



NEWFOUNDLAND AND LABRADOR
BOARD OF COMMISSIONERS OF PUBLIC UTILITIES
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2021-08-13

Ms. Shirley Walsh
Senior Legal Counsel, Regulatory
Newfoundland and Labrador Hydro
P.O. Box 12400
Hydro Place, Columbus Drive
St. John's, NL A1B 4K7

Dear Ms. Walsh:

**Re: Newfoundland and Labrador Hydro - Reliability and Resource Adequacy Study
Review - Requests for Information**

Enclosed are Requests for Information PUB-NLH-180 to PUB-NLH-226 regarding the above-noted application.

If you have any questions, please do not hesitate to contact the Board's Legal Counsel, Ms. Jacqui Glynn, by email, jglynn@pub.nl.ca or telephone (709) 726-6781.

Sincerely,

Sara Kean
Assistant Board Secretary

SK/rr

Enclosure

ecc **Newfoundland and Labrador Hydro**
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1 **IN THE MATTER OF**
2 the *Electrical Power Control Act, 1994*,
3 SNL 1994, Chapter E-5.1 (the “*EPCA*”)
4 and the *Public Utilities Act*, RSNL 1990,
5 Chapter P-47 (the “*Act*”), as amended, and
6 regulations thereunder; and
7

8
9 **IN THE MATTER OF** Newfoundland and
10 Labrador Hydro’s Reliability and Supply
11 Adequacy Study.

**PUBLIC UTILITIES BOARD
REQUESTS FOR INFORMATION**

PUB-NLH-180 to PUB-NLH-226

Issued: August 13, 2021

1 **Muskrat Falls Project Current Schedule**

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PUB-NLH-180 What is the schedule for completion of all work on and the in-service date for the Muskrat Falls Generating Plant?

PUB-NLH-181 Provide the current schedule for the delivery of the GE final bipole software to the site and the dates for commencement and conclusion of trial operations. Explain any material risks that exist to achieving these project dates.

PUB-NLH-182 Provide an update on the valve hall beams replacement and the modifications to the synchronous condensers, including the current schedule for the completion of this work.

PUB-NLH-183 Has Hydro determined the cause of the damage to the L'Anse aux Diabls Electrode Site caused by a December 2020 storm and whether any modifications to the site are required?

Assessment of Labrador Island Transmission Link (LIL) Reliability in Consideration of Climatological Loads, March 10, 2021 (Haldar Report) by Dr. Asim Haldar, Ph.D., P. Eng

PUB-NLH-184 Haldar Report, page 7, lines 152-159. In Dr. Haldar's opinion what factors should be considered in determining the appropriate return period and level of reliability for the LIL? In the response provide an explanation as to Dr. Haldar's view on the significance of the LIL line length, the weather zones it transverses and its role in supplying customers in assessing the appropriate level of reliability for the LIL.

PUB-NLH-185 Haldar Report, page 8, lines 226-231. Does Dr. Haldar have an opinion, based on the work completed to date, as to what the return period for the LIL overall likely is?

PUB-NLH-186 Further to PUB-NLH-185, what in Dr. Haldar's opinion should be the appropriate return period and level of reliability for the LIL?

PUB-NLH-187 Haldar Report, page 13, lines 407-409. Provide a copy of the 2009 Haldar study.

PUB-NLH-188 Haldar report, page 22. Explain the difference between the damage limit state (DLS) analysis and the ultimate limit state (ULS) analysis and if, in Dr. Haldar's opinion, both are appropriate to consider when evaluating the reliability of the LIL. In the response state whether both types of analysis are widely used in the industry to evaluate transmission line design and reliability.

PUB-NLH-189 Haldar Report, page 46, lines 1399-1404. Explain why Dr. Haldar disagrees with the main premise in the Thomas 2011 Technical Note that a higher return

