Reference: 2024 Capital Budget Overview

Q. Page 8. Please provide Newfoundland Power's targets and actual results for reliability performance for the last ten years. Explain how these targets are established and how they are considered in the capital planning process.

A. **A. Response**

Table 1 shows the target and actual reliability performance results for the last 10 years, under normal operating conditions.

Table 1
Reliability Performance
Targets and Actual Results
2013 - 2022

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actual SAIFI	1.71	2.44	2.11	1.36	1.66	1.67	1.62	2.35	1.96	2.06
Target SAIFI	1.65	1.71	1.64	1.93	1.87	1.86	1.85	1.64	1.73	1.85
Actual SAIDI	2.23	2.93	2.36	2.24	2.28	2.65	2.34	2.98	2.48	3.02
Target SAIDI	2.53	2.41	2.38	2.36	2.30	2.27	2.39	2.37	2.50	2.55

The targeted reliability indices of average frequency ("SAIFI") and duration ("SAIDI") of outages are based on the Company's actual reliability metrics averaged over the most recent five-year period.

The service reliability experienced by customers primarily reflects the condition of the electrical system. Annual capital expenditures are essential to maintaining the condition of Newfoundland Power's system and, in turn, essential to maintaining the level of reliability currently experienced by customers.

While no projects or programs in the *2024 Capital Budget Application* are justified based on meeting a particular reliability target, the Company views its reliability performance to be indicative of the effectiveness of its approach to capital planning.[1]

[1] Newfoundland Power reviews the SAIDI and SAIFI statistics of its worst performing feeders as part of the Company's *Distribution Reliability Initiative*. Projects undertaken under the *Distribution Reliability Initiative* are targeted at improving service to customers that experience reliability that is considerably below the Company's corporate average. These projects are not undertaken for the purpose of improving overall corporate reliability. See Newfoundland Power's *2024 Capital Budget Application,* report *1.1 Distribution Reliability Initiative*.

Newfoundland Power is focused on maintaining current levels of service reliability for its customers under normal operating conditions. The frequency and duration of customer outages has been reasonably stable over the last decade under normal operating conditions.[2] In Newfoundland Power's view, this indicates that its approach to capital planning has been effective in maintaining the condition of its electrical system.

Reliability performance is not necessarily static over time. Degradation of reliability can have significant impacts on customers, both in terms of safety and costs, and is generally not consistent with sound utility practice. Challenges facing the electric utility industry pose a risk to maintaining reliability levels at a time when electrification of energy will make the reliability of electricity service even more essential to everyday life for customers.

For further information on distribution reliability and challenges that pose a risk to maintaining current levels, see the discussion below.

B. Distribution Reliability

Background

In 1998, the Board retained a consultant to review and report on the quality of service provided by Newfoundland Power to its customers. The Board's consultant recommended that the Company seek to improve its service reliability.[3]

Over the following decade, Newfoundland Power worked to improve the service reliability experienced by its customers.[4]

Table 2 shows the Company's SAIFI and SAIDI results for 1997 and 2007 under normal operating conditions.

Table 2
Reliability Performance
SAIFI and SAIDI
1997 and 2007

	1997	2007
SAIFI	2.76	2.11
SAIDI	3.71	2.65

[2] The average duration of customer outages over the last decade has ranged from approximately 2.2 to 3.0 hours per year. The average frequency of customer outages over the last decade has ranged from approximately 1.4 to 2.4 outages per year.

[3] See D.G. Brown, P. Eng., *Report on Newfoundland Light and Power Co., Limited Re Quality of Service and Reliability of Supply,* page v.

[4] For example, Newfoundland Power's *Rebuild Distribution Lines* capital program, which was introduced in *2004 Capital Budget Application*, is a cornerstone of its overall distribution reliability management practices.

Since that time, Newfoundland Power has worked to maintain its SAIFI and SAIDI performance. For example, over each of the last 10 and 15-year timeframes, SAIFI and SAIDI have averaged 1.9 and 2.6, respectively.

The Company's reliability performance was recognized by the Liberty Consulting Group ("Liberty") as part of the Board's investigation following #darkNL.[5] Liberty conducted a comprehensive review of the engineered operations of both Newfoundland Power and Newfoundland and Labrador Hydro ("Hydro"). With regard to the Company's reliability performance, Liberty found that:

> *Newfoundland Power's reliability has improved significantly since 1999 and has recently remained stable overall. Its transmission and distribution systems operate effectively in ensuring* ***adequate service reliability****. Effective maintenance and capital programs, that appropriately recognize the age of its assets, have contributed materially to improved reliability.*[6] ***[Emphasis added]***

In Newfoundland Power's view, its reliability performance is consistent with its obligation to deliver service that is safe and adequate and just and reasonable as required by Section 37(1) of the *Public Utilities Act*.

