**Date : 8/28/2012 4:25:22 PM**
**From : "Thompson, Robert"**
**To : "'BrianCrawley@nalcorenergy.com'" , "Taylor, Brian W."**
**Cc : "EMartin@nalcorenergy.com"**
**Subject : RE: discussion paper NR**
**Attachment : Electricity Demand Forecasting (CWB Aug 25-2).doc;**

Brian C:

Attached are my comments on the Electricity Demand paper. While the content is strong, I have suggested some deletions and some changes in order (plus lots of gratuitous edits), to hopefully strengthen and focus it.

Robert

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**From:** BrianCrawley@nalcorenergy.com [mailto:BrianCrawley@nalcorenergy.com]
**Sent:** Monday, August 27, 2012 9:11 AM
**To:** Taylor, Brian W.; Thompson, Robert
**Cc:** EMartin@nalcorenergy.com
**Subject:** discussion paper NR

Brian/Robert: Minister Kennedy asked that you both review the attached discussion papers relating to legal matters and demand forecasting. Could I pls. have your comments by the end of the week? I understand Justice has some concerns with releasing the legal paper but are working it with the Minister. Also, just a reminder that I haven't heard back from you on the remaining papers. We were looking to provide comments to the Minister comments this week. Thanks
Brian

**Brian Crawley**
Nalcor Energy - Lower Churchill Project
t. 709 737 - 1499 c. 709 725 - 9145
1.888.576.5454

# Electricity Demand Forecast: Do We Need the Power?

**Department of Natural Resources**

August 2012

This paper may be changed once the complete 2012 Planning Load Forecast (2012PLF) for the province is available.

## Key Factors

- New generation is required to meet future Island demand. Newfoundland and Labrador Hydro's 2010 Planning Load Forecast indicates that by 2015, the province will be challenged to meet peak demand in the winter months and, post-2019, there will not be sufficient energy to meet demand through the year.

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- ~~Electricity demand is strongly linked to economic growth.~~

- ~~Since 2002, Newfoundland and Labrador has experienced significant economic growth as a result of mining and petroleum developments. GDP has increased by 71%, personal disposable income per person by 52%, and housing starts are up 49%.~~

- ~~Since 2002, Island residential demand has increased by 16% and Island commercial demand is up 10%. The number of Island residential customers has increased by 12% and the average electricity use per home has increased by 4%. Over the same period, approximately 25,300 new homes were constructed. While industrial demand has fluctuated, the underlying growth in residential and commercial demand has sustained electricity demand.~~

- ~~The most recent economic forecast prepared by the Department of Finance indicates that GDP will increase by 1.6% annually over the next 20 years, and that the number of households in the province and new developments in the commercial and industrial sectors are expected to increase.~~

- Newfoundland and Labrador Hydro's latest electricity demand forecast points to growth in Island electricity demand of 1.4% annually between 2011 and 2031, with 3.1% average annual growth up to 2016 and 0.8% average annual growth post 2016. Industrial demand will be higher in the initial period due to the commissioning of ~~led by~~ the Long Harbour processing facility which will require approximately 85MW of new supply.

- ~~New generation is required to meet future Island demand. Newfoundland and Labrador Hydro's 2010 Planning Load Forecast indicates that by 2015, the province will be challenged to meet peak demand in the winter months and, post-2019, there will not be sufficient energy to meet demand through the year.~~

- In addition to Island demand, an~~d~~ estimated $10-15 billion of investment in Labrador mining projects may be realized over the next decade, but this is dependent in part on the availability of power. Based on projects already in construction or near sanction, existing generating capacity in Labrador will be exhausted by 2015-17.

## Introduction

Newfoundland and Labrador has been experiencing significant levels of economic growth as a result of mining and petroleum developments and substantial spin-off commercial activities. Figure 1 shows that the economy has experienced significant growth in GDP; ~~and has grown~~ an astounding 71% from 2002 to 2010.[1] As well, both personal disposable income per person and housing starts have increased from 2002 to 2010 by 52%[2] and 49%[3], respectively.

