

June 1, 2015

Ms. G. Cheryl Blundon  
Board of Commissioners of Public Utilities  
120 Torbay Road, P.O. Box 12040  
St. John's, NL  
A1A5B2

**Attention: G. Cheryl Blundon, Director of Corporate Services and Board Secretary**

Ladies & Gentlemen:

**Re: The Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System - Requests for information**

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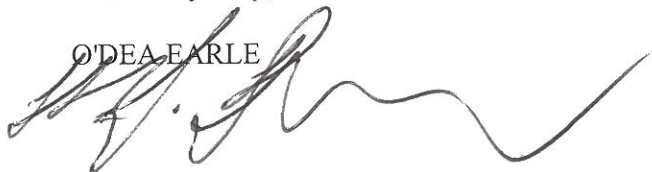
Further to the above noted, please find enclosed one (1) original and twelve (12) copies of the Consumer Advocate's Requests for Information numbered CA-NLH-86 to CA-NLH-131.

We trust the enclosed are found to be in order.

If you have any questions please feel free to contact the undersigned.

Yours very truly,

O'DEA-EARLE



THOMAS JOHNSON, Q.C.  
Encl.

cc; Newfoundland and Labrador Hydro  
Attention: Geoffrey P. Young

Newfoundland Power  
Attention: Gerard Hayes

Island Industrial Customers Group  
Attention: Mr. Paul Coxworthy (Stewart McKelvey)

Mr. Danny Dumaresque

**IN THE MATTER OF**

the *Electrical Power Control Act, 1994*,  
SNL 1994, Chapter E-5.1 (the "EPCA")  
and the *Public Utilities Act, RSNL 1990*,  
Chapter P-47 (the "Act"), as amended;

**AND**

**IN THE MATTER OF**

the Board's Investigation and Hearing  
into Supply Issues and Power Outages  
on the Island Interconnected System.

**CONSUMER ADVOCATE  
REQUESTS FOR INFORMATION  
CA-NLH-086 to CA-NLH-131  
Issued: June 1, 2015**

1 **CA-NLH-086:** In Hydro's Technical Note entitled Labrador-Island HVdc Link and Island  
2 Interconnected System Reliability dated October 30, 2011 (Exhibit 106 to Muskrat Falls  
3 Review), Hydro's System Planning Department states:

4  
5 **While the impact of these outage events could be further mitigated with the**  
6 **application of additional combustion turbines on the Island Interconnected**  
7 **System, given the low probability of the event and minimal impact on unsupplied**  
8 **energy, Nalcor, in the interest of minimizing overall cost to the customer, has**  
9 **opted to apply load rotation and other means to minimize the impact to customers**  
10 **should an event occur.**  
11

12 Does this statement reflect Hydro's anticipated approach to mitigating the outage events  
13 referred to in the Technical Note? If this remains the approach how does it compare with North  
14 American reliability standards? If not, what is the current approach and how does that  
15 approach compare with North American reliability standards?  
16

17 **CA-NLH-087:** Further to CA-NLH-034, has Hydro established any agreements with NERC,  
18 NPCC or ISO-NE regarding Hydro's proposals to comply with NPCC and NERC requirements?  
19 If so, please provide a copy of the agreements.  
20

21 **CA-NLH-088:** Further to CA-NLH-038, what is the status of the dedicated position for NERC  
22 compliance and the status of the plan development to date?  
23

1 **CA-NLH-089: Reference CA-NLH-063:** Please provide the latest Project Report on Muskrat  
2 Falls.

3  
4 **CA-NLH-090:** Further to CA-NLH-064, has Hydro considered the likelihood of an emergency  
5 supply situation in Newfoundland and Labrador due to weather also affecting Nova Scotia and  
6 interrupting Nova Scotia's power system?

7  
8 **CA-NLH-091: Reference CA-NLH-083:** Please provide a status update as to the work being  
9 undertaken by Hydro with Nova Scotia and other Maritime utilities.

10  
11 **CA-NLH-092:** Further to CA-NLH-083, please provide the data relied upon for concluding that  
12 "...there is a large enough distance between the island and neighbouring jurisdictions, that  
13 weather events do not tend to have major implications for all of the jurisdictions at the same  
14 time" as outlined in lines 14 to 17.

15  
16 **CA-NLH-093:** Further to GRK-NLH-068, please provide an update as to the status of the  
17 operational studies which were scheduled to be completed in 2015-2016.

18  
19 **CA-NLH-094: Reference: PUB-NLH 271:** What is the status of the operational studies for  
20 the operating guidelines for the LIL and synchronous condensing scheduled to be complete in  
21 2015-2016?

22  
23 **CA-NLH-095:** Further to PUB-NLH-279, please provide an update on the status review Hydro  
24 is undertaking with regards to generation capacity planning requirements to be applied following  
25 interconnection via the LIL and Maritime Link.

