to adaptation measures. The province has also worked collaboratively with the federal government and other jurisdictions through the Council of the Federation and the Conference of New England Governors and Eastern Canadian Premiers, recognizing the need for joint action to address this global challenge.

The Provincial Government has adopted a balanced approach in working to sustain strong economic growth while responding to climate change. Few jurisdictions in North America can match Newfoundland and Labrador’s energy warehouse of oil, gas, hydro, wind and other energy sources. Newfoundland and Labrador is, for example, the second largest producer of conventional light crude oil in Canada, accounting for approximately 34 per cent of total Canadian production in 2009, and has the capacity to produce more than 6000 mega watts of hydro electricity. Through the Energy Plan, the Provincial Government committed to utilize revenues from non-renewable energy resources to contribute to clean and renewable energy development. Opportunities like the 3000 MW Lower Churchill hydroelectric project and vast wind energy resources are unrivalled in North America, and can enable the province to be a global leader in responding to climate change. These opportunities can also help other jurisdictions like the Atlantic provinces reduce their greenhouse gas (GHG) emissions and grow their economies with clean energy.

The Provincial Government also recognizes that responding to climate change in Newfoundland and Labrador is a shared challenge. Government policies and programs must be complemented by actions by individuals, communities and businesses to fully respond to climate change. For this reason, many initiatives to date have focused on promoting individual and industry actions to reduce GHG emissions and use energy more wisely, raising awareness of climate change impacts, strengthening community capacity to adapt to climate change, developing the province’s research base and fostering partnerships with community groups. The Provincial Government recognizes that more needs to be done.

Building on actions already underway and the opportunities that climate change presents for Newfoundland and Labrador, the Provincial Government has committed to advance the province’s efforts by:
1. Preparing an update to the 2005 Climate Change Action Plan, to build on existing initiatives to prepare for and adapt to climate change and reduce greenhouse gas emissions;

2. Developing a Greenhouse Gas Strategy for the Energy-Intensive Sector, which includes large industrial companies operating in the province; and

3. Developing an Energy Efficiency Strategy, to help individuals and businesses reduce energy use in the province.

In 2009, the Government of Newfoundland and Labrador established the new Office of Climate Change, Energy Efficiency and Emissions Trading, located in Executive Council and reporting to the Premier, to act as lead within the Provincial Government for strategy and policy development on climate change, energy efficiency and emissions trading. It was established to enhance the Provincial Government’s capacity and to demonstrate the province’s commitment to action in this growing and important area. This new office will lead the development of these strategies in consultation with other key departments such as Natural Resources and Environment and Conservation, which continue to implement important programs to respond to this challenge. The development of these strategies is the focus of this public discussion document.

1. Update to the Climate Change Action Plan

Since the 2005 plan was released, the science on climate change and debate on appropriate policy responses has evolved considerably. In 2007, the Intergovernmental Panel on Climate Change (IPCC), the world’s authoritative voice on climate change, concluded that climate change is happening and the need to adapt and reduce greenhouse gas emissions is urgent.

As jurisdictions around the world have worked to reduce greenhouse gas emissions, various policy responses have evolved such as emissions trading (‘cap-and-trade’) schemes in the northeast United States; carbon taxation in British Columbia and Quebec; and clean fuel standards in California, with Canadian regulations under development. Further, the Canadian and United States federal governments are working to complete their comprehensive plans to address climate change, and governments are working through the United Nations on a new international climate change agreement.

Building on existing efforts and recognizing the evolving national and international landscape, the update to the Climate Change Action Plan will set the Provincial Government’s future course on continuing to respond to climate change.

Approximately half of the province’s greenhouse gas emissions come from the energy-intensive sector, which includes offshore oil and gas, mining, newsprint, oil refining and electricity generation. As a result, in the Energy Plan, the Government of Newfoundland and Labrador committed to develop a dedicated strategy to deal with emissions in these industries.

There is a possibility that companies in this sector could be subject to federal regulations to reduce greenhouse gas emissions when they are finalized. The Provincial Government is closely monitoring developments in Canada and the United States to better understand the potential implications for this province. Direction taken at the national level will help inform this strategy at the provincial level.

The Government of Newfoundland and Labrador recognizes that these companies compete in international markets and are major employers and contributors to the provincial economy. Accordingly, and as stated clearly in the Energy Plan, actions to reduce greenhouse gas emissions must be environmentally progressive and economically prudent.

3. Energy Efficiency Strategy

Energy efficiency efforts can be a cost-effective way to reduce greenhouse gas emissions and lower costs for households and businesses. In Newfoundland and Labrador, many initiatives have commenced to improve the province’s performance in this area. Examples include Newfoundland and Labrador Hydro and Newfoundland Power’s Take Charge program and the Provincial Government’s Newfoundland and Labrador EnerGuide for Houses Program and Residential Energy Efficiency Program. These programs offer incentives and grants for homeowners to improve the energy efficiency of their homes and reduce their heating costs. The Energy Efficiency Strategy will build on efforts already under way and explore other opportunities to reduce energy use in the province.

Public Feedback Requested

The Government of Newfoundland and Labrador is releasing this document to provide relevant background information, highlight key actions taken to date, and stimulate discussion on the actions that should be taken in future strategies.
The document is divided into four parts, and each is concluded with a set of questions that may help guide your feedback. These questions are also compiled in Appendix A.

- **Part 1** lays out the Government of Newfoundland and Labrador’s strategic objectives that will guide the overall development of the three strategies;

- **Part 2** defines the challenges presented by climate change, and provides important contextual information on the latest science, national and international policy developments and the Provincial Government’s existing strategy framework;

- **Part 3** addresses the impacts of climate change in the province, common approaches to adaptation and actions already taken by the Provincial Government;

- **Part 4** focuses on greenhouse gas emissions and discusses the key ways to reduce them such as energy efficiency efforts and switching to clean energy resources such as hydroelectricity.

We encourage you to participate in this discussion and submit your questions, concerns or comments directly to us by July 31, 2010.

Submissions can be made online at: www.gov.nl.ca/exec/ceeeet

Alternatively, comments or questions can be submitted directly to:

Office of Climate Change, Energy Efficiency and Emissions Trading
Executive Council, Government of Newfoundland and Labrador
P.O. Box 8700, St. John’s, NL A1B 4J6

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PART 1: STRATEGIC OBJECTIVES


These are not stand-alone initiatives that can be developed or implemented independently. The causes and potential impacts of climate change, the way we use energy in our homes and businesses, and the sources of greenhouse gas emissions in our economies must be considered together. For this reason, the Provincial Government made a strategic decision to consult the public on all of these strategies under this single discussion document.

These strategies will build on existing initiatives. The Government of Newfoundland and Labrador has implemented many initiatives through the 2005 Climate Change Action Plan and 2007 Energy Plan but further analysis and public feedback is required on what more needs to be done.

The following overarching objectives are intended to guide strategy development:

• To establish credible emissions reduction targets and mechanisms to achieve those targets.

• To consider how to place a value on greenhouse gas emissions so businesses and individuals have a financial incentive to consider the climate change impact of their activities.

