Q. Please provide any recent reports or analyses conducted by Newfoundland Hydro assessing electrification possibilities for the Province. Please provide any further documentation Newfoundland Hydro may have on the prospects for, or implications of, increased electrification of end uses (transport, buildings, industry).

A. During 2018, Hydro completed some initial exploratory work with respect to electrification opportunities within the province as part of a working committee that included participation by provincial government representatives. The initial work was limited to the quantification of No. 2 heating fuel consumption within the provincial government sector to gauge the potential for fuel switching opportunities. Table 1 below provides a summary of the No. 2 fuel consumption data that was collected during this initial work.

Table 1
Summary of NL Public Administration No. 2 Fuel Consumption for Heating Purposes - Island Interconnected System

	Estimate of Annual Fuel Consumption (Litres)
Health Care Sector	18,043,000
Memorial University	11,500,000
Other NL Gov. Properties	5,816,000
K-12 Schools	NA
Total	35,359,000

Source: NL Gov. and Memorial University

Hydro has provided responses to specific requests for information from the Government of Newfoundland and Labrador as noted below:

- PUB-Nalcor-071, Attachment 1 and PUB-Nalcor-071, Attachment 2: Email exchange dated September 24, 2018; and
- PUB-Nalcor-071, Attachment 3: Email exchange dated February 12, 2019.

Hydro expects that other electrification opportunities may exist within other sectors such as industry and transportation sectors; however, there has not been any further analysis or reports completed by Hydro with respect to electrification potential/possibilities at the present time.

Hydro notes that the demand impacts associated with electrification would require further study and notes that its Reliability and Resource Adequacy Study remains before the Board.

From: Jennifer Williams/NLHydro
To: "John Cowan" <JCowan@gov.nl.ca>
Cc: Jim Haynes/NLHydro@NLHYDRO, Paul Stratton/NLHydro@NLHydro, Candace White/NLHydro@NLHYDRO, Dave Jones/NLHydro@NLHYDRO, Renee Smith/NLHydro@NLHYDRO, Deanne Fisher/NLHydro@NLHYDRO
Date: 09/24/2018 04:59 PM
Subject: Fw: [External] FW: Building Electrification - complete package of information from sub-committee

---

Hi John

Between MUN, Central health buildings, and 10 of the high consuming buildings from Transportation and Works, there is a maximum of 42 MW (assuming 100% coincidence factor) and 150 GWh in opportunity should they convert. We caution that this is an indication only, developed using assumptions around conversion rate, efficiency, and load factor. Further analysis with more accurate data (i.e. vintage and type of furnaces, Newfoundland Power load profile data for buildings of similar size/purpose). However, the analysis gives a sense of the potential magnitude of the opportunity, which is helpful.

Should government want to pursue this opportunity wholly or partially, it would be important to consider the impact each could have on the capacity on the island. It should not be assumed that we would necessarily need to replace additional capacity from conversion on a one-to-one basis. Meaning, perhaps there is an opportunity to retain oil fired equipment as back up and these buildings could be asked to curtail to back up source in the event the island needs the capacity. If that was the case, the full capacity addition for conversion does not need to be directly added to the current capacity demand.

Please advise if any questions.

Regards
Jennifer

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Central Health

Name of Facility	Location	2016/2017 Fuel Total (Litres) [1]	Secondary Energy (MWh)	Efficiency Adjusted Energy (MWh) [2]	Demand (kW) [3]
Baie Verte	Baie Verte	125,744	1,351	1,013	289
Buchans	Buchans	62,152	668	501	143
CNRHC	Grand Falls	1,097,000	11,787	8,840	2,523
Dr. Hugh Twomey	Botwood	59,191	636	477	136
Hr. Breton	Hr. Breton	112,969	1,214	910	260
JPMH	Gander	1,391,290	14,949	11,211	3,200
LSH- water heaters	Gander	43,482	467	350	100
Bonnews	New-Wes-Valley	20,125	216	162	46
Brookfield Hosp.	Brookfield	24,003	258	193	55
NDBMHC	Twillingate	234,600	2,521	1,890	540
St. Brendan's	St. Bredan's	3,502	38	28	8
Mose Ambrose Clinic	Lewisporte	4,164	45	34	10
Valley Vista	Springdale	77,384	831	624	178
Green Bay	Green Bay	35,358	380	285	81
Total		**3,290,964**	**35,361**	**26,518**	

Notes:

1. Regional Health fuel data provided by NL Government
2. Efficiency Adjusted Energy based on AFUE factor of 75%
3. Demand is based on an average load factor and is the non-coincident peak demand for the faciltiy.

Source: Market Analysis Section, Transmission Operations Division
Newfoundland & Labrador Hydro

Date: 24-Sep-18

Transportation and Works Assets

Region	Name of Facility	Location	3 Year Average Fuel Total (Litres) [1]	Secondary Energy (MWh)	Efficiency Adjusted Energy (MWh) [2]	Demand (kW) [3]
Avalon	Building #904, Heating Plant	St. John's	1,478,652	15,887	11,915	3,401
Avalon	Highways Depot, Building #1170	St. John's	226,847	2,437	1,828	522
Avalon	H.M. Penitentiary - Administration Building	St. John's	270,705	2,909	2,181	623
Avalon	Young Offender's Institute (New)	Whitbourne	183,617	1,973	1,480	422
Avalon	Seal Cove Campus - CNA	Seal Cove	205,509	2,208	1,656	473
Avalon	Carbonear Campus - CNA	Carbonear	197,270	2,120	1,590	454
Central	Burin Campus - CNA	Burin	208,515	2,240	1,680	480
Central	Gander Campus - CNA	Gander	239,189	2,570	1,927	550
Central	Wooddale Tree Nursery - Greenhouses (38)	Grand Falls - Windsor	193,074	2,074	1,556	444
Western	Corner Brook Campus (Fisher Building) - CNA	Corner Brook	367,119	3,944	2,958	844
Total			**3,570,499**	**38,363**	**28,771**	