- 1 period than 50 years could not be justified because the 230kV line feeding the
2 Soldier's Pond converter station operates under a 50-year return period.
3
- 4 **PUB-NLH-190** Haldar Report, page 51, lines 1491-1494. What are the implications for the
5 reliability of the LIL that it does not meet industry practice in that the
6 foundations fail before the towers except in Zones 4a and 10-1 and industry's
7 best practice is that the tower is supposed to fail before the foundation?
8
- 9 **PUB-NLH-191** Haldar Report, page 59, lines 1665-1668. What are the implications for the
10 reliability of the LIL that it does not meet industry best practice that the
11 structural support system should fail first compared to the cable system?
12
- 13 **PUB-NLH-192** Haldar Report, pages 62-63. Explain how topographical effects are considered
14 under industry best practices for transmission line design and how they could
15 impact the reliability of a line and explain the degree to which topographical
16 effects are considered in the LIL design.
17
- 18 **PUB-NLH-193** Haldar Report, page 86, lines 2456-2462. In Dr. Haldar's opinion the LIL
19 design does not meet the requirement of critical load combinations and the
20 design is not adequate with respect to unbalanced loads. He further says that the
21 towers in Labrador do not have sufficient structural integrity and, in certain
22 scenarios, the LIL could experience structural failure. Is this concern limited,
23 in Dr. Haldar's opinion, to only sections of the LIL in Labrador?
24
- 25 **PUB-NLH-194** Haldar Report, pages 88-90. Dr. Haldar has made a number of
26 recommendations for additional studies and analyses with respect to the
27 assessment of the probability of failure of the LIL. Explain the priority that, in
28 Dr. Haldar's opinion, should be given to completing each of the recommended
29 additional analyses. In the response include whether all are necessary to be
30 completed, in his opinion, to gain a full understanding of the reliability of the
31 LIL and its probability of failure and which ones are most likely to have a
32 material impact.
33
- 34 **PUB-NLH-195** Haldar Report, pages 88-90. In the executive summary, page iv, it is stated that
35 the baseline probability of failure values reported in the report will change and
36 most likely increase when a fuller assessment is completed as recommended.
37 Results are given of a sensitivity completed of a combined wind and ice load
38 on certain structures in certain zones with the analysis showing a return period
39 of 10 to 20 years. Does Dr. Haldar expect that additional analysis will show
40 similar return periods for other zones?
41
- 42 **PUB-NLH-196** Haldar Report, page 89, lines 2583-2587. Dr. Haldar concludes that there are
43 gaps in the current LIL design due to the "*complete omission of load*
44 *combinations in the design*". Explain the implication of this gap for the LIL
45 design and its reliability.

- 1 **PUB-NLH-197** Newfoundland and Labrador Hydro filed a report, dated March 12, 2021 that
 2 provided an overview of the Haldar Report and Hydro's conclusions with
 3 respect to the findings. On page 3 it is stated that, "*To Hydro's knowledge,*
 4 *consideration of full line length was not a standard design consideration pre-*
 5 *CSA 60826 and it remains unclear how widely adopted such an approach is at*
 6 *present.*" Explain why, in Dr. Haldar's opinion, consideration of the LIL full
 7 line length is appropriate to gain a full understanding of the reliability of the
 8 LIL.
 9
- 10 **PUB-NLH-198** Further to PUB-NLH-197, is there an accepted methodology to evaluate the
 11 impact of line length on the reliability of a transmission line?
 12
- 13 **PUB-NLH-199** Further to PUB-NLH-198, is Dr. Haldar aware of any utilities or organizations
 14 that have considered full line length in the design of, or assessment of, reliability
 15 of a transmission line?
 16
- 17 **PUB-NLH-200** On April 30, 2021 Hydro provided to the Board and the parties its plan of work
 18 with respect to each of the recommendations in the Haldar Report. Provide Dr.
 19 Haldar's opinion as to whether Hydro's planned response to each of the Haldar
 20 Report recommendations is adequate to address the recommendation.
 21
- 22 **PUB-NLH-201** In an April 30, 2021 letter to the Board Hydro stated:
 23 *Additional scenarios and return periods were identified by Haldar &*
 24 *Associates based on line length considerations. The original design did*
 25 *not contemplate the impact of line length on reliability as this is not a*
 26 *requirement under the CSA standard. Haldar & Associates identified the*
 27 *independency between glaze and rime icing and the line length to be an*
 28 *important consideration. Correlations under both a DLS and a ULS*
 29 *scenario resulted in both having a return period of less than 50 years.*
 30 *Hydro has yet to determine its position with respect to this finding*
 31 *identified by Haldar & Associates. The consideration of overall line length*
 32 *and regional correlation will have a material impact on the overall*
 33 *calculated assessment of reliability of the line. Over the course of the*
 34 *coming weeks, Hydro will continue to evaluate the considerations*
 35 *identified by Haldar & Associate with respect to this concept to determine*
 36 *whether it should proceed with further work in this regard.*
 37
- 38 Has Hydro concluded its consideration of this finding? If yes, explain Hydro's
 39 position and whether it will be undertaking further work to address this finding.
 40 If no, explain what Hydro is doing to ensure it is fully considering this finding.
 41
- 42 **PUB-NLH-202** In letters dated April 30, 2021 and July 30, 2021 Hydro provided its plan and
 43 update on the plan to address recommendations in the Haldar Report. Please
 44 provide an update on the plan and the current status of Hydro's work to address
 45 the recommendations.