• To identify and maximize economic opportunities arising from climate change, including clean energy development, innovation and technology advancement.

• To encourage and facilitate businesses, consumers and other users to enhance and maximize energy conservation and efficiency.

• To establish mechanisms to comprehensively address adaptation issues arising from climate change.

• To build public awareness and raise the level of public knowledge about climate change and the role that individuals and organizations can play in tackling it.

1.1 Strategic Objectives - Suggested Question to Consider

• Has the Provincial Government captured the right strategic objectives to guide strategy development?
Newfoundland and Labrador’s response to climate change will be influenced by the latest scientific findings and the actions of other governments. The second part of this public discussion document is intended to explore the latest science, the international context and the Provincial Government’s existing strategy framework. Later parts will explore more detailed potential actions.

2.1 What Is Climate Change?

Climate is generally defined as the average weather that a location experiences, from daily and seasonal temperatures to wind patterns and precipitation. Communities, regions and countries can experience different climates - differences which can be caused by factors ranging from geography and ocean currents to the direction of prevailing winds.

The ongoing discussions about climate change are focused much less on natural trends, but on changes that are very likely caused by human activity, such as the combustion of fossil fuels which releases significant volumes of GHG emissions. These emissions can trap heat and warm the planet in a process referred to as the greenhouse effect.

Box 1: The Greenhouse Effect

Life on Earth is sustained by naturally occurring gases in the Earth’s atmosphere which allow the sun’s rays to pass through the atmosphere to warm the Earth and then trap the warmth to prevent it escaping out into space. This is known as the natural greenhouse effect and, without it, the planet would be too cold to support many of the life forms we know. However, since the industrial revolution, human activities have rapidly increased the amount of GHGs emitted into the atmosphere.

These GHGs have thickened the blanket of gases surrounding the Earth, making it more difficult for the heat reflected off the Earth’s surface to escape into space. This has caused the Earth’s average surface temperature on land and in the sea to rise.
The three most notable GHGs, carbon dioxide, methane and nitrous oxide, have risen by 32 per cent, 150 per cent and 20 per cent respectively since the industrial revolution. Carbon dioxide is the main contributor to climate change and is mostly released through the combustion of fossil fuels, while methane is produced naturally when vegetation decays without the presence of oxygen. Methane is a very potent GHG and is 21 times more powerful than carbon dioxide in its warming potential.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) – the world’s authoritative voice on climate change – concluded that the Earth’s climate is warming and that human activities are by far the most likely cause. The IPCC also found that the impacts of warming are now evident in many of the Earth’s natural systems, both physical (e.g. melting glaciers and rising sea levels) and biological (e.g. shift in plant and animal ranges). For the first time, scientists were able to attribute many of these changes directly to human actions. The IPCC concluded that the amount of future warming will be strongly dependent on future global emission levels, but estimated that temperatures will most likely rise between 1.8°C and 4°C by the end of the century.
2.2 International and National Developments

Climate change is a global issue and countries around the world are currently working to address this challenge. Various collaborative approaches and policy responses are being debated around the world and these could influence actions taken in Newfoundland and Labrador.

International

The United Nations Framework Convention on Climate Change (UNFCCC) sets the overall global framework for international efforts to tackle climate change. To date, 192 countries have ratified the Convention, including Canada and the United States (US). The ultimate objective of the Convention is to stabilize GHG concentrations in the atmosphere to prevent dangerous human interference with the climate. The Kyoto Protocol was negotiated in 1997 under the UNFCCC, and it is the first legally binding international agreement to set GHG reduction targets for developing countries. Canada ratified the agreement, but the United States did not.

Negotiations are currently taking place on a new international agreement, as the current commitments under the Kyoto Protocol expire in 2012. In December 2009, the United Nations climate change negotiations in Copenhagen, Denmark concluded with the Copenhagen Accord. The Copenhagen Accord is not a legally binding agreement, but rather a political document that includes high-level commitments. Negotiations on next steps are continuing.

Canada

The federal government proposed its climate change plan, Turning the Corner, in 2007. The most significant component was to be the introduction of an emissions trading scheme to reduce emissions from the industrial sector, with additional reductions to come from the electricity sector through separate initiatives. The plan was expected to cover sectors such as oil and gas, pulp and paper, iron and steel, smelting and refining. The firms in these sectors were going to be required to reduce their emissions intensity by 18 per cent from 2006 levels by 2010, with a 2 per cent continuous improvement every year thereafter to 2020. Emissions intensity refers to emissions per unit of economic activity – at a national level this could be GHG emissions per billion dollars of Gross Domestic Product (GDP); at a company level it could be emissions per unit of production.

The plan was expected to come into force in 2010, but it was delayed following the election of U.S. President Barack Obama in November 2008 as the federal government wanted clarity on the new administration’s policy on climate change before proceeding. The
federal government has since stated that it intends to follow the lead of the US in its approach to climate change, to ensure the countries’ close trading relationship is not affected. The US Congress is currently considering a number of proposed plans but it is unclear when legislation will be finalized.

While an overall plan has not been finalized, the federal government has recently harmonized its strengthened vehicle efficiency standards with the US, beginning with the 2011 model year. It is estimated that by 2016, average new vehicle GHG emissions will be 25 per cent lower than in 2008. The improvements are expected to reduce GHG emissions in Canada by 92 million tonnes from 2011-2016.

The federal government has also recently indicated to the electricity industry that it may introduce regulations to phase out coal-fired generating stations as they reach their end of the commercial life. This is intended to meet the federal goal of having 90 per cent of electricity in Canada generated from cleaner energy sources such as renewable energy and natural gas by 2020. The federal government has not outlined its policy approach for oil-fired generating stations such as Holyrood.

2.3 Newfoundland and Labrador’s Current Strategy Framework

The province has released or partnered on a number of complementary strategies to respond to climate change. In 2001, the Government of Newfoundland and Labrador was party to the Conference of New England Governors and Eastern Canadian Premiers (NEG-ECP) Climate Change Action Plan. Under the Plan, Premiers and Governors agreed to regional GHG reduction targets and an action plan to achieve them. Premiers and Governors agreed to reduce regional GHGs to 1990 levels by 2010; 10 per cent below 1990 emissions by 2020; and 75-85 per cent below 2001 levels by 2050.

In 2005, the Provincial Government published the province’s first-ever Climate Change Action Plan. It contained 40 commitments to reduce GHG emissions, adapt to climate change, raise public awareness, enhance research and development, and build partnerships with key stakeholders such as municipalities. Some key initiatives include the province’s hosting of the first conference in Canada on climate change and health care issues, energy efficiency measures for the fisheries sector and households, collaboration with climate change experts at Memorial University on impacts of climate change, anti-idling programs around public buildings, risk assessments with coastal communities and information sessions on climate change with the general public and Provincial Government employees.
In 2007, the Government of Newfoundland and Labrador released its comprehensive Energy Plan, *Focusing Our Energy*. In this plan, the Provincial Government outlined its approach to develop the province’s energy warehouse, which includes significant clean and renewable energy potential. As part of that plan, the Provincial Government committed to build on its approach to responding to climate change by updating its Climate Change Action Plan, developing an Energy Efficiency strategy and developing a GHG strategy for the Energy-Intensive sector. The update to the Climate Change Action Plan is to contain specific provincial targets and commitments.