Name of Facility		2016/2017 Fuel Total (Litres) [4]	Secondary Energy (MWh)	Efficiency Adjusted Energy (MWh) [2]	Demand (kW) [3]
Memorial University		11,500,000	123,561	92,671	26,447

Notes:
1. Transportation and Works fuel data provided by NL Government
2. Efficiency Adjusted Energy based on AFUE factor of 75%
3. Demand is based on an average load factor and is the non-coincident peak demand for the faciltiy.
4. Memorial University fuel estimate confirmed by MUN data

Source: Market Analysis Section, Transmission Operations Division
Newfoundland & Labrador Hydro

Date: 24-Sep-18

On Feb 12, 2019, at 6:36 PM, Renee Smith <ReneeSmith@nlh.nl.ca> wrote:

Hi Corey,

The range considers that varied facilities exist. For example, a school would have a low load factor (0.43) while a hospital or service centre would have a higher on (0.6).

If we consider that conversion would likely occur in medium to large sized general service customers (i.e. rate class 2-2 and 2-4), and based on the different facilities that exist (i.e. a school at close to 0.43 load factor vs a hospital or service centre at closer to 0.6 load factor), we can estimate the energy consumption on the Newfoundland Power system load factor (approx 0.5).

As such, 10 MW of incremental new heating load of approximately 44 GWh.

For Hydro, the revenue associated with that load is approximated at $3.4M annually. This is based on the energy being charged at NPs energy rate from Hydro, estimated at an average of 7.6 cents / kWh, including demand charge.

Does that help?

Thanks,
Renee

Renee Smith, P. Eng. FEC
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From: "Snook, Corey" <coreysnook@gov.nl.ca>
To: '"JenniferWilliams@nlh.nl.ca"' <JenniferWilliams@nlh.nl.ca>
Cc: "ReneeSmith@nlh.nl.ca" <ReneeSmith@nlh.nl.ca>, "GrantOuterbridge@nlh.nl.ca" <GrantOuterbridge@nlh.nl.ca>
Date: 02/11/2019 09:05 AM
Subject: RE: [External] Rule of thumb

Hi Jennifer,

Thanks to you, Renee and Grant for your emails - clear and helpful.

Why would the load factor for hot water boiler/radiation heating vary so significantly (43-60%)? To be clear, I am just wondering about impacts of converting hot water boilers in large buildings from oil boilers to electric.

It's useful to think of the facility categories as either 1) those with oil boilers that can be retained for redundancy/contingency; 2) those where oil boilers will be removed and replaced with electric.

-Corey

Corey Snook
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<M2.jpeg>

From: JenniferWilliams@nlh.nl.ca <JenniferWilliams@nlh.nl.ca>
Sent: Friday, February 8, 2019 5:37 PM
To: Snook, Corey <coreysnook@gov.nl.ca>
Cc: ReneeSmith@nlh.nl.ca; GrantOuterbridge@nlh.nl.ca
Subject: Fw: [External] Rule of thumb

Hi Corey

Based on a rough set of calculations Renee and Grant completed below, your rule of thumb is in the ball park. The revenue is dependent on the customer class, so for the class of service of government buildings, the kwh rate is lower than domestic. If the current contemplation is the general service customer, you may want to be conservative in your base assumption and assume about $3m for 10 MW of load, however, that appears to be the lower bound and an increase in capacity factor or if other domestic new load commenced, the revenue would increase.

Please let us know if any additional questions,
Jennifer

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----- Forwarded by Jennifer Williams/NLHydro on 02/08/2019 05:27 PM -----

From: Renee Smith/NLHydro
To: Jennifer Williams/NLHydro@NLHYDRO
Cc: Grant Outerbridge/NLHydro@NLHYDRO
Date: 02/08/2019 05:26 PM
Subject: Re: Fwd: [External] Rule of thumb

Hi Jennifer,

Grant and I compiled the below. For 10 MW of load, assuming that all 10 MW came from the same rate class:

<M4.gif>

Based on this high level analysis, it looks like the revenue generated by an incremental 10 MW of load at current rates, depending on the rate class of the various customers could result in between $3M and $6M.

Thanks,
Renee

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From: Jennifer Williams/NLHydro
To: Renee Smith/NLHydro@nlhydro, Grant Outerbridge/NLHydro@nlhydro
Date: 02/08/2019 03:37 PM
Subject: Fwd: [External] Rule of thumb

Please see note below

Jennifer Williams
709-631-0914

Begin forwarded message:

From: "Snook, Corey" <coreysnook@gov.nl.ca>
Date: February 8, 2019 at 3:17:35 PM NST
To: "JenniferWilliams@nlh.nl.ca" <JenniferWilliams@nlh.nl.ca>
Subject: [External] Rule of thumb

Hi Jennifer,

Further to our meeting on electrification, can you please confirm that a fair rule of thumb for large heating facilities is:

10 MW new heating load can be expected to be ~43% load factor, which translates into 37.67 GWh/year. Assuming 10 cents/kWH, this means $3.8 million per year in new revenue.

In other words, each 10 MW of new heating demand added to the system will create about $3.8 million per year in new revenue?

-Corey

Corey Snook
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