

**NLH-LAB-004.** Re: “Newfoundland and Labrador Hydro’s Proposed Network Addition Policy and Transmission Expansion Study”, Section 2.4.2.3, page 23. “There is of course a value to improved reliability. There is however no reason to believe that this methodology captures it appropriately.”

- a) Has research been conducted on what would be a reasonable approach to valuing reliability? If yes, please provide.
- b) Is Mr. Raphals aware of an approach that he believes would reasonably quantify the value of reliability to existing customers from transmission upgrades? If yes, please provide.
- c) Please confirm if Mr. Raphals believes that using changes in Expected Unserved Energy is not a reasonable approach in evaluating the reliability benefits to existing customers of network additions. If not confirmed, please explain why Newfoundland and Labrador Hydro’s proposed approach is not reasonable.
- d) Please explain what aspects of Mr. Raphals professional and educational background provides the basis for his assessment of the appropriate approach to valuing improved reliability.

**RESPONSE:**

Mr. Raphals states:

- a) and b) There is an abundant literature debating different approaches to measuring and valuing reliability. The NERC study cited by Hydro in PUB-NLH-059, is a good example of the former. This study compares a variety of probabilistic indicators, such as LOLE, LOLP, LOLH, LOLEV as well as EUE. Its stated purpose is for resource adequacy and reliability assessment:

NERC is considering the value of implementing more probabilistic approaches to measuring the BPS (*bulk power system*) resource and transmission adequacy and evaluating whether probabilistic approaches should be used permanently in resource adequacy/reliability assessments.<sup>3</sup> (underlining added)

Nowhere in the study is it suggested that these measures are, could be or should be used for the purposes of fixing a tariff or a customer contribution to capital works. Under the heading “Applications”, the study’s comments about EUE read as follow (in their entirety):

---

<sup>3</sup> NERC, Probabilistic Adequacy and Measures, Technical Reference Report, April 2018, page 5.

Among survey responses, 20 of them calculate EUE in their probabilistic studies. EUE is widely used not only in probabilistic studies but also in other planning studies since it is an important indicator of system adequacy and easy to calculate. EUE is very useful in estimating the size of loss of load events so the planners can estimate the cost and impact of the loss of load events. EUE can be used as basis for reference reserve margin to determine capacity credits for variable energy resources. In addition, EUE can be used to quantify the impacts of extreme weather, common mode failure etc.<sup>4</sup>

There is thus no suggestion that NERC or the utilities it consulted ever considered using EUE for the purpose proposed by Hydro, nor have I been unable to identify any other utility that has used or considered using EUE for this purpose. Presumably Hydro would have identified such a precedent in its materials if it were aware of one.

There is also an abundant literature regarding how to value reliability. Examples are the 2009 and 2015 studies by Sullivan et al. published by the Berkeley Laboratory.<sup>5</sup> These are meta-analyses combining the results of many individual studies carried out by US utilities. However, the results cannot be readily applied to Labrador, due to its great demographic, geographic and economic differences from the US.

It is also important to distinguish between the different uses to which data about the value of reliability may be put. These include:

- Setting system reliability standards;
- Cost-benefit tests for individual investments;
- Setting parameters for incentive-based regulation; and
- Valuation of demand management resources.

I am not aware of any utility that has attempted to deduct the estimated value of improved reliability in calculating the capital contribution necessary for a transmission upgrade.

The Australian Energy Regulator (AER) has been charged with:

Develop[ing] a methodology for estimating VCRs [value of customer reliability], which includes a mechanism for directly engaging with retail and other customers to determine these values and a mechanism for adjusting VCR on an annual basis. This methodology must be fit for purpose for any current or potential uses of customer reliability that we consider to be relevant. Our practice is to consult widely on our decisions to maximise

---

<sup>4</sup> Ibid., page 18.

<sup>5</sup> Sullivan, M.J., et al., Estimated Value of Service Reliability for Electric Utility Customers in the United States, Lawrence Berkeley Laboratory, LBNL-2132E (June 2009); Sullivan, M.J., et al., Updated Value of Service Reliability for Electric Utility Customers in the United States, Lawrence Berkeley Laboratory, LBNL-6941E (January 2015).

stakeholder input on matters which may affect the costs customers face for the services they receive.

