

IR# JRP.85

Project GHG Emissions

Requesting Organization – Joint Review Panel

Information Request No.: JRP.85

Subject – Project GHG Emissions

References:

EIS Guidelines, Section 4.5.1 (Environmental Effects)

EIS Volume IIA, Section 2.2.3 (Greenhouse Gas Emissions)

Related Comments / Information Requests:

CEAR # 184 (Sierra Club Atlantic)

CEAR # 194 (Mouvement au Courant)

CEAR # 200 (Grand Riverkeeper Labrador Inc.)

CEAR # 203 (Hydro-Québec)

IRs # JRP.7, 27, 46, 88, 99, 100

Rationale:

The EIS Guidelines require that “the Proponent shall describe and analyze GHG emissions from the Project (including methane). This shall include provision of a GHG budget for emissions from all phases of the Project” (p. 33).

There is no reference to NO_x as a contributor of GHGs and how it would contribute to the GHGs produced by the Project in the EIS.

In Section 2.2.3 of Volume IIA, the Proponent cites the results of a component study on greenhouse gas fluxes in the Smallwood Reservoir and future reservoir areas. The results presented are based on measurements made in 2006.

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The Proponent is asked to provide:

- a. any additional new data on GHGs that are available for the Smallwood Reservoir;

Response:

Aside from information presented in the component study “Green House Gas Fluxes” (Environnement Illimité, 2007) which formed part of the original EIS submission, no additional data are available on GHGs for the Smallwood Reservoir.

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The Proponent is asked to provide:

- b. a comprehensive GHG budget for emissions from all Project sources from all phases, including Project emissions of NO_x. Phases include construction, operation, and decommissioning, Project sources should be inclusive of both physical components and activities associated with the Project (i.e. timber harvesting, worker transportation, reservoir clearing, transport of timber, etc.);

Response:

A comprehensive GHG emissions inventory has been developed for the Project for construction and operation and this has been presented in the EIS (Volume IIA, Chapter 3, Section 3.9.1.1 and 3.9.2). The GHG emissions for the decommissioning phase have not been considered by Nalcor Energy (Nalcor). This estimate would be prepared in the event that the plant is decommissioned (refer to response IR# JRP.40). For construction, the estimate was made on the basis of best estimates of heavy equipment and vehicle activity during construction and a best estimate of the anticipated fuel consumption throughout the construction period at each proposed site, including temporal overlap. This estimate includes the fuel used for worker transportation, reservoir clearing and timber harvesting. The assessment of GHG emissions during operation was made on the basis of the carbon stocks and carbon fluxes that are anticipated to occur during operation. The carbon modeling accounts for the change in forest cover, size of the reservoirs, zero, partial and full reservoir clearing, and organic material decomposition, among many other processes. This information has been provided in detail in the EIS (Volume IIA – Chapter 3 and in Lower Churchill Hydroelectric Generation Project GHG Emissions Study (Minaskuat 2008).

The compounds considered by Environment Canada in its *Notice with Respect to Reporting of Greenhouse Gases (GHGs) for 2009* do not list NO_x as a greenhouse gas subject to mandatory reporting. Nitrous oxide or N₂O is subject to mandatory reporting, and it has been considered in the EIS. Since N₂O emissions from boreal reservoirs are typically very low, relative to CO₂ and CH₄ (United Nations Educational Scientific and Cultural Organization (UNESCO) 2006; International Panel on Climate Change (IPCC) 2006), it has been suggested that “N₂O emissions need not be included in future reservoir induced GHG research” (UNESCO 2006). As a result N₂O was not considered a GHG of substantive importance and therefore not considered further in the Lower Churchill Hydroelectric Generation Project GHG Emissions Study (Minaskuat 2008) or the EIS.

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The Proponent is asked to provide:

- c. a discussion of how reservoir clearing and the loss of carbon sinks has been factored into the GHG budget, including how the Proponent will account for this loss over the long term; and

Response:

The assessment of GHG emissions included, as part of the assessment, the reservoir clearing activities.