Further information on specific actions taken by the Provincial Government, including clean and renewable energy development, climate change adaptation measures, energy efficiency programs, and addressing non-energy related GHG emissions (such as from waste management), are discussed in parts 3 and 4 of this document.

### 2.4 Strategy Development Context – Suggested Questions to Consider

- To what extent should the province’s GHG reduction targets be informed by the latest science on climate change?

- What is the appropriate role for each of the following groups to tackle climate change and promote energy efficiency - individuals, communities, businesses and the federal and provincial governments?

- How can the province continue to respond to climate change while not constraining economic growth?

- Are there priority issues or opportunities that the Government of Newfoundland and Labrador should advocate for inclusion in a federal plan?
PART 3: CLIMATE CHANGE IMPACTS AND ADAPTATION

This component of the public discussion document will explore the potential impacts of climate change and possible ways to adapt.

3.1 The Potential Impacts of Climate Change

The impacts associated with climate change are already being observed across the world and increasingly severe impacts are expected in the future. Glaciers are shrinking. Polar ice is melting faster than ever before. Storms are increasing in intensity and ecosystems are being adversely affected.

For Newfoundland and Labrador, forecasts from the federal government suggest that the province will experience temperature increases by mid-century, relative to historical averages, of between 2-3°C on the island and between 2-4°C in Labrador. Precipitation changes are also likely to occur, with federal forecasts suggesting an increase of up to 10 per cent by mid-century. In addition to temperature and precipitation change, this province could experience a number of impacts including:

Sea-level Rise
Sea-level rise is a particular concern for many low-lying areas. Combined with storm surges, many areas could experience increased flooding, or flooding where none had previously occurred. Rising sea-levels may also cause greater salt water intrusion, which could compromise groundwater wells and other freshwater sources.
Ecosystem Impacts

Warmer temperatures, which may be accompanied by shorter winters and longer summers, can impact natural ecosystems, ice and transportation routes, water, fisheries, agriculture, forestry, wildlife and the distribution and incidence of insect-borne diseases.

Source: Geological Survey, Newfoundland and Labrador
**Coastal Erosion**

Coastal erosion is a natural process, but the severity and rate of the erosion can be accelerated by climate change. As a coastal province with over 17,000 km of coastline and 90 per cent of inhabitants living close to the sea, coastal erosion is a particular concern in vulnerable areas like Daniel’s Harbour on the west coast, Burnside in central and locations on the Avalon Peninsula. While erosion in these locations may not be necessarily linked to climate change, the impacts bring focus to the need to better understand long-term changes in the environment.

*Source: Geological Survey, Newfoundland and Labrador*
Extreme Weather Events

Extreme weather events such as flooding, forest fires, hurricanes, major blizzards and heavy rainfall can threaten lives and cause significant damage to built infrastructure. Past events in the province such as Hurricane Chantal in 2007 illustrate the costly damages and major disruptions to services and transportation networks that these events can cause. Table 1 illustrates examples of extreme weather events, which may increase in a warming climate.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 2007</td>
<td>Trout River, Cow Head</td>
<td>High winds and large waves destroyed parts of the boardwalk at Trout River; there was minor damage to houses and the fish plant. The storm also affected Cow Head, with some roads washed out, and houses threatened by storm surge activity.</td>
</tr>
<tr>
<td>February 2007</td>
<td>Daniel’s Harbour</td>
<td>A major storm affected the west coast of Newfoundland, with waves of 8 m reported at Daniel’s Harbour.</td>
</tr>
<tr>
<td>August 2008</td>
<td>Middle Cove</td>
<td>A “rogue wave” impacted Middle Cove beach causing several people to be swept out to sea. The wave covered the entire beach, washing inland as far as the parking area. Four people were taken to hospital but no serious injuries occurred.</td>
</tr>
<tr>
<td>December 2009</td>
<td>Battery, St. John’s</td>
<td>Consistent high winds over a 24-hour period resulted in exceptional high seas impacting the east coast of the Avalon Peninsula. The Narrows (the entrance to St. John’s Harbour) experienced large waves and the Battery was impacted, with wharves, stages and fishing huts damaged.</td>
</tr>
<tr>
<td>December 2009</td>
<td>Ferryland</td>
<td>High seas washed out part of the road leading from Ferryland out to the light-house, damaging property and the breakwater in the area. This is the same part of the road affected in 2004. About 150 m of cribbing was washed away, leaving the area vulnerable to further damage. There had been minor damage in October 2009.</td>
</tr>
</tbody>
</table>

3.2 Possible Adaptation Responses

As the impacts of climate change are already being seen and the Earth is subject to some level of future warming even if GHGs could be reduced to zero today, part of the focus of both the developed and developing world is about preparing to adapt to the unavoidable impacts of climate change.

In general, there are four broad approaches that are typically taken to adapt to climate change:

a) Capacity building and planning
As responding to climate change is a shared challenge, adaptation can depend on individual and community awareness of climate change impacts and having the ability to respond. At the community level, having adequate training, long-term planning and emergency response capabilities may alleviate the impacts of a changing climate.

b) Coastal and infrastructure protection
Common approaches for coastal locations include fortified seawalls, enhanced breakwaters, and planting vegetation in sandy areas. Land-use policies, such as restricting or limiting new growth in vulnerable areas, and building design specifications, such as raised structures, can further alleviate the threat on coastal areas.

For infrastructure, road and bridge construction must account for changing weather patterns, and in the marine environment specifically, a changing climate may warrant new shipping patterns, vessels and wharf construction. Changing weather patterns may also require consistent monitoring of energy demand and impacts on generation and transmission infrastructure.

c) Ecosystem monitoring and safeguarding
Effective land-use planning and habitat protection can ensure that the most vulnerable areas and species are protected and not subject to other pressures. In the marine environment, actions could include establishing protected areas, increased monitoring and response plans for invasive species, and possibly reconsidering the timing of harvesting seasons where the historic patterns of some species are known to be changing.

d) Natural resource monitoring and protection
In the fishing sector, region-specific research, long term environmental monitoring, oceanographic/environmental modeling and industry engagement could be key to determine what has to be done to deal with climate change. While conservation of marine species and the ocean...
environment is a key consideration, possible impacts on harvesters may require reconsideration of vessel regulations and increased fisheries research, in consultation with other levels of government and stakeholders as required.

In the forestry sector, increasing monitoring and research may be necessary, as well as enhanced emergency response capabilities to deal with threats such as forest fires. In the agriculture sector, climate change may require increased research and experimentation with crops and increased water management techniques.

**Newfoundland and Labrador Actions - Adaptation**

Adaptation was a central component of the 2005 Climate Change Action Plan, which laid the groundwork for identifying and responding to impacts in the province. A central principle of these efforts was the development of partnerships with community leaders and academic experts and building awareness of the role individuals can play in addressing this challenge. Some key initiatives that have been completed or are underway include:

- Research by Memorial University on the possible impacts of climate change on communities in Newfoundland and Labrador;
- Workshops with municipalities, in partnership with Municipalities Newfoundland and Labrador, to build capacity to adapt to climate change;
- A workshop for health professionals to raise awareness on the impacts of climate change;
- Presentations for the public and Provincial Government employees on climate change;
- Monitoring of invasive species in the fishery; and
- Support for the Climate Change Education Centre to raise public awareness.