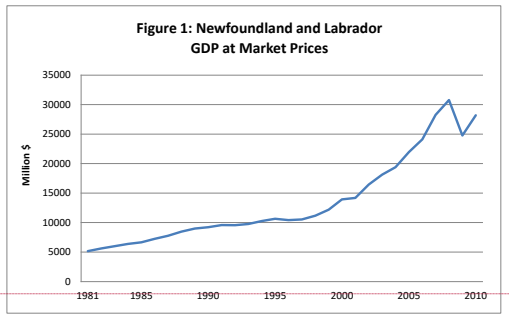



**Figure 1: Newfoundland and Labrador GDP at Market Prices**

Source: Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) and Statistics Canada, Provincial Economic Accounts

Coincident with this growth has been an increase in electricity demand in the province. Figure 2 demonstrates that the demand for electricity in Newfoundland and Labrador has increased since 1981 and has included continued growth in the Island residential and commercial sectors. Since the beginning of 2002, Island commercial electricity demand has increased by 10% and Island residential demand has increased by 16%.[4] Over the same period, the number of Island residential electricity customers has increased by 12%.[5]

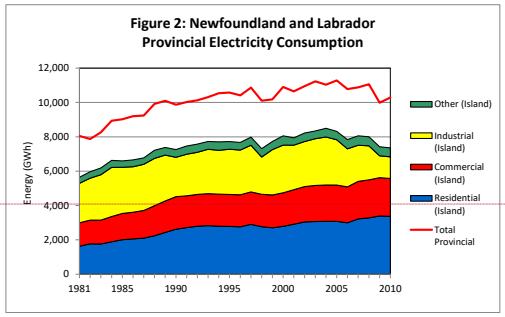



**Figure 2: Newfoundland and Labrador Provincial Electricity Consumption**

Source: Newfoundland and Labrador Hydro, System Planning Department

Future growth in electricity demand across the residential, commercial and industrial sectors in the province will be strongly influenced by economic growth. Increasing personal income, capital investment and housing starts are major contributors in continued growth in electricity demand.

**Commented [r1]:** The Total provincial demand line in Figure 2 took me a while to understand. It includes Labrador. To be honest it is a little confusing because there is no reference in the text to Labrador demand, so I suggest eliminating the Total Provincial line and re-labelling the chart to say "Island Electricity Consumption"

**Commented [r2]:** This para seems to deliberately ignore the industrial decline, and thus seems weak. I think it should state the issue and explain it. Maybe, "While there has been a decline in industrial demand since 2004, the growth in commercial and residential demand has been strong and continuous. Since 2002, …etc. Since 2004 the decline in industrial demand has provided flexibility to meet the continuously growing commercial and residential demand. However, as will be described below, this flexibility will be substantially reduced by 2015, and new electricity supply will be required."

---

[1] Calculated from GDP data published by Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada, Provincial Economic Accounts available at http://www.stats.gov.nl.ca/Statistics/GDP/PDF/GDP_Current_Prices.pdf

[2] Calculated from personal income data published by Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada, Provincial Economic Accounts available at http://www.stats.gov.nl.ca/Statistics/GDP/PDF/Personal_Income.pdf

[3] Calculated from housing starts data published by Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Canada Mortgage and Housing Corporation (CMHC) and Statistics Canada available at http://www.stats.gov.nl.ca/Statistics/Industry/PDF/Housing_Starts.pdf

[4] Newfoundland and Labrador Hydro, System Planning Department.

[5] Newfoundland and Labrador Hydro, System Planning Department.

The profile for electricity demand growth is developed each year by Newfoundland and Labrador Hydro (NLH) in a long-term Planning Load Forecast (PLF). NLH has had the responsibility for developing the load forecast for the province for the last 40 years and has used it as a critical tool for determining the timing of new generation supply to meet demand. The ~~electricity demand~~ forecast considers both the demand for electricity and available supply. If supply is not sufficient to meet the forecast demand, then NLH makes a recommendation to add new generation.

The purpose of this paper is to describe~~monstrate that there is a~~ the growing demand for electricity in the province and ~~to provide the information that supports~~ the need for new generation. Information and data used in the preparation of this document was obtained from publicly available information developed by the following sources:

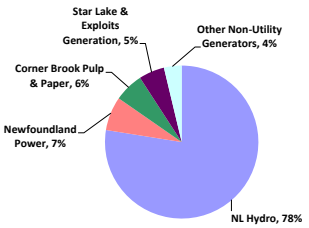
**Commented [r3]:** This paragraph could perhaps be better placed at the start of this section.

- Newfoundland and Labrador Hydro;
- Nalcor Energy;
- Government of Newfoundland and Labrador, Department of Finance;
- Statistics Canada;
- Canada Mortgage Housing Corporation.

## Historic and Current Electricity Demand

The total generating capacity for the Island interconnected system is 1,958 MW, with NLH providing 1,518 MW of power.[6] The total Labrador interconnected peak demand is approximately 460 MW in 2012[7] and includes Happy Valley/Goose Bay and region, Wabush, Labrador City, and Churchill Falls (figure 4). The Labrador interconnected load is supplied by the Churchill Falls hydroelectric generating station.