This assessment was made on the basis of the carbon stocks and carbon fluxes that are anticipated to occur during operation, when the reservoir areas are flooded. An inventory was done for the existing or baseline condition (pre-flooding) and a carbon model was set up and used to account for the changes to the carbon stocks as a result of the flooding over the reservoir area. The carbon modeling accounts for the change in forest cover, size of the reservoirs, zero, partial and full reservoir clearing, the organic material present initially, influxes from the watershed, organic material decomposition, and many other processes. The GHG emissions during operation have been predicted with the carbon model for three different clearing scenarios: no clearing, partial clearing and full clearing. The result is a range of estimated emissions as shown in Table 1 below.

This information has been provided in detail in the EIS (Volume IIA, Chapter 3 and in Lower Churchill Hydroelectric Generation Project GHG Emissions Study (Minaskuat 2008).

Table 1 GHG Emission Estimates for Lower Churchill Hydroelectric Generation Project – Effect of Reservoir Clearing

	Total Emissions – Gull Island and Muskrat Falls (tonnes CO₂ eq/yr)		
	No Clearing	Partial Clearing	Full Clearing
Year 2	1,160,176	1,090,831	938,625
Year 20	124,997	123,624	120,611
50-year average	280,275	218,706	143,313
100-year average	202,636	196,165	181,962
Notes: Values based on information in Table 3-12 of the EIS Volume IIA, p. 3-18			

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The Proponent is asked to provide:

- d. a discussion of how this Project will affect short, medium and long term provincial, national and international emission reduction objectives, commitments, and requirements, including any plans to offset emissions.**

Response:

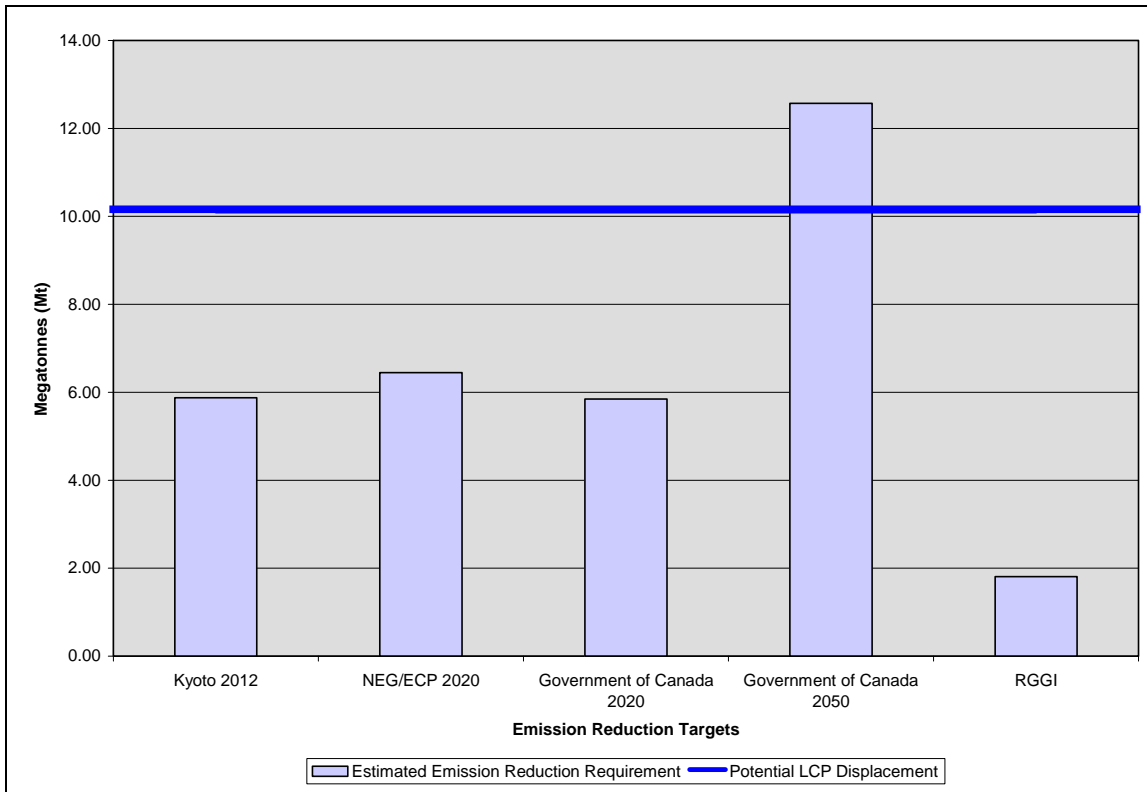
In the absence of emission forecasts, published 2004-2006 annual average emissions were used as a proxy for future emissions to estimate required reductions throughout this response. In addition, the potential greenhouse gas displacement values were calculated utilizing Nalcor's internal assumptions on the types of generation that would be displaced by power generation from the Project. As such, the reduction requirements identified in this response are general estimates only and should be treated as such by the Review Panel.