Building on this work, in 2008 Newfoundland and Labrador collaborated with the Atlantic provinces on the *Atlantic Adaptation Strategy*, given many similar potential impacts across the region. This strategy, being delivered by the Department of Environment and Conservation, lays out a comprehensive plan to identify risks and vulnerabilities, enhance decision-making and build collaborative partnerships.

One of the main components of this strategy is a cost-shared project by the Atlantic provinces and the federal government for *Atlantic Climate Adaptation Solutions*. This $8.5 million initiative was formally announced by the federal and provincial governments on April 23, 2010, and will help communities integrate climate change considerations.
into community plans, engineering practices, and water and resource decisions.

Climate change can also present new economic opportunities and the Provincial Government has taken action in this area. In June 2009, the Government of Newfoundland and Labrador released its oceans technology strategy – *Oceans of Opportunity: Newfoundland and Labrador’s Ocean Technology Sector Strategy*. The five-year, $28 million strategy is intended to capitalize on opportunities and expand the world-class local ocean technology sector. One of the major projects the Provincial Government has supported is ‘Smart-Bay’ in Placentia Bay. Smart Bay is the largest ocean observation project in eastern Canada, providing weather forecasting, environmental monitoring and ship-navigation support. This project, and others, can play a role in monitoring and responding to changes in ocean conditions.

Newfoundland and Labrador, through the Council of the Federation, has also been involved in studies on forest carbon management, tree species impacts, water conservation and scarcity, and flood mitigation.
3.3 Impacts and Adaptation: Suggested Questions to Consider

- What additional measures could the Provincial Government take to better understand the potential impacts of climate change and help the province adapt?

- How should individuals and communities be engaged and informed on the potential impacts of climate change?

- What should be the priority issues for research and monitoring on climate change impacts?
Nations around the world are working to reduce GHG emissions to avoid the worst potential impacts of climate change. This part of the discussion document will explore existing greenhouse gas trends, ways to reduce them and actions taken to date in Newfoundland and Labrador.

4.1 Current Greenhouse Gas Trends

Global GHG emissions increased by 70 per cent between 1970 and 2004, and the concentration of GHGs in the atmosphere has reached levels unprecedented for tens of thousands of years. Developed countries are principally responsible for the higher concentration of GHG emissions in the atmosphere. However, a new and challenging dynamic is the GHG growth occurring in major developing economies such as China, Brazil, and India as they seek to improve the quality of life of their citizens.

In the absence of international effort to reverse the growth in GHG emissions, levels will continue to rise over the coming decades. The extent of future warming will be strongly dependent on these emissions. To avoid dangerous climate change, the IPCC advises that global emissions must peak by 2015 and fall by between 50-85 per cent below 2000 levels by 2050.

Canada

Canada is responsible for approximately 1.8 per cent of global emissions, but it has experienced some of the highest GHG growth rates in the world. Between 1990 and 2008, GHGs in Canada grew more than the global average with an increase of 24.1 per cent. Canada is also among those countries with the highest per capita emissions in the world. As a party to the Kyoto Protocol, Canada committed to reduce its emissions by six per cent below 1990 levels by 2012, but the federal government has since stated it will not meet this target.

On January 31, 2010, the federal government released a new 2020 target to align with the target in the US. The new target is a 17 per cent reduction from 2005 levels by 2020, and is conditional on climate change legislation being passed in the US Congress. The new target equates to reducing emissions by approximately 2.5 per cent above 1990 levels by 2020.

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1 IPCC
2 Environment Canada
Newfoundland and Labrador

Newfoundland and Labrador’s GHG emissions are approximately 10.1 million tonnes (Mt), which accounts for 1.4 per cent of total emissions in Canada. Newfoundland and Labrador has the second lowest provincial GHG levels in Canada in absolute terms but is fifth among provinces in terms of per capita emissions (see Appendix B), due to its resource-based economy.

Chart 2: Newfoundland and Labrador GHG Emissions (kilotonnes) 1990 - 2008

The province’s emissions have grown by approximately 6.9 per cent since 1990 as a result of strong economic growth in the offshore oil and gas sector. Approximately half of the province’s emissions come from large industrial companies in the energy-intensive sector, which includes oil extraction and refining, mining operations, newsprint and electricity generation. The transportation sector is also a major source of GHGs, currently accounting for one third of emissions.
Additional information on GHG levels for Canada and other provinces and territories is attached as Appendix B for comparison purposes.

### 4.2 Reducing Greenhouse Gas Emissions

Action to reduce GHG emissions and improve energy efficiency needs to be taken across all sectors of the economy: electricity generation, heavy industry, commercial, residential, transportation, forestry, agriculture, manufacturing, fishery, and waste management. Generally there are four main means to reduce GHG emissions:

- **a) Energy conservation and efficiency;**
- **b) Fuel switching;**
- **c) Addressing non-energy GHG sources such as forestry, agriculture and waste; and**
- **d) Carbon capture and storage.**

#### a) Energy conservation and efficiency

Saving energy can reduce GHGs, but it can also contribute to economic growth by lowering energy costs for firms and consumers. Energy use can be reduced by changing behaviour, such as turning off energy-consuming appliances when not in use, and through technological improvements, such as through new building materials and more efficient vehicles.
Many energy efficiency measures can be cost effective, meaning that over the long term they pay for themselves by reducing energy costs. However, despite the potential to reduce costs, households and firms are often not realizing the full potential of energy efficiency. The barriers to action include lack of information, low awareness of the financial benefits, lack of availability or confidence in new technologies, long payback periods and lack of incentives (e.g. building owners have no incentive to invest in energy efficiency where tenants pay the energy bill).

Governments can advance energy efficiency through actions such as awareness raising, incentive programs, better product standards and the promotion of new technologies, but individuals and businesses can play important roles by making simple behavioural changes and cost-effective investments in high-efficiency products.

Newfoundland and Labrador Actions – Energy Efficiency and Conservation

Newfoundland and Labrador has made progress in this area with measures aimed at residential, commercial and Provincial Government buildings, the transportation sector, large industry and the fishery. Major initiatives include:

- The Newfoundland and Labrador EnerGuide for Houses Program and Residential Energy Efficiency Program offer subsidies and grants for homeowners to improve the energy efficiency of their homes and reduce their heating costs. In April 2010, the Provincial Government announced that these programs would not be impacted by the federal government’s decision to not renew its ecoEnergy Retrofit-Homes Program.

- The Provincial Government is developing a policy to ensure that all new Provincial Government owned buildings, or buildings that receive public funding, exceed the Model National Energy Code by 25 per cent or qualify for the Leadership in Energy and Environmental Design (LEED) Silver standard where possible.