Current Reliability Assessment

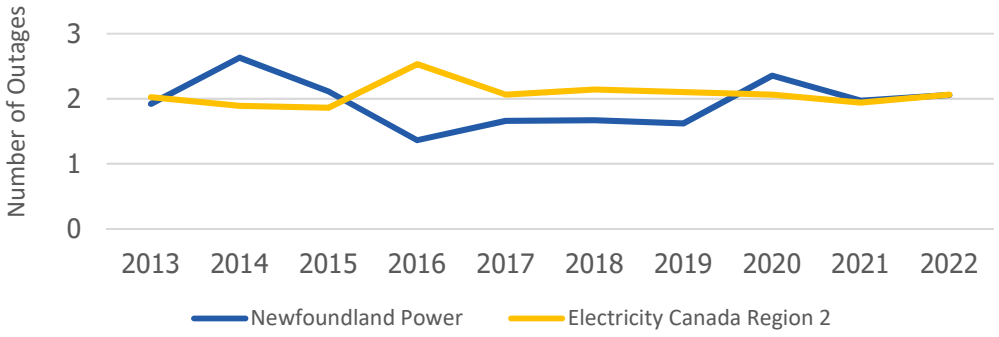
Figure 1 compares the average number of outages experienced by Newfoundland Power's customers to the Canadian average under normal operating conditions from 2013 to 2022.[7]

[5] During the period January 2-8, 2014, commonly referred to as #darkNL, customers on the Island Interconnected System experienced a series of power outages due to generation supply shortages and major electrical disruptions. The generation supply shortages resulted in rotating power outages which caused as many as 33,529 Newfoundland Power customers to be without electricity at one time. The impact of the major electrical system disruptions resulted in as many as 187,501 Newfoundland Power customers to be without power at one time.

[6] The Liberty Consulting Group, *Executive Summary of Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power Inc.*, December 17, 2014, page ES-2.

[7] The Canadian average reflects Region 2 utilities of Electricity Canada. Region 2 utilities include Canadian utilities that serve a mix of urban and rural markets. These are ATCO Electric, BC Hydro, FortisAlberta, FortisBC, Hydro One, Hydro-Québec, Manitoba Hydro, Maritime Electric, NB Power, Newfoundland and Labrador Hydro, Newfoundland Power, Newmarket-Tay Power Distribution, Nova Scotia Power, Northwest Territories Power Corporation, SaskPower, Elexicon Energy, Waterloo North Hydro, ATCO Electric Yukon and Yukon Energy.

Figure 1
Newfoundland Power vs. Canadian Average
SAIFI - Normal Operating Conditions
(2013-2022)

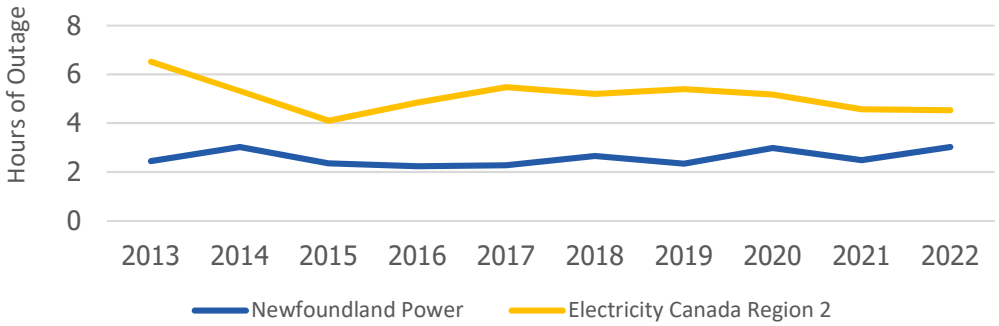


Newfoundland Power's customers currently experience about two customer outages each year. The SAIFI results are consistent over the last decade. The level of customer outages is also consistent with the average number of outages experienced by the comparator group of Canadian utilities.

In Newfoundland Power's view, SAIFI performance is most reflective of the condition of the electrical system. Capital planning priorities such as condition assessments, long-term asset management strategies and preventative and corrective maintenance programs maintained over time are essential to managing the number of power outages customers experience on an annual basis.