The response to IR# JRP.7 identified the potential displacement of up to 10.1 Mt of greenhouse gas emissions per year in Atlantic Canada based on different market sales scenarios.

Figure 1 highlights the emission reductions that are required in the electricity sector in Atlantic Canada to meet various GHG emission reduction targets. Estimates indicate that the potential displacement of fossil-fuel generation in the region by power generation from the Project could result in reductions that are sufficient to meet the most of the medium-term targets. In addition, the potential displacement of 10.1 Mt of emissions by the Project in the region accounts for approximately 14 percent of the reductions that would be required by the Atlantic Canadian electricity sector under the Government of Canada's long term GHG reduction target of 60-70 percent below 2006 emission levels.

The Project will also be a substantive contributor to GHG emission reduction targets at the national level. Figure 2 illustrates the potential reductions that would be required by the electricity sector across the country to meet the stated targets of the Government of Canada and the Kyoto Protocol. The total potential displacement of up to 11.5 Mt of GHG emissions from the Project (10.1 Mt in Atlantic Canada plus potential displacement from other sales) would account for 42 percent of the reductions required under Canada's medium-term target (20 percent below 2006 levels for the electricity sector) and 36 per cent of the Kyoto target (10 percent below 1990 levels). In addition, potential displacement resulting from the Project would be equal to almost 16 percent of the reductions that will be required in the national electricity sector under Canada's long-term target (60-70 percent below 2006 levels).

Figure 1 Greenhouse Gas Reduction Targets for the Electricity Sector - Atlantic Canada



Notes:

- (1) Required reductions are calculated by applying the various GHG emission reduction targets to the 2004-2006 annual average emissions for the electricity sector in Atlantic Canada.
- (2) The targets are:
 - Kyoto 2012 – Kyoto Protocol target of 6% below 1990 levels by 2012¹
 - NEG/ECP 2020 - New England Governors/ Eastern Canadian Premiers target of 10% below 1990 levels by 2020²
 - Government of Canada 2020 – Federal government target of 20% below 2006 levels by 2020³
 - Government of Canada 2050 – Minimum of Federal government target of 60-70% below 2006 levels by 2050⁴
 - RGGI – Regional Greenhouse Gas Initiative target of 10% below current levels.⁵

¹ Kyoto Protocol, United Nations Framework Convention on Climate Change, <http://unfccc.int/resource/docs/convkp/kpeng.html>