26  
27 **CA-NLH-096: Reference: PUB-NLH-280:** Please provide an update regarding Hydro's  
28 discussions with Nova Scotia Power Inc. and New Brunswick Power with regards to emergency  
29 assistance and reserve sharing. Have any final arrangements been negotiated? If so, please  
30 provide a copy of these arrangements. If not, when does Hydro anticipate the arrangements  
31 will be completed?

32  
33

1 **CA-NLH-097: Reference: PUB-NLH-298:** Please provide an update as to the status of the  
2 restoration plans relating to a failure of the HVdc line.

3  
4 **CA-NLH-098:** Referring to NP-NLH-001 and PUB-NLH-157, was the analysis anticipated for  
5 2012 ever completed? Have there been discussions with NERC and NPCC related to NERC  
6 compliance? If so, please provide a status report on those discussions.

7  
8 **CA-NLH-099:** Referring to NP-NLH-004, details are provided on design of the LITL HVdc line  
9 regarding ice and wind loading, but there is no inclusion of the impact ice could have on  
10 electrical flashovers due to ice on insulators. Please provide an overall MTBF (mean time  
11 before failure) and MTTR (mean time to repair) for both mechanical and electrical outages for  
12 the LITL overhead line and end-to-end evaluation of the LITL including the converter stations,  
13 submarine cable and electrode stations. The MTBF and MTTR should include both monopolar  
14 faults and bipolar faults.

15  
16 **CA-NLH-100:** Referencing NP-NLH-020 please explain the estimated amount of electrical  
17 flashovers per year that will be due to glaze and rime ice. How many of these annual  
18 flashovers will result in a successful restart of the HVdc line and how many will result in a  
19 monopolar forced outage and in a bipolar forced outage?

20  
21 **CA-NLH-101: Reference: PUB-NLH-210:** The Independent Engineer's Report provided  
22 was written in November 2013. Please file any updated Independent Engineer's Reports.  
23 When is the next Engineer's Report anticipated to be received by Hydro?

24  
25 **CA-NLH-102: Reference: PUB-NLH-223:** The response indicates that each electrode line  
26 will consist of two conductors such that a failure of an electrode line insulator does not result in  
27 a shutdown of the HVdc system. Does Nalcor have permission to allow the electrode line to be  
28 operated if there is a fault, such as a shorted insulator, that could conduct dc current into the  
29 earth at a location other than the electrode?

30  
31 **CA-NLH-103: Reference: PUB-NLH-239:** Nalcor did not answer if support agreements  
32 would be established with the submarine cable manufacturer and with marine contracting firms  
33 that are qualified to handle HVdc submarine cables. Does Nalcor intend to establish these  
34 support agreements and if so, when? If Nalcor does not plan to execute support agreements,

1 please estimate the time required to draft and negotiate these agreements when needed to  
2 repair a submarine cable.

3  
4 **CA-NLH-104: Reference: PUB-NLH-269:** Hydro states in its reply that there is adequacy  
5 of separation between the AC and DC lines. The value of the 60Hz current induced in the  
6 HVdc line was not provided. Has this 60Hz induced current been calculated? If yes, has the  
7 HVdc manufacturer been required to design 60Hz blocking filters for the DC circuit?

8  
9 **CA-NLH-105: Reference: PUB-NLH-298:** Hydro notes that asset management plans for  
10 the HVDC transmission line will be completed in the next 12-18 months. What is the status of  
11 the asset management plans for the HVDC converter stations, submarine cables, the electrode  
12 lines and electrodes? If they have been completed, please provide the reports. If the reports  
13 are not completed, why not and when does Hydro currently anticipate they will be completed?

14  
15 **CA-NLH-106: Reference: PUB-NLH-470:** The spare 350kV cable will need to be rapidly  
16 discharged from one potential and then connected to the opposite polarity pole. This means  
17 the spare 350kV cable will be exposed to a polarity reversal over a short period of time. Please  
18 confirm that the 350kV cable insulation, factory joints, field joints and station terminations will be  
19 designed to withstand the polarity reversal, and will be factory tested with the polarity reversal.  
20 Please also provide the amount of years of life that are reduced due to each polarity reversal for  
21 the 350kV cable insulation, factory joints, field joints and station terminations.

22  
23 **CA-NLH-107: Reference: PUB-NLH-496:** Figure 1 in the response provides the LIL  
24 delivered power profile following a permanent pole fault, a period of 30 minutes. Have studies  
25 been completed to estimate the amount of the electrode current that may return through  
26 unintended paths such as power transformer neutrals? If so, please provide the studies for  
27 review. If not, does Hydro intend to complete these studies and if so, when?