VCRs seek to reflect the value different types of customers place on reliable electricity supply under different conditions and are usually expressed in dollars per kilowatt hour (kWh). VCR is a critical input into identifying efficient levels of network expenditure.

AER further explains:

Because individual customers cannot directly specify the value they place on reliability, VCR is difficult to observe, and is typically estimated by survey techniques. VCR is not a single number but rather a collection of numerous values which apply to customers segmented by jurisdiction, region in a jurisdiction and customer type. The primary customer segments in previous surveys have been residential, commercial, industrial and directly connected customers.

AER is currently engaged in a multi-phase consultation process in order to determine the appropriate value of VCR for the Australian electricity system.<sup>6</sup> While it may not be necessary to undertake such an elaborate process in Labrador, a thorough, methodologically sound effort would nevertheless be required in order to place a monetary value on reliability improvements there.

c) I believe that Hydro's proposal with respect to EUE is problematic for a number of reasons:

- The proposed valuation of a kWh of EUE is not well supported. As indicated in PUB-LAB-002, while Hydro states it is using the cost of backup energy (gas turbine fuel) to calculate EUE, it appears instead to be using the average realized export price of 3.5 cents/kWh without escalation. Neither approach is an adequate substitute to a thorough-going evaluation of the value of improved reliability to Labrador consumers.

Unserved Energy is, by definition, unserved by the utility, and so it is not provided by gas turbine fuel. The value of an exported kWh is not relevant either.<sup>7</sup>

For those customers with their own backup generation, the benefit may indeed be measured by the cost of their fuel usage, but for other customers, the cost of an outage can vary from zero to a large amount, depending on their particular circumstances and the time of the outage.

---

<sup>6</sup> <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability-vcr>.

<sup>7</sup> I pointed out on page 23 of my report that, "Since unserved energy in fact increases the pool of unused recall power available for export, one could argue that, in reducing expected unserved energy, the transmission expansion creates an additional cost for Hydro, rather than a benefit."

It is interesting to note that, in the 2009 study, Sullivan et al. observed that:

The distribution of reported interruption costs has at least three characteristics which present significant challenges to the modeling exercise contemplated here. First, a significant portion of the observations have a value of zero. For example, 33.3% of reported interruption costs for medium and large C&I customers are zero.<sup>8</sup>

I am not aware of any study that attempts to determine the value of a kWh of unserved energy to the consumers of the Labrador Interconnected System. See also PUB-LAB-004.

- Hydro has not provided examples of any other jurisdictions that deduct the value of reliability to existing customers from the cost of transmission upgrades, nor am I aware of any.
- Even if a realistic EUE value could be determined, there are several aspects of the way that Hydro has chosen to use that value that are problematic. As noted on page 23 of my report, “In crediting the new customer for the full value of the EUE (up to a limit of 50% of the advancement costs), it is as if other consumers were reimbursing the new customer for saving them costs that they do not in fact incur”. No detailed justification has been provided for the proposed 50% cap. Furthermore, Hydro acknowledges that adding loads *without* corresponding capital upgrades inevitably tends to increase EUE. If EUE were treated as a real cost to consumers, shouldn’t consumers be compensated each time a new user comes on the system and degrades its reliability?

It may indeed be possible to develop a methodology for recognizing the value to other customers of the reliability benefits flowing from transmission upgrades, and for integrating that value into a network upgrade policy. If other utilities have explored this possibility, the fruits of their efforts should be obtained and considered. In my opinion, the method proposed by Hydro in this proceeding has significant flaws, and should not be approved at this time.

- d) See the CV appended to Mr. Raphals’ expert report. The views expressed are supported by Mr. Raphals’ expertise with respect to ratemaking, which has been recognized by several Canadian regulators, including this Board.

---

<sup>8</sup> Sullivan et al., 2009, *supra* note 5 at page 11 (p. 43 pdf).