- The Provincial Government has several facilities under construction that are following the LEED Silver standard, such as schools in Torbay and Paradise and the Corner Brook long-term care facility. The Provincial Government has also provided support to other facilities that intend to meet this standard, such as the new Corner Brook City Hall which is receiving support under the Green Fund (see Box 2).

- Newfoundland and Labrador Hydro and Newfoundland Power have initiated various commercial lighting, residential insulation and general energy efficiency programs. Through the Take Charge initiative, commercial programming includes lighting subsidies provided through retailers and wholesalers while residential
programming includes rebates to individuals installing energy efficient materials.

- Newfoundland and Labrador Hydro is implementing an energy audit program to assist large industrial operations identify opportunities for energy efficiency.
- In the 2007 Energy Plan, the Provincial Government adopted a policy that 25 per cent of all new car and SUV purchases by the Provincial Government must be energy efficient or hybrid vehicles, extending to pickup trucks when more products are available. The Government of Newfoundland and Labrador has exceeded this commitment - since April 2008 over 50 per cent of new car and SUV purchases have been hybrid vehicles.
- The Provincial Government has concluded the Coastal Labrador Energy Efficiency Pilot Project in the Labrador communities of Port Hope Simpson and Hopedale. In partnership with Newfoundland and Labrador Hydro, teams of energy efficiency assessors provided information and energy saving tool-kits to home and business owners.
- The Government of Newfoundland and Labrador has developed a Fish Harvesting Energy Efficiency Initiative, and projects have included workshops and fact-sheets on energy-efficiency, energy audits on vessels and energy efficient shrimp trawl designs. Efforts in the fish processing sector have included energy audits of selected fish plants and a booklet and workshops on energy saving measures. The Department of Fisheries and Aquaculture has also established an expert committee on energy-efficiency matters with industry representatives, academic experts and other Provincial Government departments.

Promoting energy efficiency and conservation has also been addressed extensively at intergovernmental forums such as the Council of the Federation. It was a central component of the 2007 Council of the Federation Energy Strategy and, at the July 2008 meeting, Premiers agreed to achieve a 20 per cent increase in energy efficiency by 2020 in their respective jurisdictions.
b) Fuel switching

There is growing momentum to transition the global economy to non-GHG emitting sources of energy. Many locations around the world have long relied on coal and oil generated electricity, but as efforts to reduce GHG emissions advance around the globe, clean and renewable energy sources are increasingly sought after. Interest in renewable energy such as hydroelectricity, wind, solar and ocean energy continues to grow to displace fuel-derived (GHG emitting) electricity generation.

In the transportation sector, technology for hybrid, plug-in electric and biofuel-powered vehicles continues to advance. The development of plug-in electric vehicles in particular can also add greater impetus for clean electricity sources, to ensure that low emissions from the operation of the vehicle are not offset by emissions from the generation of electricity. Many companies around the world are also investing in...
low-carbon fuels such as ethanol, and jurisdictions are considering regulations to lower the overall carbon content of fuels.

**Newfoundland and Labrador Actions – Fuel Switching**

Approximately 85 per cent of the electricity in Newfoundland and Labrador comes from hydroelectricity developments. The 5428 MW Churchill Falls Generating Station and other smaller hydro and wind projects provide significant clean energy to Newfoundland and Labrador and other locations in North America, displacing the need for GHG intensive generation. The 2007 Energy Plan outlined the Provincial Government’s comprehensive plan to further develop the province’s energy warehouse, which includes significant non-renewable (oil, natural gas) and renewable (wind, hydro) resources. In addition to the substantive benefits that will, and are, accruing to the province as a result of this plan, much of the clean power could be available to export to jurisdictions in North America to help them grow their economies and meet their climate change goals.

Some of the province’s major initiatives on fuel-switching include:

- The Government of Newfoundland and Labrador has committed to pursue the development of the 3000 MW Lower Churchill hydroelectric project. This project could displace electricity from the oil-fired Holyrood Thermal Generating Station while also supporting other jurisdictions in North America, particularly the Atlantic provinces, in their efforts to reduce GHG emissions and grow their economies with clean energy.

- Newfoundland and Labrador Hydro has switched to a cleaner-burning fuel at the Holyrood Thermal Generating Station. In 2006, a switch to a 1 per cent sulphur content fuel (down from 2 per cent), reduced some emissions by 50 per cent. In 2009, a switch to 0.7 per cent reduced some emissions by a further 30 per cent.

- The province also has two wind projects operating on the island portion of the province, in St. Lawrence and Fermeuse, with a total capacity of 54 MW of clean energy. This power reduces GHG emissions by displacing oil-fired electricity from Holyrood.

- Newfoundland and Labrador Hydro initiated the world’s first completely isolated wind-hydro-diesel electricity generation project in the community of Ramea. This research and demonstration project is intended to displace diesel-only generated power.
• The Provincial Government has supported the development of alternative fuels like wood pellets, such as through the Residential Wood Pellet Rebate Program which provides a rebate for the purchase of wood pellet stoves and furnaces, and through support for manufacturer development.

• The province has also committed, through the Energy Plan, to develop the province’s significant natural gas potential. While still a non-renewable resource, burning natural gas results in lower GHG emissions than burning oil or coal.

• A study into potential sources of alternative energy has commenced in seven coastal Labrador communities. Preliminary results of the hydrology study and some early wind and solar data have been collected. Additional analysis and data collection is ongoing.

Clean and renewable energy development has been a major topic of discussion at intergovernmental forums such as the NEG-ECP, the Council of the Federation and the Council of Atlantic Premiers. The Council of the Federation, for example, has committed to produce an additional 25,000 MW of renewable energy by 2020 through sources such as hydroelectric, wind, solar and tidal power.

c) Non-energy GHGs (i.e. forestry, agriculture and waste)

Emissions from permanent de-forestation, agricultural production and waste management are some of the largest sources of non-energy GHGs in many jurisdictions. In the forestry sector, there is growing interest in the value of preserving and managing forests as ‘carbon sinks’ to store carbon dioxide, and many emission trading schemes (explained further below) contemplate preserving the carbon in forests as a revenue generating activity. Re-forestation activities are also important activities to capture GHG emissions. Collaborative work involving the Provincial and federal governments is ongoing to ensure carbon accounting models accurately measure the net contributions of the forest sector, including carbon stored in wood products.

In the agriculture sector, organic farming and reduced tilling and no-tilling techniques could be considered to reduce overall GHGs, and like forestry, there may be opportunities to maintain soils as carbon sinks. In the waste management sector, recycling and composting programs can reduce the amount of material that are going to waste locations, and many sites are implementing methane capture technology which can either be flared or used for electricity generation purposes.

While many actions occur at the industry level, individual actions can support the reduction of non-energy GHG emissions through waste reduction and recycling efforts, making environmentally-focused choices...
as consumers and undertaking efforts to preserve or improve the natural environment.