28  
29 **CA-NLH-108: Reference PUB-NLH-499 and CA-NLH-067:** Hydro claims the converter will  
30 not trip due to the loss of auxiliary power because an emergency generator will be started. The  
31 diesel generator start time will not be determined until later in 2015. Diesel generator start  
32 times may exceed the amount of time that can be tolerated for loss of the converter valve  
33 cooling system. Is there a backup plan, such as a smaller emergency pump supplied by a  
34 UPS, to prevent a trip? If yes, please provide the plan.

1 **CA-NLH-109: Reference: GRK-NLH-068:** The responses indicate that studies will be  
 2 required in the 2015/2016 timeframe to review the case for a bipolar trip of the LIL and  
 3 demonstrate the proposed load shedding schemes. The responses indicate the 2015/2016  
 4 studies will include the detailed PSS/e and PSCAD models that have been validated and  
 5 provided by the HVdc vendors. Will Hydro also use PSS/e and PSCAD models, validated by  
 6 the various vendors, for the synchronous condensers and generating units?

7  
 8 **CA-NLH-110: Reference: CA-NLH-069:** Have the HVdc vendor models for PSS/e and  
 9 PSCAD been completed? If not, what is the completion date? If yes, have the HVdc models  
 10 been exchanged between the HVdc vendors and has each HVdc vendor acknowledged the  
 11 models are working?

12  
 13 **CA-NLH-111: Reference: CA-NLH-081:** Please confirm that the table below is  
 14 representative of the supply situation on the Avalon Peninsula in 2013 and 2020 following  
 15 commissioning of Muskrat Falls and associated transmission, and assuming Holyrood TGS is  
 16 retired.

	<b>2013</b>	<b>2020</b>
<b>Peak Demand (MW)</b>	800	920
<b>Supply Capability</b>		
<b>Local Generation (MW)</b>	603	257
<b>Firm Transmission Capacity (MW)</b>	370	966
<b>Total (MW)</b>	973	1223
<b>Surplus Supply Capacity (MW)</b>	173	303

17  
 18  
 19 **CA-NLH-112: Reference: CA-NLH-081:** The difference in supply to the Avalon Peninsula  
 20 between 2013 and 2022 following Holyrood retirement relates to the amount of local generation  
 21 – it is substantially reduced in 2022 with greater reliance on power brought in to the Avalon  
 22 Peninsula over the enhanced transmission system. What are the pros and cons of this shift in  
 23 approach to the supply of power to the Avalon Peninsula? Are there other jurisdictions in  
 24 Canada and the United States that rely heavily on power brought in over the transmission  
 25 system rather than local power? More specifically, do the major load centers in Montreal,  
 26 Toronto and Winnipeg have full local backup power to supply the load in the event of loss of all  
 27 transmission into the cities?

1 **CA-NLH-113: Reference: CA-NLH-081:** The response addresses the double contingency  
2 assuming the total loss of the LIL and one circuit in the Bay d'Espoir to Western Avalon  
3 transmission corridor. What is the probability of occurrence of this double contingency? Further,  
4 the LIL and Bay d'Espoir to Western Avalon transmission corridors appear to be very close  
5 geographically where they cross into the Avalon Peninsula. What is the probability of loss of  
6 both corridors; i.e., loss of all transmission into the Avalon Peninsula?

7  
8 **CA-NLH-114: Reference: CA-NLH-081:** Please provide a table similar to Table 1  
9 (CA-NLH-081) comparing the capacity and energy balances on the Island Interconnected  
10 System in 2013 to 2022, but for the situation assuming the complete loss of the 830 MW LIL  
11 (delete the column relating to LOLH). Please identify the assumed level of support over the  
12 Maritime Link in 2022.

13  
14 **CA-NLH-115:** Under what scenarios would the post Muskrat Falls power system be less  
15 reliable and adequate than the power system currently in place?

16  
17 **CA-NLH-116:** Reliability can always be enhanced at additional cost. For example, the  
18 reliability of the power system is improved post Muskrat Falls if Holyrood TGS remains in  
19 service (CA-NLH-81). How does a utility determine if it has reached the point of diminishing  
20 returns when it comes to reliability expenditures?

21  
22 **CA-NLH-117:** Please refer to the response for PUB-NLH-212 and the Reliability & Availability  
23 Assessment of the HVdc Island Link. Has a similar reliability and availability report been  
24 completed for the Maritime Transmission Link? If yes, please provide a copy of the report. If  
25 no, please provide the date this report will be completed.

26  
27 **CA-NLH-118:** Please refer to the response for NP-NLH-004. Have similar HVdc overhead line  
28 tower and conductor design studies been completed for the Maritime Transmission Link? If  
29 yes, please provide a copy of the studies. If no, please provide the date(s) when these reports  
30 will be completed.