**Figure 4: Newfoundland Generation Capacity**
**Total = 1,958 MW**




Source: Newfoundland and Labrador Hydro, Generation Planning Issues, July 2010 Update

[6] Generation Planning Issues, July 2010 Update (p. 7), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf

[7] Summary of Newfoundland and Labrador Hydro 2010 Long Term Planning Load Forecast (Appendix A), published by NLH available at http://www.pub.nf.ca/applications/muskratfalls2011/files/exhibits/Exhibit27-LongTermPlanLoadForecast2010.pdf

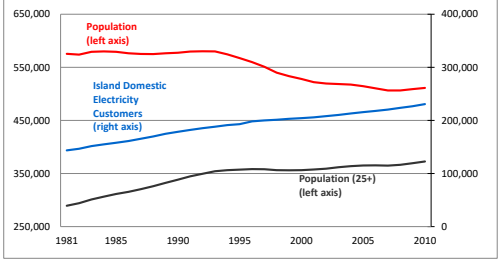
## Island Residential

In 2010, there were 230,581 residential customers[8] on the Island interconnected system representing approximately 95%[9] of the province's residential customer base and accounting for 60%[10] of total retail sales[11] on the Island. Since 2002, there have been some significant changes in this sector.

- There have been approximately 2,800 new housing starts annually between 2002-2010[12], 80% of which were single-detached homes[13] with 86% of new homes choosing electric heat as their heating source[14]. Between 2005-2010, the number of housing starts has increased, averaging approximately 2,885 new homes annually, with significant growth occurring between 2008-2010, which saw 3,200 new homes per year[15].

- There are approximately 25,300 new households in the province from 2002 to 2010.[16] While the population of the province has not grown substantially in this period, there has been an increase in the number of households and domestic electricity customers as well as increases in population in the +25 year old age group (Figure 3).[17] The increase in the number of new homes results in more ratepayers and an increase in the demand for electricity.

**Figure 3: Newfoundland and Labrador Population and Island Residential Electricity Customers**




Source: 1) Island Domestic Electricity Customers from Newfoundland and Labrador Hydro, System Planning Department
2) Population from Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) and Statistics Canada

- In addition to continued housing starts in the province, the historical trend in

[8] Newfoundland and Labrador Hydro, System Planning Department.
[9] Newfoundland and Labrador Hydro, System Planning Department.
[10] Newfoundland and Labrador Hydro, System Planning Department.
[11] Retail sales of electricity do not include industrial sales.
[12] Housing Now: Atlantic Region, published by the Canada Mortgage Housing Corporation (p.11) available at http://www.cmhc-schl.gc.ca/odpub/esub/64135/64135_2012_Q02.pdf?lang=en
[13] The Economy 2012: Real Estate, published by the Department of Finance (p. 1) available at http://www.economics.gov.nl.ca/E2012/RealEstate.pdf
[14] Lower Churchill Project: Presentation to Newfoundland Environmental Industry Association by Nalcor Energy available at http://www.neia.org/presentations/lower%20churchill%20project.pdf
[15] Housing Now: Atlantic Region, published by the Canada Mortgage Housing Corporation (p.11) available at http://www.cmhc-schl.gc.ca/odpub/esub/64135/64135_2012_Q02.pdf?lang=en
[16] Housing Now: Atlantic Region, published by the Canada Mortgage Housing Corporation (p.11) available at http://www.cmhc-schl.gc.ca/odpub/esub/64135/64135_2012_Q02.pdf?lang=en
[17] NL Population: Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada available at http://www.stats.gov.nl.ca/Statistics/Population/PDF/PopAgeSex_BS.PDF
Residential (Domestic) Customer data from Newfoundland and Labrador Hydro, System Planning Department

the last 20 years has been fewer people occupying each household and homes that are larger (ie. increased floor space per household).[18] More homes and more space means more electricity has been required to power and heat these homes.

- The increase in the number of new homes has resulted in more ratepayers and an increase in the demand for electricity. In 2010, there were approximately 17,600[19] additional residential ratepayers on the Island system compared to the beginning of 2005.

The Government of Newfoundland and Labrador, Department of Finance's latest economic outlook forecasts GDP and personal disposable income to increase annually by approximately 1.6% and 3.3%, respectively, over the next 20 years.[20] **[Note: Alternative public source for GDP and personal disposable income forecast may become available with PLF2012 if released.]** As well, the outlook anticipates continued new housing starts in the residential sector through the forecast period and a result will be increased electricity demand.