**Newfoundland and Labrador Actions – Non-energy GHG Emissions**

The Provincial Government has acted on addressing emissions from non-energy GHG emissions. In the forestry sector, the Provincial Government continues to support forest-regeneration activities across the province and agrees that more work and consensus is required on carbon accounting principles. In the waste management sector, the Government of Newfoundland and Labrador is implementing its Solid Waste Management Strategy which, among other things, seeks to eliminate open burning, reduce the number of waste management sites, and reduce the amount of material going to sites by 50 per cent. The Multi Materials Stewardship Board has implemented measures to increase recycling and composting in the province to reduce the material that goes to waste management sites. The Provincial Government also provided $1.6 million from the Green Fund to the Robin Hood Bay Regional Waste Management Facility in St. John’s to implement methane capture technology.

d) **Carbon capture and storage**

Carbon capture and storage is a process intended to capture GHG emissions from industrial installations and store it in geological formations. While this technology is largely unproven on a widespread level, and remains in the research and development stage in most locations, there are many that argue the world will be unable to reduce GHGs by the levels called for by the scientific community without the possibility of using carbon capture and storage. Internationally, in advanced developing countries such as China, the demand for energy is increasing dramatically and it is being met largely by new coal-powered thermal generating stations. In these countries, and major developed countries such as the U.S. and Canada, there is considerable interest and growing investment in advancing this technology. Alberta and Saskatchewan have advocated and supported the development of this technology in Canada. In 2008, Premier Stelmach created the Alberta Carbon Capture and Storage Development Council and allocated $2 billion to support the development of this technology.

**Newfoundland and Labrador Action – Carbon capture and storage**

There are no carbon capture and storage projects in Newfoundland and Labrador. However, the offshore oil and gas sector captures natural gas from oil extraction and re-injects what it does not use for energy production on the platform back into the reservoir. This enhances oil recovery and maintains its availability for the future. This process prevents the release of significant volumes of GHGs that would occur if the gas was flared.
4.3 The Cost of Greenhouse Gas Emissions

As detailed in part two, the growing levels of GHGs in the atmosphere can have significant and potentially costly impacts on individuals, communities and the natural environment. There is evidence that the cost of adapting to adverse impacts in the long-term exceeds the costs associated with reducing GHGs to levels called for by the scientific community.

As a result, there is widespread recognition of the need to take into account the societal costs of greenhouse gas emissions in order to affect reductions. The approach to achieve this is most often referred to as carbon pricing, and it comprises the introduction of financial incentives to drive reductions in greenhouse gas emissions. This approach is intended to promote reductions in GHG emissions today, that will prevent the costs of responding to the impacts of climate change in the future.

Carbon pricing can be implemented by:
1. Carbon taxes on fuels that release GHGs when used, such as gasoline or diesel; or
2. Emissions trading schemes which place limits on the GHGs that firms can release each year and require that they obtain tradable credits to cover their emissions limits, often referred to as ‘cap-and-trade’ schemes.

Carbon Taxes
British Columbia and Quebec are the only jurisdictions in Canada to have adopted carbon taxes. In 2008, the British Columbia government implemented a tax on fuels such as gasoline, diesel, and propane. The tax is paid at the retail level, i.e. ‘at the pump’, and it has grown over time to increase the incentive on consumers to reduce their fuel use. While the carbon tax has led to fuel price increase, provincial legislation requires that carbon tax revenues be returned to individuals and businesses through income tax reductions and other measures.

The Quebec government levies its carbon tax at fuel distributors rather than consumers. Quebec has also taken a different approach than British Columbia in how it uses revenues from the tax, as all revenues are directed towards the Quebec ‘Green Fund’, which supports initiatives under its climate change strategy.

In each case, by increasing the ‘price signal’ on consumers, there is a direct financial incentive to conserve the use of fuel. This also establishes incentives for more efficient cars and engines, efficient driving methods, greater use of public transit and other alternative
modes of transportation, and the development of lower carbon fuel sources as discussed above.

**Emissions Trading**

Emissions trading or ‘cap-and-trade’ schemes are a regulatory versus a taxation approach to reduce GHG emissions. Under this approach, a government sets a cap on the amount of GHGs that can be released and companies are given, or are required to purchase, emission credits equal to their cap. Companies that reduce their emissions below the target set by government would require fewer credits, and in some cases, could sell excess credits to generate revenue. Companies that are unable to achieve their target would be required to purchase additional credits to achieve compliance.

Under this approach, companies have a financial incentive to reduce emissions to sell excess credits or reduce costs. This encourages a greater focus on energy efficiency and conservation, the development of clean and renewable energy sources, and other technological and process improvements to reduce GHG emissions.

Emissions trading schemes may provide for the use of ‘offset credits’. These are credits which are created from GHG reducing projects in sectors that fall outside of the emissions trading scheme. Offset credits may be generated by, for example, a forestation project that has reduced GHGs from the atmosphere – often called a carbon ‘sink’ project. The availability of offset credits present other ways for companies to meet their obligations, and it may also result in lower credit prices and reduced price fluctuations.

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**Box 3: Emissions Trading Schemes**

- In 2005, the European Union launched the world’s largest emissions trading scheme. The scheme applies to 10,800 facilities and covers electricity generators and some industrial sectors. The scheme currently covers over 40 per cent of EU emissions.

- 10 Northeastern US states participate in the emissions trading scheme called the Regional Greenhouse Gas Initiative. The scheme began in January 2009 and applies to electricity generators. The target is to reduce emissions by 10 per cent by 2019 from 2009 levels.

- The Western Climate Initiative comprises seven states and four provinces (British Columbia, Manitoba, Ontario and Quebec) and plans to establish, by 2012, a trading scheme to capture approximately 90 per cent of emissions in the member jurisdictions by 2015. The goal is to reduce emissions 15 per cent by 2020 from 2005 levels.
4.4 Reducing GHG Emissions – Suggested Questions to Consider

- Do you think individuals are sufficiently aware of what climate change is and how they can reduce the GHG emissions associated with their actions?

- What mix of policies and programs should the province consider to further encourage a reduction of GHG emissions and promote energy efficiency, for example subsidies, regulation, fiscal incentives, and information campaigns?

- What sectors should be targeted, if any, to reduce greenhouse gas emissions?

- What approaches should be taken to help industry reduce emissions without compromising economic growth?

- What should the province be doing to maximize the economic opportunities associated with responding to climate change?
The science on climate change is clear, and it is calling for significant GHG reductions in the decades ahead to avoid the worst potential impact of a changing climate. Through the 2005 Climate Change Action Plan and the 2007 Energy Plan, and extensive collaboration with other governments, the Government of Newfoundland and Labrador has implemented many actions to respond to climate change. The Provincial Government recognizes that more needs to be done, and has committed to advance its agenda by developing an update to the Climate Change Action Plan, an Energy Efficiency strategy and a Greenhouse Gas Strategy for the Energy-Intensive Sector.

The potential impacts of climate change on Newfoundland and Labrador can vary, as can possible adaptation responses. Equally, there are a number of options underway or could be further considered to reduce greenhouse gas emissions. These are complex issues, and successfully responding to them in Newfoundland and Labrador requires concerted and collaborative actions by individuals, businesses, communities and all levels of government.

The information in this discussion document is intended to stimulate public discussion on the actions that the Provincial Government should consider in these future strategies. The public is encouraged to study the information and actively engage in discussion about how the Province should move forward.
Adaptation – Actions to plan for and respond to the impacts of climate change. Includes measures taken by governments, communities and businesses to, among other things, monitor natural resources, protect species and ecosystems, build community capacity and upgrade infrastructure.