1 **Reliability and Resource Adequacy Study 2021 Update - Volume II: Near-Term Reliability**
 2 **(2021 RRAS Update)**

- 3
- 4 **PUB-NLH-203** 2021 RRAS Update, page 17, lines 1-4. Has Hydro received Newfoundland
 5 Power's forecast and updated its own load forecast? If, yes provide the updated
 6 forecast and explain any material differences between Hydro's and
 7 Newfoundland Power's forecast and any material difference between the
 8 forecast in the May, 2021 Update and the revised Hydro forecast. If
 9 Newfoundland Power's forecast has not been received, state when it is expected
 10 to be.
- 11
- 12 **PUB-NLH-204** 2021 RRAS Update, page 17. Restate Tables 3 and 4 to include the forecasts
 13 included in Hydro's May, 2020 Near Term Reliability Update, its October 2020
 14 Winter Readiness Planning Report and its November 2020 Reliability and
 15 Resource Adequacy Study 2020 Update. Explain any material differences
 16 between these various forecasts.
- 17
- 18 **PUB-NLH-205** 2021 RRAS Update, page 17, Table 4. Hydro has previously advised that the
 19 implications of additional generation requests for the Labrador Interconnected
 20 system are being addressed separately through the Network Additions Policy
 21 Incremental Load Requirements and System Impact Studies. When will these
 22 studies be completed and filed with the Board?
- 23
- 24 **PUB-NLH-206** 2021 RRAS Update, page 17, Table 4. Further to PUB-NLH-205 how many
 25 requests has Hydro received for additional generation on the Labrador
 26 Interconnected system and what is the total generation requested?
- 27
- 28 **PUB-NLH-207** 2021 RRAS Update, page 17, Footnote 26. How much from the total available
 29 generation capacity from the Recall and the Twin Falls Corporation blocks is
 30 forecast to be required for the Labrador Interconnected system in the winter of
 31 2021-2022? How much of this is used to supply industrial customers?
- 32
- 33 **PUB-NLH-208** 2021 RRAS Update, page 19, Figure 1. Update Figure 1 to show total system
 34 energy storage for the most recent available date.
- 35
- 36 **PUB-NLH-209** 2021 RRAS Update, page 23, lines 3-8. There is a significant risk of a shortage
 37 of generation availability if the LIL is not available in 2022 with the magnitude
 38 of the risk dependent on the availability of the Holyrood thermal generating
 39 plant. Hydro says this risk can be mitigated with imports over the Maritime
 40 Link. Does Hydro have contracts in place to source the required imports if
 41 necessary? If yes, provide the details of the purchase arrangements. If no,
 42 explain the degree of reliance Hydro places on the availability of imports to
 43 meet generation shortfalls in the absence of contractual entitlement to imports.

1 **PUB-NLH-210** 2021 RRAS Update, page 23, lines 3-8. Further to PUB-NLH-209 explain what
 2 Hydro's back-up plan to supply customers is should the LIL be unavailable for
 3 2022, the Holyrood thermal generating plant is not available and imports over
 4 the Maritime Link are not available.
 5
 6

7 **Failure Investigation Report – L3501/2 Tower and Conductor Damage, Icing Event**
 8 **January 2021 in Labrador (January 2021 Icing Event Report)**
 9

10 **PUB-NLH-211** January 2021 Icing Event Report, page 39. Weather stations are said to be
 11 located a significant distance from the transmission line with large differences
 12 in exposure and elevation and at page 14 it is noted that while there are existing
 13 transmission lines in central Labrador they are not in parallel corridors. Explain
 14 whether the weather information and limited operating experience available for
 15 the locations where the damage occurred was sufficient to properly inform the
 16 appropriate design for the transmission line in this section of central Labrador
 17 and what action Hydro is taking to obtain more detailed information on the
 18 weather exposures of the line in this area.
 19

20 **PUB-NLH-212** January 2021 Icing Event Report, page 47. Hydro concluded that the ice load
 21 in the January storm exceeded the 50-year loading at most tower locations
 22 between 350-600. What level of confidence does Hydro have that the 50-year
 23 design loading accurately reflects the weather conditions that can be expected
 24 to be experienced in the areas where the damage occurred?
 25