### Island Commercial

Commercial electricity sales account for about 40%[21] of total retail sales on the Island and are dependent on changes in provincial GDP, personal income, building stock and heating requirements. Demand from this sector has grown over the past twenty years, including that related to spin-off activity from the mining and petroleum sectors as well as other commercial developments. Both GDP and personal disposable income have risen in the last 20 years[22], and the forecast of longer term economic growth will help drive commercial development and commercial demand for electricity.

### Island Industrial

On the Island interconnected system, closure of the newsprint mills in Stephenville and Grand Falls-Windsor as well as reduced paper production at the Corner Brook mill resulted in a total reduction in industrial average demand of approximately 176 MW[23] since 2004. By 2011, about one third or 58 MW of average demand of this reduced industrial consumption has been utilized by other Island consumers.

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[18] Based on household information from Natural Resources Canada, Office of Energy Efficiency available at http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/trends_res_nf.cfm and population data from Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada available at http://www.stats.gov.nl.ca/Statistics/Population/PDF/PopAgeSex_BS.PDF .

[19] Newfoundland and Labrador Hydro, System Planning Department.

[20] Newfoundland and Labrador Economic Forecast prepared by the Newfoundland and Labrador Department of Finance, April 2012. **NOTE: Document is CONFIDENTIAL and not for public release.**

[21] Newfoundland and Labrador Hydro, System Planning Department.

[22] GDP data published by Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada, Provincial Economic Accounts available at http://www.stats.gov.nl.ca/Statistics/GDP/PDF/GDP_Current_Prices.pdf

Personal income data published by Economics and Statistics Branch (Newfoundland & Labrador Statistics Agency) that has been sourced from Statistics Canada, Provincial Economic Accounts available at http://www.stats.gov.nl.ca/Statistics/GDP/PDF/Personal_Income.pdf

[23] Newfoundland and Labrador Hydro, System Planning Department.

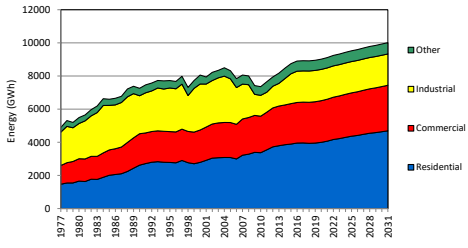
### Labrador Industrial

Current mining operations in Labrador have a combined electrical power requirement of nearly 300 MW and include companies like the Iron Ore Company of Canada (IOC) and Wabush Mines. A separate paper, *"Labrador Mining and Power: How Much and Where From?"* demonstrates the potential increasing demand requirement in Labrador and the need for additional supply.

### Future Electricity Demand

Since 1977, there has been a continued increase in electricity demand in the residential and commercial sectors as demonstrated in Figure 7.[24] Industrial demand has seen both high growth and contraction over this period and was particularly impacted in 2006 and 2009 with the closure of the pulp and paper mills. Looking forward, the Government of Newfoundland and Labrador, Department of Finance's latest economic outlook forecasts GDP and personal disposable income to increase annually by approximately 1.6% and 3.3%, respectively, over the next 20 years.[25] As well, the outlook anticipates continued new housing starts in the residential sector through the forecast period and a result will be increased electricity demand. ~~t~~Therefore~~e~~ load requirement for the Island Interconnected system is expected to increase by 1.4% annually between 2011 and 2031 (approximately 3.1% average annual growth up to 2016 and 0.8% average annual growth post 2016) driven by continued growth in the residential and commercial sectors.

**Figure 7: Newfoundland and Labrador Island Interconnected Electricity Requirements**




Source: Newfoundland and Labrador Hydro, System Planning Department

~~The most recent economic forecast prepared by the Department of Finance shows continued growth in the economy driven by major investments in natural resource projects. These projects also support indirect capital investments in new commercial and light industrial enterprises.~~

~~The Government of Newfoundland and Labrador, Department of Finance's latest economic outlook forecasts GDP and personal disposable income to increase annually by approximately 1.6% and 3.3%, respectively, over the next 20 years.[26] As well, the outlook anticipates continued new housing starts in the residential sector through the forecast period and a result will be increased electricity demand.~~

The latest electricity demand outlook anticipates that total Island consumption in the 2013/2014 time frame will surpass the 2004 level and the 176 MW noted above, formerly consumed by the pulp and