Atlantic Adaptation Strategy – Released in June 2008 by the Council of Atlantic Ministers of the Environment. A central component is a cost-shared project with the federal government to establish a ‘Regional Adaptation Collaborative’ for the Atlantic provinces. In Newfoundland and Labrador, this cost-shared program will support initiatives to address adaptation of coastal communities and communities along inland waters, and related infrastructure.

Cap and Trade – See Emissions Trading.

Carbon Sinks – An area of land or water that can absorb and store carbon dioxide from the atmosphere. Forests are the most common form of carbon sink, as well as soils, peat, permafrost, ocean water and carbonate deposits in the deep ocean. With changes in conditions (e.g. temperature, precipitation, and natural or man-made disturbances), a carbon sink can become a carbon source, in other words release carbon dioxide back into the atmosphere. For example, a growing forest is a carbon sink as it absorbs more carbon than it releases, but if the forest burns down or is destroyed by pests, it becomes a carbon source as it releases carbon into the atmosphere.

Carbon Taxes – Taxes which are placed on fuels that emit greenhouse gases when consumed. Within Canada, British Columbia (at the retail level) and Quebec (at the fuel distributor level) have levied carbon taxes on fuels such as gasoline and diesel. Carbon taxes provide an incentive to consumers to use less emitting fuels either by improving their energy efficiency or switching to alternative fuel-types. They are often levied in a way that makes them revenue-neutral – i.e. other taxes are reduced to compensate for fuel tax.

Conference of New England Governors and Eastern Canadian Premiers (NEG-ECP) – NEG-ECP is a forum of Premiers from Newfoundland and Labrador, Quebec, Nova Scotia, New Brunswick and Prince Edward Island, and Governors from Massachusetts, Maine, New Hampshire, Rhode Island, Vermont and Connecticut. Premiers and Governors meet annually to address various cross-border issues including energy and transmission, climate change and air quality, transportation, trade and export development and border security. Newfoundland and Labrador last hosted Premiers and Governors in 2005.
Copenhagen Accord – The outcome of the United Nations climate change negotiations in Copenhagen, Denmark in December 2009. The agreement is not a legally binding international treaty. It provides a broad set of commitments which will guide future actions and negotiations to tackle climate change post-2012. The Kyoto Protocol (see definition below) covers the period up to 2012 and has been ratified by 184 countries, including Canada.

Council of Atlantic Premiers (CAP) – CAP is a forum of Premiers from Newfoundland and Labrador, Nova Scotia, New Brunswick and Prince Edward Island. Premiers meet regularly and discuss issues of mutual concern, including energy development, transportation and infrastructure, health and wellness, and the environment. Premiers have also undertaken several trade and export development missions within North America. Premier Williams hosted the most recent meeting in Churchill Falls on November 20, 2009.

Council of the Federation (COF) – COF is a forum of all Canadian Premiers. COF meets annually to address key issues in Canada including the economy, energy, transportation, international and intra-provincial trade, health and emergency preparedness and climate change. Newfoundland and Labrador hosted COF in August 2006, and most recently hosted the COF Forum on Large-Scale Hydroelectric Development on October 21, 2009.

Emissions Trading Schemes – Commonly referred to as ‘cap-and-trade’ schemes, this refers to a regulatory regime that sets limits on certain industries’ annual greenhouse gas emissions, and requires firms to obtain tradable ‘credits’ to cover all of their emissions. Given that climate change is a global problem and the environmental effect of reducing emissions is the same wherever the reductions take place, it makes sense to reduce emissions where the cost is lowest. A trading scheme allows regulated entities greater flexibility than straightforward standard regulation as it allows them to choose between reducing their own emissions or buying allowances from another entity that has reduced its emissions below its target and therefore has surplus allowances to sell. All other things being equal, the regulated entity will buy allowances if it is cheaper than investing in on-site reductions. Schemes usually permit the use of ‘offset credits’, which are credits created from greenhouse gas reducing projects in sectors that are not subject to the emissions trading regulation.
Energy Efficiency – Refers to using less energy to provide the same level of energy service (e.g., powering computers or lighting). In residential homes, increasing insulation or buying new high-efficiency appliances can allow householders to reduce their energy consumption and thereby save money while maintaining the same level of comfort. In the industrial sector, new technology investments and processes may save energy while maintaining or increasing the level of production.

Energy-Intensive Sector – Industrial firms and power generators/distributors that require large amounts of energy to produce and transport their products and services. In Newfoundland and Labrador, this would include the operations of large industrial firms such as North Atlantic Refinery Limited, Corner Brook Pulp and Paper, Wabush Mines, Iron Ore Company of Canada, Vale Inco, Exxon Mobil, Husky Energy, Suncor and Nalcor.

Flaring – The process of burning off hydrocarbons such as natural gas at offshore oil and gas installations, or methane after it is captured from landfill sites.

Greenhouse Effect - The process whereby some of the heat reflected by the earth’s surface is trapped by naturally occurring greenhouse gases in the atmosphere keeping the earth’s temperature at a hospitable level.

Greenhouse Gases (GHGs) - Gases that are responsible for climate change and which may be released by natural processes or human activity. The six gases covered by the Kyoto Protocol are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). The majority of GHGs come from the combustion of fossil fuels, but ‘non-energy’ sources of GHGs such as those emitted from waste (methane from decaying material) and agriculture (nitrous oxide from fertilizers or methane from cattle) can account for large amounts of GHGs in some locations.

Intergovernmental Panel on Climate Change (IPCC) - Established in 1988 by the World Meteorological Organization and the UN Environment Programme, the IPCC surveys peer reviewed scientific and technical literature and periodically publishes assessment reports on the latest scientific evidence. These reports are approved by 192 governments party to the United Nations Framework Convention on Climate Change and is widely recognized as the most authoritative source of information on climate change.
**Kyoto Protocol** – An international treaty that sets legally binding targets for the reduction of greenhouse gas emissions by industrialized countries in the period 2008-2012. Canada ratified the Protocol on December 17, 2002, committing to reduce its greenhouse gas emissions by 6 per cent below 1990 levels by 2012. The Protocol entered into force internationally on February 16, 2005. Australia ratified Kyoto in December 2007, leaving the United States as the only major industrialized nation that has not ratified the agreement. The Kyoto Protocol has two project-based market mechanisms that assist developed countries in meeting their targets.

**Mitigation** - Actions taken by individuals and businesses to reduce the greenhouse gas emissions in order to minimize their effects on global climate change. Such actions are usually taken in conjunction with national and international policies that minimize greenhouse gas production and release into the atmosphere. Relative to adaptation, mitigation of global warming refers more to the prevention and control of the products and actions that cause climate change.

**Non-Renewable Energy** – Sources of energy that are not self-renewing, such as oil, natural gas and coal.

**Offset credits** – See Emissions Trading.

**Renewable Energy** - Sources of energy which are inherently self-renewing, such as hydro, solar, wind, tidal and geothermal energy. Wood, wood pellets, garbage and waste burned as fuel are also considered renewable. Biofuels such as ethanol, which is derived largely from sugar and corn sources, is also a renewable energy.