31  
32 **CA-NLH-119:** Further to CA-NLH-118, have studies been completed regarding the electrical  
33 performance of the Maritime Transmission Link overhead transmission line considering steady  
34 state voltage and transient overvoltage with normal conditions, pollution due to smoke and ice  
35 (rime and glaze) covering? If yes, please provide a copy of the studies. If no, please provide

1 the date(s) when these reports will be completed.

2  
3 **CA-NLH-120:** Further to CA-NLH-118, please provide the overall MTBF (mean time between  
4 failures) and MTTR (mean time to repair) for both mechanical outages (i.e., tower failure,  
5 conductor failure) and electrical outages (flashovers to other phases or to ground). Please  
6 include the MTBF and MTTR for both monopolar and bipolar faults.

7  
8 **CA-NLH-121:** Further to NP-NLH-020, for the Maritime Transmission Link, please provide the  
9 estimated numbers of electrical flashovers per year due to glaze and rime ice. How many of  
10 these flashovers are estimated to result in a successful restart and how many will result in an  
11 outage? Please provide your answers for both monopolar and bipolar faults.

12  
13 **CA-NLH-122:** Please provide the independent engineer's report for the Maritime Transmission  
14 Link.

15  
16 **CA-NLH-123:** Please refer to PUB-NLH-223 regarding the electrodes and electrode lines for  
17 the Labrador Island Link. Please provide the design reports for the Maritime Transmission Link  
18 electrode sites and the electrode lines. Do the design reports include an analysis of stray DC  
19 current that may flow, when the electrodes carry load current, on unintended paths such as  
20 pipelines, power system neutrals, through grounded-wye transformers, etc? If no, will a study  
21 be performed?

22  
23 **CA-NLH-124:** Please refer to PUB-NLH-239 regarding submarine cable repair support  
24 agreements for the Labrador Island Link. Have submarine cable repair support agreements  
25 been signed with the cable vendor and with qualified marine construction contractors for the  
26 Maritime Transmission Link? If yes, please provide copies of the agreements. If no, when will  
27 these agreements be completed? If the agreements will not be established, please estimate  
28 the required time and cost to establish these agreements when needed to repair a submarine  
29 cable fault.

30  
31 **CA-NLH-125:** Please refer to PUB-NLH-269 regarding the separation of the AC and DC  
32 overhead transmission lines for the Labrador Island Link. Please provide any reports that  
33 assess the separation distance for the AC and DC overhead lines for the Maritime Transmission  
34 Link. Do these reports include an analysis of the amount of 60Hz current that will be coupled  
35 into the overhead HVdc line? If not, when will the 60Hz coupling current analysis be



1 completed?  
2

3 **CA-NLH-126:** Please refer to PUB-NLH-298 regarding the asset management plans for the  
4 Labrador Island Link overhead transmission line. Please provide the asset management plans  
5 for the Maritime Transmission Link overhead HVdc lines, the HVdc submarine cable, the HVdc  
6 converter stations, the electrode lines and the electrodes.

7  
8 **CA-NLH-127:** Please refer to CA-NLH-034 regarding Hydro's assessment of NERC  
9 requirements. Have the Maritime Transmission Link parties established any agreements with  
10 NERC, NPCC or ISO-NE regarding compliance with NPCC or NERC requirements? If yes,  
11 please provide a copy of the agreements. If no, when will these agreements be completed?

12  
13 **CA-NLH-128:** In its submission of January 14, 2015, Hydro confirmed that it does not have a  
14 worst case planning estimate in excess of 2 weeks for the duration of an ice related forced  
15 outage for the HVdc line through the Northern Peninsula. Assuming that Hydro faced its worst  
16 case scenario in the heart of the winter heating season, provide a detailed explanation of how  
17 customers on the Island Interconnected System would have their power deliveries impacted.

18  
19 **CA-NLH-129:** As regards backup power from Nova Scotia, will there be adequate  
20 transmission line capacity to the Avalon Peninsula for the winter peak?

21  
22 **CA-NLH-130:** Has Hydro engaged with Newfoundland Power as regards coordinating and  
23 identifying the measures that have to be taken by each utility in order to successfully integrate  
24 power and energy from Muskrat Falls into the Island? Please detail these efforts. Has Hydro  
25 identified the measures that Newfoundland Power must take to allow the successful integration  
26 of Muskrat Falls power and energy on the Island?

27  
28 **CA-NLH-131:** Please provide the dates of, and participants in, any meetings held between  
29 officials of Hydro and Newfoundland Power to review and identify the measures required for the  
30 successful integration of Muskrat Falls power and energy on the Island.

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1 Dated at St. John's in the Province of Newfoundland and Labrador, this 1<sup>st</sup> day of June, 2015.

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