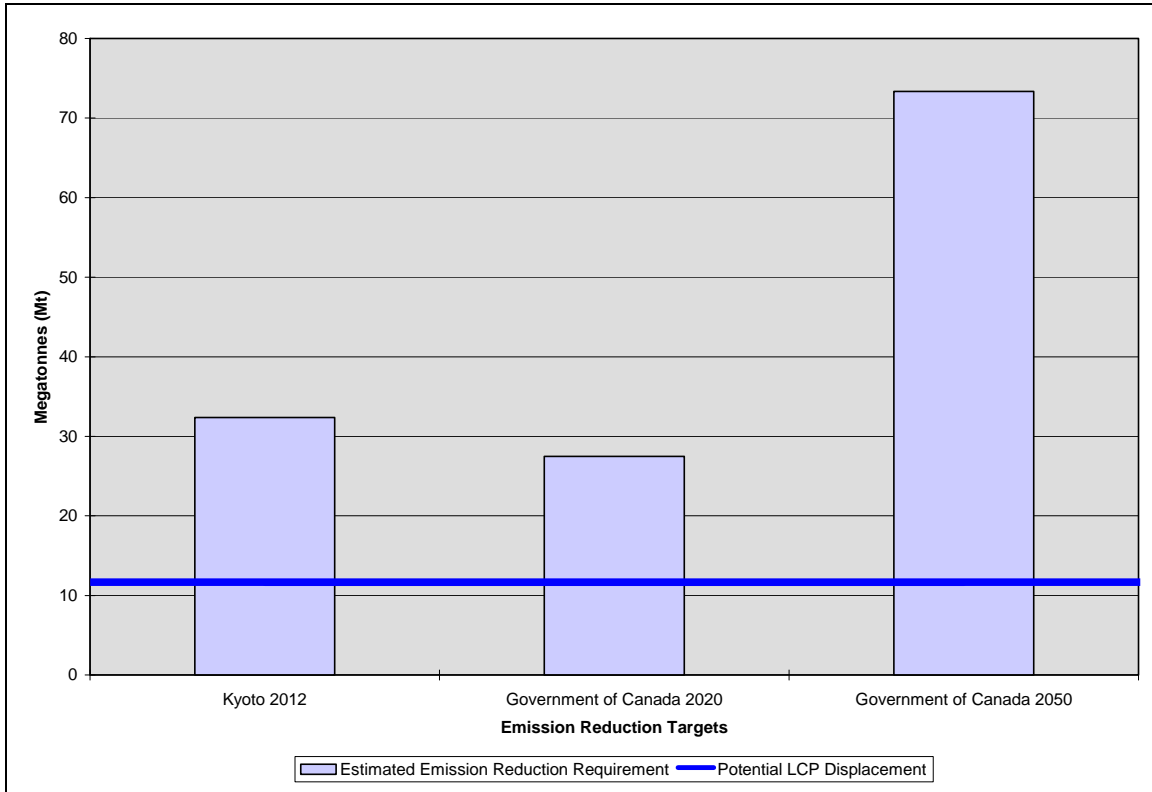
² Resolution 31-1, Resolution Concerning Energy and the Environment, 2007, New England Governors, Eastern Canadian Premiers, http://www.negc.org/documents/NEG-ECP_31-1.pdf

³ Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions, 2008, Government of Canada, http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/COM-541_Framework.pdf

⁴ Canada’s Action Plan, Government of Canada, <http://www.ec.gc.ca/cc/default.asp?lang=En&n=D80B0B3A-1>

⁵ Regional Greenhouse Gas Initiative, <http://www.rggi.org/home>

Figure 2 Greenhouse Gas Reduction Targets for the Electricity Sector - Canada



Notes:

- (1) Required reductions are calculated by applying the various GHG emission reduction targets to the 2004-2006 annual average emissions for the electricity sector in Canada.
- (2) The targets are:
 - Kyoto 2012 – Kyoto Protocol target of 6% below 1990 levels by 2012⁶
 - Government of Canada 2020 – Federal government target of 20% below 2006 levels by 2020⁷
 - Government of Canada 2050 – Minimum of Federal government target of 60-70% below 2006 levels by 2050⁸

The supply of clean, renewable power from the Project could assist the Atlantic Provinces and the Federal Government meet not only the GHG reduction targets identified above but could also provide a means to partially address other environmental goals and objectives that have been established by the individual jurisdictions. Table 1 highlights the assistance the Project could provide to the federal and provincial governments in achieving their respective goals and objectives under the possible market sales scenarios outlined in the response to IR# JRP.7.