[24] Newfoundland and Labrador Hydro, System Planning Department.
[25] Newfoundland and Labrador Economic Forecast prepared by the Newfoundland and Labrador Department of Finance, April 2012. **NOTE: Document is CONFIDENTIAL and not for public release.**
[26] Newfoundland and Labrador Economic Forecast prepared by the Newfoundland and Labrador Department of Finance, April 2012. **NOTE: Document is CONFIDENTIAL and not for public release.**

paper mills, will be entirely utilized with continued residential and commercial sector growth and the addition of the Vale Long Harbour facility (will require approximately 70 MW average demand through the year with 85 MW at peak demand). As well, NLH in consultation with the existing island industrial customers indicates that the existing industrial customer base will be sustained. Corner Brook Pulp and Paper will require approximately 26 MW at current operational levels in addition to their generation capability at Deer Lake. North Atlantic Refining Ltd., which operates an oil refinery at Come-By-Chance, has a peak demand of 31 MW.[27] Teck Resources' copper-zinc mine and mill near Millertown, is expected to remain in operation through 2014, with a peak demand of 10 MW.[28]

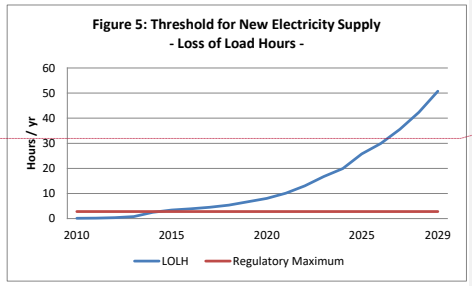
In additional to Island demand, the Labrador interconnected system's demand is forecast to grow by 1.1% annually on average[29]. However, Its important to note that this forecast does not include any of the potential $10-15 billion in industrial mining growth that may occur which could create additional demand. Should these projects materialize, then there will be insufficient supply available from CFLCo to meet the full demand. New generation will be required as the Holyrood plant cannot serve new industrial load in Labrador. A separate paper, *"Labrador Mining and Power: How Much and Where From?"* demonstrates the potential increasing demand requirement in Labrador and the need for additional supply.

**Commented [r4]:** I get it, but this point seems so obvious, I wonder is it worth stating.

## When Is New Supply Required?

To ensure that all levels of demand can be met, the PUB sets reliability standards for the Island and electricity generation. The reliability standard requires that NLH install enough generation to result in 2.8 hours (or less)[30] per year with insufficient generation available. This equates to having enough generation available at least 99.97% of the time. NLH is the main supplier of electricity on the Island Interconnected System, providing 78%[31] of the capacity. In order to meet the PUB standard and ensure there is an adequate supply of generation to meet peak system demand, NLH maintains capacity and energy reserves (effectively a generation

**Commented [r5]:** ?? should it be "electricity generation on the Island." ????




Source: Newfoundland and Labrador Hydro

[27] Summary of Newfoundland and Labrador Hydro 2010 Long Term Planning Load Forecast (p. 8), published by NLH available at http://www.pub.nf.ca/applications/muskratfalls2011/files/exhibits/Exhibit27-LongTermPlanLoadForecast2010.pdf

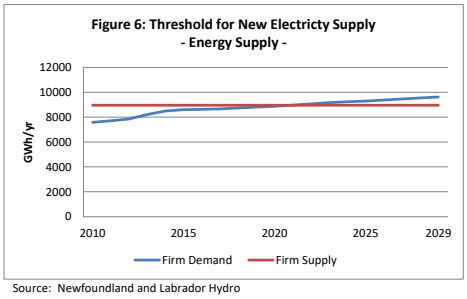
[28] Newfoundland and Labrador Hydro, System Planning Department.

[29] "Summary of Newfoundland and Labrador Hydro 2010 Long Term Planning Load Forecast" (Appendix A) published by NLH available at http://www.pub.nf.ca/applications/muskratfalls2011/files/exhibits/Exhibit27-LongTermPlanLoadForecast2010.pdf

[30] Generation Planning Issues, July 2010 Update (p. 9), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf .

[31] Generation Planning Issues, July 2010 Update (p. 6-7), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf .

"buffer"). This buffer size depends on the reliability of the units in use, but is approximately 15% in the current Island system. In 2012, for example, the Island's 1,958 MW of installed generation is sufficient to meet expected peak demand of 1,571 MW, well within the approved reliability standard as set by the PUB.[32]



Source: Newfoundland and Labrador Hydro

The electricity demand forecast indicates that by 2015, there will be a capacity deficit on the Island.[33] This means that there will not be enough power to meet peak demand in the middle of winter. NLH likely will exceed its maximum allowable reliability standard of 2.8 hours in 2015 (Figure 5). Post-2019, NLH forecasts an energy deficit on the Island (Figure 6).[34] This means there will not be enough generating capability on the Island to meet demand over the year. Additional power is therefore required by 2015 in order to satisfy demand and to meet the reliability standards.