Figure 2 compares the average duration of outages experienced by Newfoundland Power's customers to the Canadian average under normal operating conditions from 2013 to 2022.

Figure 2
Newfoundland Power vs. Canadian Average
SAIDI - Normal Operating Conditions
(2013-2022)



Newfoundland Power's customers currently experience about two and a half to three hours, on average, of customer outages each year. The SAIDI results are relatively consistent over the last decade. The duration of customer outages is lower than the Canadian average over the last decade. However, the gap has narrowed in recent years, with the Canadian average improving slightly over the last five years.

In Newfoundland Power's view, SAIDI performance reflects both the condition of the grid as well as the Company's response when outages occur. Newfoundland Power's operational response requires the deployment of a skilled workforce throughout its service territory. Annual capital investments, such as the installation of equipment that provide a level of electricity system automation and the deployment of technology that allows the Company to respond to customer outages more quickly, are essential to customer outage response.[8]

Newfoundland Power's asset management and operating practices have provided consistent distribution system reliability performance for customers for more than a decade. Customers have indicated a reasonable level of satisfaction with the Company's service delivery over this period.[9] The number of outages experienced by Newfoundland Power's customers is comparable to the Canadian average while the Company's response to outages has provided for outages shorter in duration than the Canadian average.

Overall, Newfoundland Power considers its current distribution system reliability to be adequate.

Reliability Outlook

There are a number of factors that could impact the level of reliability currently being experienced by customers. Aging utility assets present a challenge to the electric utility industry generally, including Newfoundland Power. Weather events have historically been a risk to utility operations on the Island Interconnected System ("IIS"). Current uncertainties with supply adequacy and bulk transmission reliability could also have significant impacts on customers over the next decade.

At the same time, electrification of energy has begun and is expected to accelerate over the next decade as the province strives to meet net-zero targets. Beyond the system additions and demand management measures that will be required to meet the new load, the electricity system will become even more essential to all residents in the province.

Each of these factors are discussed below.

---

8 For a discussion on how the advancements in technology have contributed to an improvement in Newfoundland Power's reliability and overall consistent level of reliability since 2004, see the response to Request for Information PUB-NP-020.

9 Since 2013, customers' satisfaction with Newfoundland Power's service delivery has averaged approximately 86%. Newfoundland Power's lowest level of customer satisfaction during the period was 82%. That survey was conducted in the first quarter of 2014 following widespread customer outages experienced during #darkNL.

Aging Infrastructure

As Newfoundland Power's distribution system ages, the overall strength of the distribution system can be expected to decline. Issues associated with aging infrastructure, and related risks to current levels of reliability, are recognized across North America.[10]

Newfoundland Power is exposed to an increasing risk of equipment failure going forward due to the age of its electrical system.[11]

Table 3 summarizes the age of the Newfoundland Power's key Distribution and Substation assets.[12]

Table 3
Key Distribution and Substation Assets
Aging Analysis

Asset type	% exceeding industry average useful life	% to exceed industry average useful life in next decade
Distribution wooden support structures	13%	14%
Distribution overhead conductor	22%	21%
Substation power transformers	35%	34%

While age is not the primary determinant as to whether an asset requires refurbishment or replacement, it provides a reasonable indication of the probability that an asset may begin to fail. Approximately 27% of distribution wooden support structures either currently exceed, or will within the next decade, the average industry expected useful service life for that asset type.[13] The percentages for the same scenario for distribution overhead conductor and substation power transformers are 43% and 69%, respectively.[14]

[10] For example, in the Province of Ontario, the Mowat Centre's Report on the Ontario Energy Sector notes an average of $15 billion a year will need to be invested over the next two decades just to maintain current service levels. See *Mowat Centre, Background Report on the Ontario Energy Sector (December 2016).*

[11] The effect of age on the condition of Newfoundland Power's electrical system can be observed through its recent experience with equipment failures. An average of approximately 1,200 equipment failures per year were experienced on the distribution system from 2018 to 2022, which represents a 34% increase compared to the previous five-year period.

[12] See Newfoundland Power's *2024 Capital Budget Application, 2024-2028 Capital Plan, 2.4 Asset Condition Outlook*.

[13] 13% + 14% = 27%.

[14] Distribution overhead conductors: 22% + 21% = 43%. Substation power transformers: 35% + 34% = 69%.