As the Project itself will reduce GHG emissions in the electricity sector, Nalcor has no specific plans to offset GHG emissions from this Project.

⁶ Kyoto Protocol, United Nations Framework Convention on Climate Change, <http://unfccc.int/resource/docs/convkp/kpeng.html>

⁷ Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions, 2008, Government of Canada, http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/COM-541_Framework.pdf

⁸ Canada’s Action Plan, Government of Canada, <http://www.ec.gc.ca/cc/default.asp?lang=En&n=D80B0B3A-1>

Table 1 Potential Impact of Lower Churchill Development on GHG Objectives, Commitments and Requirements

Jurisdiction	Policy Directive/ Target	Potential Impact of Project
Newfoundland and Labrador	Reduce reliance on the Holyrood Generating Station ¹	Will displace the existing generation at Holyrood
Nova Scotia	Reduce Nova Scotia's annual GHG emissions by 5 Mt by 2020 ²	Will displace up to 8.4 Mt in annual GHG emissions in the Maritimes
	Reduce Nova Scotia's annual GHG emissions by up to 80 percent by 2020 ³	Will displace up to 8.4 Mt in annual GHG emissions in the Maritimes (80 percent of 2007 emissions were 16.5 Mt)
	Ensure that at least 25 per cent of our electricity is generated from renewable energy sources by 2020 ⁴	Will result in up to 9.7 TWh of new, renewable energy in the Maritime markets
New Brunswick	10 percent of electricity sales must come from new renewable sources by 2016 ⁵	Will result in up to 9.7 TWh of new, renewable energy in the Maritime markets
Canada	90 percent of electricity needs to be provided by non-emitting sources ⁶	Will result in 16.9 TWh of new non-emitting electricity production annually
	Clean Energy Task Force – 25 Mt reduction in annual GHG emissions from the electricity sector ⁷	Will displace up to 11.5 Mt in annual GHG emissions (46 percent of targeted reduction)

Note: The impacts of the project are based on the possible market sales scenarios outlined in the response to IR# JRP.7.

Sources:

1. Focusing Our Energy, 2007, Government of Newfoundland and Labrador, <http://www.nr.gov.nl.ca/energyplan/EnergyReport.pdf>
2. Toward a Greener Future: Nova Scotia's Climate Change Action Plan, 2009, Government of Nova Scotia, <http://www.gov.ns.ca/energy/resources/spps/energy-strategy/Climate-Change-Action-Plan-2009.pdf>.
3. *ibid.*
4. *ibid.*
5. Climate Change Action: 2007-2012, 2007, Government of New Brunswick, <http://www.gnb.ca/0009/0369/0015/0001-e.pdf>
6. Canada's Action Plan, Government of Canada, <http://www.ec.gc.ca/cc/default.asp?lang=En&n=D80B0B3A-1>
7. Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions, 2008, Government of Canada, http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/COM-541_Framework.pdf

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Cap & Trade Program Design, Western Climate Change Initiative <http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program>.

Climate Change Action: 2007-2012, 2007, Government of New Brunswick <http://www.gnb.ca/0009/0369/0015/0001-e.pdf>.

Environment Canada. 2009. Notice with respect to reporting of greenhouse gases (GHGs) for 2009. <http://www.gazette.gc.ca/rp-pr/p1/2009/2009-07-11/html/notice-avis-eng.html#d101>

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Focusing Our Energy. 2007. Government of Newfoundland and Labrador <http://www.nr.gov.nl.ca/energyplan/EnergyReport.pdf>.

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Online Industrial GHG Search Tool, Environment Canada
http://www.ec.gc.ca/pdb/ghg/onlineData/dataSearch_e.cfm.

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<http://www.gov.ns.ca/energy/resources/spps/energy-strategy/Climate-Change-Action-Plan-2009.pdf>.

Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions, 2008, Government of Canada http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/COM-541_Framework.pdf.