## Future of the Holyrood Generating Plant

The Holyrood thermal generating plant is a major source of electrical energy supply to the Island interconnected system, currently generating between 15 and 25%, on average, of the island's electricity annually. The Holyrood generating facility has a total generating capacity of 490 MW and supplies power for heating in winter as well as meeting system reliability requirements. Holyrood does not produce large quantities of power during the summer months but the plant must be available to produce its full capacity in the event that customers demand it. At peak production, the plant can burn 18,000 barrels of fuel oil per day. [35]

In the 2007 Energy Plan, the Provincial Government stated that the Holyrood thermal generating plant represents a significant challenge for the Island interconnected system. [36] As discussed in the *"Electricity Rates Forecasting: Muskrat Falls Will Stabilize Rates"* paper, the cost of operating Holyrood has increased with world oil prices (given its reliance on burning fuel oil to produce electricity), the result

**Commented [r6]:** This section is not needed in this paper. The paper is about "do we need the power"? The points made in this section address a different issue – what to do with Holyrood. It raises issues of oil-related cost increases and costly pollution abatement. These issues do not belong here, because they deflect attention away from the core purpose of the paper.

**Commented [r7]:** Statistical point – this is a range, not an average.

[32] Generation Planning Issues, July 2010 Update (p. 10), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf .
[33] Generation Planning Issues, July 2010 Update (p. 8-10), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf .
[34] Generation Planning Issues, July 2010 Update (p. 8-10), published by NLH available at http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit16-GenerationPlanningIssuesJuly2010.pdf .
[35] NL Hydro Thermal Operations, http://www.nlh.nl.ca/hydroweb/nlhydroweb.nsf/TopSubContent/Operations-Thermal%20Generation?OpenDocument
[36] NL Energy Plan: Focusing Our Energy (p.38), Government of Newfoundland and Labrador, http://www.nr.gov.nl.ca/nr/energy/plan/pdf/energy_report.pdf

being significant electricity rate increases for Island customers. Holyrood also emits greenhouse gases and other pollutants with an impact on the environment.

Nalcor Energy and NLH investigated the long-term options for the Holyrood plant. An estimated investment of more than $800 million will be required in the 2015 to 2019 time period to help extend the plant's life and install equipment upgrades to reduce pollutant emissions.[37] These investments will not eliminate greenhouse gas emissions. If the plant is retained rather than building Muskrat Falls, ~~used to accommodate the increased demand in the current forecast~~ then greenhouse gas emissions will increase and electricity rates will increase with oil prices that are forecast to increase in the long-term.

In order to avoid the significant investments at Holyrood noted above, that would be necessary to continue its operation, as well as the future electricity rate increases due to oil prices, a decision is required in the near term regarding the retirement of the facility.

## Conclusions

It is clear that we need the power.

- With residential sector growth, commercial sector growth, the new nickel smelter at Long Harbour, ~~expected to continue, new commercial development associated with increased economic activity~~ and a number of potential mining developments in Labrador, additional power will be required to meet this new demand.
- To ensure that power is available to all customers, the development of Muskrat Falls will ensure that all sectors have access to clean, reliable and least-cost electricity. Muskrat Falls will also facilitate the retirement of the Holyrood generating plant.
- Without the addition of new generation from Muskrat Falls, the province will have to rely on more expensive and less viable electricity supply options to heat homes and power mining developments. Demand is expected to continue to rise as the province's economy continues to flourish.
- Surplus power from the Muskrat Falls project will be available to meet some of the incremental demand growth that would be possible from future Labrador mining opportunities. Without Muskrat Falls surplus power supply, the result could be these mining investments and associated economic opportunities could move elsewhere, including Quebec.

**Commented [r8]:** This text, similar to the previous section, is not related to the main purpose of the paper and should be addressed in different papers.

It is critical that sufficient capacity exists to ensure that homes and residences have access to electricity for heating and other household requirements; and business and industry have the power they need to grow. Muskrat Falls will ensure that this demand is met.