**United Nations Framework Convention on Climate Change (UNFCCC or Convention)** – A treaty signed at the 1992 Earth Summit in Rio de Janeiro that established the “ultimate objective” for action to tackle climate change, namely, to stabilize “…greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human induced] interference with the climate system.” The Convention included a non-binding commitment for all developed countries to return their emissions to 1990 levels by the year 2000. Canada ratified the Convention on December 4, 1992 and the Convention came into force in March 1994. There are currently 192 countries are signatories to the Convention.
APPENDIX A: Questions to Consider

Strategic Objectives

1. Has the Provincial Government captured the right strategic objectives to guide strategy development?

Strategy Context

2. To what extent should the province’s GHG reduction targets be informed by the latest science on climate change?

3. What is the appropriate role for each of the following groups to tackle climate change and promote energy efficiency - individuals, communities, businesses and the federal and provincial governments?

4. How can the province continue to respond to climate change while not constraining economic growth?

5. Are there priority issues or opportunities that the Government of Newfoundland and Labrador should advocate for inclusion in a federal plan?

Climate Change Impacts and Adaptation

6. What additional measures could the Provincial Government take to better understand the potential impacts of climate change and help the province adapt?

7. How should individuals and communities be engaged and informed on the potential impacts of climate change?

8. What should be the priority issues for research and monitoring on climate change impacts?
Addressing Greenhouse Gas Emissions

9. Do you think individuals are sufficiently aware of what climate change is and how they can reduce the GHG emissions associated with their actions?

10. What mix of policies and programs should the province consider to further encourage a reduction of GHG emissions and promote energy efficiency, for example subsidies, regulation, fiscal incentives, and information campaigns?

11. What sectors should be targeted, if any, to reduce greenhouse gas emissions?

12. What approaches should be taken to help industry reduce emissions without compromising economic growth?

13. What should the province be doing to maximize the economic opportunities associated with responding to climate change?
<table>
<thead>
<tr>
<th>Province/Territory</th>
<th>Emissions (Mt)</th>
<th>% Change</th>
<th>Per capita emissions</th>
<th>Emissions Intensity (Emissions/$B real GDP/Mt)</th>
<th>2020 Provincial-Territorial “Equivalent” Targets (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>592</td>
<td>734</td>
<td>24.1%</td>
<td>21.4</td>
<td>22.0</td>
</tr>
<tr>
<td>Newfoundland &amp; Labrador</td>
<td>9.5</td>
<td>10.1</td>
<td>6.9%</td>
<td>16.4</td>
<td>19.9</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>2.0</td>
<td>2.0</td>
<td>-0.8%</td>
<td>15.2</td>
<td>14.1</td>
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<tr>
<td>Nova Scotia</td>
<td>19.0</td>
<td>20.9</td>
<td>9.9%</td>
<td>20.9</td>
<td>22.3</td>
</tr>
<tr>
<td>New Brunswick</td>
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<td>18.0</td>
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<td>24.0</td>
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<td>Quebec</td>
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<tr>
<td>Ontario</td>
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<td>Manitoba</td>
<td>18.6</td>
<td>21.9</td>
<td>17.6%</td>
<td>16.8</td>
<td>18.1</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>43.4</td>
<td>75.0</td>
<td>72.8%</td>
<td>43.1</td>
<td>73.8</td>
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<tr>
<td>Alberta</td>
<td>171.0</td>
<td>244.0</td>
<td>42.8%</td>
<td>67.2</td>
<td>68.1</td>
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<td>British Columbia</td>
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<td>65.1</td>
<td>32.0%</td>
<td>15.0</td>
<td>14.8</td>
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<tr>
<td>Territories (combined)</td>
<td>2.1</td>
<td>2.2</td>
<td>5.5%</td>
<td>23.5</td>
<td>20.0</td>
</tr>
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</table>

Source: Calculated from Statistics Canada and Environment Canada

Notes:
1. 1990 is used as the base year in the Table as it is the base year for the Kyoto Protocol.
2. The NEG-ECP (New England Governors-Eastern Canadian Premiers conference) target is a regional target and applies to the New England States, the Atlantic provinces and Quebec. The projections shown represent what the “equivalent” emissions would be if applied on a provincial-territorial basis. For comparison purposes, the same “equivalent” target is applied to the remaining provinces and territories. Numbers do not add due to rounding.
3. The federal target is a national level target as set out in the Copenhagen report. It is contingent on the target to be established by the United States. The projections shown represent what the “equivalent” emissions would be if applied on a provincial-territorial basis. Numbers do not add due to rounding.
4. NL GHG growth between 1990 and 2008 was driven by strong economic and the offshore oil and gas sector.
### APPENDIX C: GHG Reduction Targets in Canada

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Short-Term</th>
<th>Medium-Term</th>
<th>Long-Term</th>
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<td><strong>Canada</strong> (Federal government)</td>
<td>17% below 2005 by 2020. (NEG-ECP)</td>
<td>10% below 1990 by 2020. (NEG-ECP)</td>
<td>75 – 85% below 2001 by 2050. (NEG-ECP)</td>
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<tr>
<td>NS</td>
<td>1990 levels by 2010. (NEG-ECP)</td>
<td>10% below 1990 by 2020. (NEG-ECP)</td>
<td>75 – 85% below 2001 by 2050. (NEG-ECP)</td>
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<tr>
<td>PEI</td>
<td>1990 levels by 2010. (NEG-ECP)</td>
<td>10% below 1990 by 2020. (NEG-ECP)</td>
<td>75 – 85% below 2001 by 2050. (NEG-ECP)</td>
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<td>QC</td>
<td>1990 levels by 2012.</td>
<td>10% below 1990 by 2020. (NEG-ECP)</td>
<td>75 – 85% below 2001 by 2050. (NEG-ECP)</td>
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<td>ON</td>
<td>6% below 1990 by 2012.</td>
<td>15% below 1990 by 2020.</td>
<td>80% below 1990 by 2050.</td>
</tr>
<tr>
<td>MB</td>
<td>6% below 1990 by 2012.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SK</td>
<td>-</td>
<td>-</td>
<td>75 – 85% below 2001 by 2050. (NEG-ECP)</td>
</tr>
<tr>
<td>AB</td>
<td>20Mt below business as usual (BAU) by 2010.</td>
<td>Stabilize by 2010 (Government emissions only)</td>
<td>200Mt below BAU by 2050.</td>
</tr>
<tr>
<td>BC</td>
<td>-</td>
<td>15% below 2011 by 2011 (Government emissions only)</td>
<td>Equates to 14% below 2005 levels by 2050.</td>
</tr>
<tr>
<td>YK</td>
<td>-</td>
<td>-</td>
<td>80% below 2007 by 2050.</td>
</tr>
<tr>
<td>NWT</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NU</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

*Source: Federal, provincial and territorial climate change information*
Responding to Climate Change in Newfoundland and Labrador

Public Discussion Document

Office of Climate Change,
Energy Efficiency and Emissions Trading

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