26 **PUB-NLH-213** January 2021 Icing Event Report. Explain any actions Hydro is taking to
 27 determine whether any additional work is required to strengthen the
 28 transmission line in central Labrador. If no action is being taken explain why
 29 not.
 30

31 **PUB-NLH-214** January 2021 Icing Event Report, page 71. Is the fact that with unbalanced load
 32 it is possible for the insulator to swing and contact the conductor considered a
 33 design deficiency? What steps is Hydro taking to eliminate this condition?
 34

35 **PUB-NLH-215** January 2021 Icing Event Report, page 73. Has the testing of the suspension
 36 clamps been concluded? If so, what were the results? If not, when will the
 37 testing be complete?
 38

39 **PUB-NLH-216** January 2021 Icing Event Report, page 73. What is the status of the
 40 investigation into the suspected galloping and vibration issues?
 41

42 **PUB-NLH-217** January 2021 Icing Event Report, page 73. It is recommended that ice
 43 monitoring and removal should be incorporated into the maintenance plan for
 44 L3501/2 to prevent ice accumulation that would overload the line. Describe
 45 what action Hydro is taking in response to this recommendation. If a plan has
 46 been developed to incorporate ice monitoring and removal provide a copy.

- 1 **PUB-NLH-218** January 2021 Icing Event Report, page 73. Explain the actions Hydro is taking
 2 to address the recommendations to consider adding additional bracing on the
 3 electrode cross arms, to review an alternate damper design, and to consider an
 4 alternate electrode suspension clamp design.
 5
 6
- 7 **Failure Investigation Report – L3501/2 Pole Assembly Turnbuckle Failure – Failure Event**
 8 **February 2021 in Labrador (2021 Turnbuckle Failure Report)**
 9
- 10 **PUB-NLH-219** 2021 Turnbuckle Failure Report, page 14. Explain the actions Hydro is taking
 11 to address the recommendations to add air spoilers in certain sections of the LIL
 12 to prevent galloping, to undertake a galloping study, to check the turnbuckle
 13 installation and to review the dead-end design.
 14
- 15 **PUB-NLH-220** 2021 Turnbuckle Failure Report. How long did the repairs to the LIL take for
 16 the January, 2021 weather events and the February, 2021 turnbuckle failure
 17 events and how long was the LIL out of service?
 18
- 19 **PUB-NLH-221** 2021 Turnbuckle Failure Report. Describe Hydro’s response to repair the LIL
 20 following the January 2021 icing event in Labrador and the February, 2021
 21 turnbuckle failure event. Include in the response how access to the locations
 22 where damage occurred was obtained and the length of time to access each of
 23 the damaged areas, the resources utilized to effect the repairs, any difficulties
 24 encountered in securing resources, the use of helicopters in the event diagnosis
 25 and repair, and the availability of materials required.
 26
- 27 **PUB-NLH-222** 2021 Turnbuckle Failure report. Assume the January and February, 2021
 28 Labrador outage events had occurred with the LIL in full rated bipole operation,
 29 with the Holyrood Generating Plant removed from service and no new
 30 generation added, how would the supply of power to customers on the Island
 31 Interconnected system been impacted by the 2021 outage events in Labrador?
 32
- 33 **PUB-NLH-223** 2021 Turnbuckle Failure report. Explain how Hydro intends to revise its
 34 maintenance and/or repair plans for the LIL as a result of lessons learned during
 35 the repairs required as a result of the January and February, 2021 outage events
 36 in Labrador.
 37
 38
- 39 **Redesign of UFLS Scheme for High Power Operation, dated March 17, 2021 (UFLS 2021**
 40 **Report)**
 41
- 42 **PUB-NLH-224** UFLS 2021 Report. Assuming the frequency controller is in service on the
 43 Maritime Link and the LIL and both interconnections are in service, what
 44 categories of system events would result in operation of the Under-Frequency
 45 Load Shedding scheme?

- 1 **PUB-NLH-225** UFLS 2021 Report. How much load would be shed on the Island Interconnected
2 system (IIS) if the Maritime Link and its frequency controller are in service and
3 the LIL is lost when importing 900 MW to the IIS?
4
- 5 **PUB-NLH-226** UFLS 2021 Report. Assuming normal restoration and adequate supply post a
6 LIL outage event and the Maritime Link and its frequency controller are in
7 service, how long will it take to restore the Island Interconnected system to its
8 pre-event condition if the LIL were lost when carrying 900 MW?

DATED at St. John's, Newfoundland this 13th day of August, 2021.

BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

Per 
Sara Kean
Assistant Board Secretary