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[37] PUB Muskrat Falls Review Exhibit 28, Nalcor Energy, http://www.pub.nf.ca/applications/MuskratFalls2011/files/exhibits/Exhibit28-PUBletterJuly12-Q10.pdf; and PUB Report on Two Generation Expansion Alternatives for the Island Interconnected Electrical System Volume 1: Summary of Reviews (p.77), MHI, http://www.pub.nl.ca/applications/MuskratFalls2011/files/mhi/MHI-Report-VolumeI.pdf

## Appendix 1 – Load Forecast from NLH's 2012 PLF

**Table 1: Island Interconnected Load Forecast**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domestic (GWh) | 3,543 | 3,723 | 3,791 | 3,852 | 3,893 | 3,954 | 3,961 | 3,936 | 3,952 | 3,997 | 4,067 | 4,168 | 4,223 | 4,297 | 4,366 | 4,413 | 4,483 | 4,546 | 4,584 | 4,638 | 4,692 |
| Annual Growth Rate (%) | 5.1 | 5.1 | 1.8 | 1.6 | 1.1 | 1.6 | 0.2 | -0.6 | 0.4 | 1.1 | 1.8 | 2.5 | 1.3 | 1.8 | 1.6 | 1.1 | 1.6 | 1.4 | 0.8 | 1.2 | 1.2 |
| General Service (GWh) | 2,232 | 2,312 | 2,356 | 2,361 | 2,400 | 2,410 | 2,423 | 2,438 | 2,455 | 2,473 | 2,493 | 2,514 | 2,536 | 2,558 | 2,576 | 2,597 | 2,619 | 2,641 | 2,663 | 2,686 | 2,709 |
| Annual Growth Rate (%) | 3.0 | 3.6 | 1.9 | 0.2 | 1.7 | 0.4 | 0.6 | 0.6 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.8 |
| Industrial (GWh) | 1,206 | 1,310 | 1,367 | 1,591 | 1,804 | 1,889 | 1,886 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 |
| Annual Growth Rate (%) | -4.1 | 8.5 | 4.4 | 16.4 | 13.4 | 4.7 | -0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Street Lighting (GWh) | 39.306 | 38.9 | 39.2 | 39.9 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 | 39.275 |
| Total Losses (GWh) | 630.67 | 559.19 | 616.1 | 627.81 | 608.44 | 611.01 | 612.08 | 609.97 | 612.19 | 616.51 | 622.85 | 631.38 | 636.78 | 643.62 | 649.71 | 654.51 | 660.93 | 666.89 | 671.15 | 676.56 | 681.9 |
| **Total Island (GWh)** | **7,652** | **7,942** | **8,169** | **8,472** | **8,745** | **8,902** | **8,921** | **8,914** | **8,949** | **9,016** | **9,113** | **9,243** | **9,325** | **9,429** | **9,522** | **9,595** | **9,692** | **9,783** | **9,848** | **9,930** | **10,012** |
| Annual Growth Rate (%) | 4.0 | 3.8 | 2.9 | 3.7 | 3.2 | 1.8 | 0.2 | -0.1 | 0.4 | 0.7 | 1.1 | 1.4 | 0.9 | 1.1 | 1.0 | 0.8 | 1.0 | 0.9 | 0.7 | 0.8 | 0.8 |

**Table 2: Labrador Interconnected Load Forecast (PLF 2010 as not yet available for PLF2012)**

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total (GWh)** | **2,904** | **2,944** | **2,985** | **3,010** | **3,016** | **3,020** | **3,023** | **3,026** | **3,028** | **3,029** | **3,031** | **3,032** | **3,033** | **3,035** | **3,036** | **3,037** | **3,038** | **3,039** | **3,041** | **3,042** |
| Annual Growth Rate (%) | 19.4 | 1.4 | 1.4 | 0.8 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Demand (MW) | 457 | 458 | 459 | 460 | 461 | 461 | 462 | 463 | 464 | 464 | 465 | 465 | 466 | 467 | 467 | 468 | 468 | 469 | 469 | 470 |
| Annual Growth Rate (%) | 3.6 | 0.2 | 0.3 | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

**Table 3: Island Isolated Load Forecast (PLF 2010 as not yet available for PLF2012)**

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total (GWh)** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** |
| Annual Growth Rate (%) | 0 | 0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| Peak Demand (MW) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Annual Growth Rate (%) | 6.8 | 0 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |

**Table 4: Labrador Isolated Load Forecast (PLF 2010 as not yet available for PLF2012)**

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total (GWh)** | **60** | **62** | **63** | **64** | **65** | **66** | **67** | **68** | **68** | **69** | **70** | **71** | **72** | **73** | **74** | **75** | **76** | **77** | **78** | **79** |
| Annual Growth Rate (%) | 3.2 | 3.4 | 1.6 | 1.5 | 1.4 | 1.5 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Peak Demand (MW) | 14 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 18 | 18 | 18 | 18 | 18 |
| Annual Growth Rate (%) | 3.6 | 2.7 | 1.5 | 1.5 | 1.4 | 1.5 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |

**Table 5: Total Provincial Load Forecast (Not yet available for PLF2012)**

## Appendix 2 – Explanation of Footnotes

**1.** Peak demand or capacity refers to the highest level of electricity consumption that the utility can supply at any one time. For residential customers, capacity is measured in kilowatts (kW). Peak demand on the electrical system is measured in megawatts (MW). Firm capacity is the amount of energy available for production or transmission which can be guaranteed to be available at a given time. Energy (or consumption) refers to the total amount of electricity that the utility supplies throughout the year. In the home, the amount of energy used is measured in kilowatt hours (kWh); to NLH industrial customers, it is measured in gigawatt hours (GWh).

Peak output at Muskrat Falls is 824 MW. This is the plant's capacity, or the maximum amount of power that the plant can produce at any given time to service customers' demand, or load. However, the plant does not produce the 824 MW every hour of every day that it is capable of producing. If the plant was to produce at full capacity all of the time, the energy output would be 7,218,240 megawatt-hours (MWh), or 7.2 terawatt-hours (TWh), per year. Because the plant is not operating at full capacity all of the time, the energy output is smaller, as it aligns more closely with how customers actually use power, rather than how much power the plant is capable of producing. The actual output of Muskrat Falls is actually closer to 4.9 TWh per year. However, the plant must always be capable of meeting peak demand in the event that customers demand it.

# ECONOMIC INDICATORS

| | 2011e | 2012f | 2013f | 2014f |
|---|---|---|---|---|
| **GDP at Market Prices** ($ M) | 33,026 | 33,769 | 34,859 | 34,025 |
| % Change | 17.1 | 2.2 | 3.2 | -2.4 |
| % Change, real | 4.3 | 0.1 | 4.1 | -3.4 |
| **Final Domestic Demand*** ($ M) | 28,608 | 31,222 | 32,798 | 32,590 |
| % Change | 6.6 | 9.1 | 5.0 | -0.6 |
| % Change, real | 4.7 | 6.1 | 2.7 | -2.4 |
| **Personal Income** ($ M) | 18,469 | 19,463 | 20,467 | 21,283 |
| % Change | 6.3 | 5.4 | 5.2 | 4.0 |
| % Change, real | 2.8 | 3.1 | 3.0 | 1.7 |
| **Personal Disposable Income** ($ M) | 14,891 | 15,696 | 16,503 | 17,172 |
| % Change | 6.3 | 5.4 | 5.1 | 4.1 |
| % Change, real | 2.8 | 3.2 | 3.0 | 1.7 |
| **Retail Sales** ($ M) | 7,833 | 8,149 | 8,653 | 8,973 |
| % Change | 5.1 | 4.0 | 6.2 | 3.7 |
| % Change, real | 1.4 | 2.7 | 4.8 | 1.9 |
| **Consumer Price Index** (2002=100) | 121.4 | 124.0 | 126.6 | 129.5 |
| % Change | 3.4 | 2.2 | 2.1 | 2.3 |
| **Capital Investment** ($ M) | 7,376 | 9,598 | 10,345 | 9,302 |
| % Change | 21.9 | 30.1 | 7.8 | -10.1 |
| % Change, real | 24.4 | 24.3 | 4.6 | -11.0 |
| **Housing Starts** (units) | 3,488 | 3,371 | 3,363 | 3,176 |
| % Change | -3.3 | -3.4 | -0.2 | -5.5 |
| **Employment** (000s) | 225.4 | 229.4 | 233.4 | 234.3 |
| % Change | 2.7 | 1.8 | 1.7 | 0.4 |
| **Labour Force** (000s) | 258.0 | 261.5 | 264.6 | 265.6 |
| % Change | 0.7 | 1.4 | 1.2 | 0.4 |
| **Unemployment Rate** (%) | 12.7 | 12.3 | 11.8 | 11.8 |
| **Population** (000s) | 510.6 | 513.0 | 515.6 | 517.3 |
| % Change | -0.1 | 0.5 | 0.5 | 0.3 |

* Final domestic demand measures demand in the local economy by summing consumption, investment and government expenditures; it excludes net exports.
e: estimate; f: forecast, Department of Finance, April 2012
Source: Statistics Canada; Department of Finance