Weather Events

Hurricanes, blizzards and ice accumulation have long posed a risk to distribution reliability for Newfoundland Power. Weather conditions that are less than extreme can also have a material effect on distribution reliability performance. For the Company's aerial distribution systems, the most common weather feature affecting customer reliability tends to be wind.

Table 4 shows the number of days where recorded wind speeds in Newfoundland Power's service territory exceeded 100 km/hr for the 10-year period from 2012 to 2021.

Table 4
Wind Speed in Excess of 100 km/hr[15] (days)
2012 to 2021

Year	Days
2012	23
2013	28
2014	51
2015	53
2016	57
2017	47
2018	50
2019	45
2020	42
2021	53

The data in Table 4 indicates that wind speeds in excess of 100 km/hr occur routinely in Newfoundland Power's service territory, averaging 50 days per year since 2014.

[15] Refers to the total days when wind speeds in excess of 100 km/h were experienced at one of four weather stations in the Company's service territory.

Compared to other electric utilities, Newfoundland Power's service territory is subject to some of the most severe wind and ice conditions for populated regions of Canada.[16]

Changing climate conditions can be expected to pose challenges to the reliability of the grid into the future.[17] The Atlantic Provinces Economic Council has stated that a greater occurrence of severe weather events is currently impacting the electricity industry and are presenting system planning and operational challenges for utilities.[18] The council also notes that a future risk of climate change is an increasing need to build reliable electricity systems as the climate becomes more unpredictable.[19]

Bulk Transmission Reliability

The reliability of bulk electricity supply from Hydro affects the reliability experienced by Newfoundland Power's customers. Outages that could result from an outage to the Labrador Island Link ("LIL") and the Holyrood thermal generating station could place additional strain on the distribution system if rotating power outages were required. For example, rotating power outages require more frequent operation of distribution equipment such as breakers and downline reclosers and cause higher loads on distribution lines than normal due to cold-load-pickup.[20] A reliable distribution system helps Newfoundland Power respond should such an event occur in the future.[21]

Given the seriousness of the potential reliability consequences, the maintenance of an adequately reliable distribution system, coupled with customer operations that enable the Company to respond to customer outages in an efficient manner, has increased importance over the next decade while resource adequacy and bulk transmission reliability concerns are addressed and solutions are implemented.

---

16 The principal design standard for distribution and transmission line design in Canada is the *CSA standard C22.3 No.1-15, Overhead Systems*. This standard recognizes four classifications of weather load conditions for ice accumulation, wind loading, and temperature. These are: (i) medium loading B; (ii) medium loading A; (iii) heavy; and (iv) severe. Newfoundland Power's service territory has heavy and severe loading classifications. Only two other provinces are identified as having severe weather loading areas. These are: (i) parts of northern and southern Manitoba; and (ii) rural parts of eastern Quebec, including the Gaspe Peninsula.

17 For example, as provided in the Canadian Institute for Climate Choices report *Enhancing the resilience of Canadian electricity systems for a net zero future*, page 5, powerlines, poles, and towers can be downed or damaged by severe weather events that may become more frequent as a result of climate change.

18 See page 4 of the Atlantic Provinces Economic Council's report, *An Overview of Atlantic Canada's Coming Economic Transition (Oct 2022).*

19 Ibid.

20 Cold-load-pickup refers to high electrical loads experienced on a transmission or distribution line following a sustained customer outage during cold weather. Higher loads on distribution lines can lead to conductor failure when trying to restore power to customers.

21 In Hydro's *Reliability and Resource Adequacy Study, 2022 Update* (the "2022 Update"), Hydro indicated that varying degrees of rotating outages could be expected in the event of a six-week outage of the LIL (see Volume III of the 2022 Update, page 30). In their response to Request for Information NP-NLH-087 of the same proceeding, Hydro estimated that a 150 MW outage would affect 40,000 to 50,000 customers, on average.

Electrification

The Provincial Government has committed to taking actions to address climate change, including advancing electrification in the province.[22] Actions to electrify space heating and the transportation sector increase customer reliance on electricity and have impacts on Newfoundland Power's distribution system and customer reliability.

Electricity is the primary source of space heating for Newfoundland Power's residential customers. Customer outages, particularly during the winter season, can present a risk to the health and safety of the population.[23] With the ongoing electrification of customer heating systems, the Company's customer base is becoming more dependent on electricity to heat their homes and businesses.[24]

Electrification of the transportation sector will also result in an increased reliance on the electricity system.[25] A common theme in electrification transportation planning is that grid readiness measures, such as increased investments, will be required to reliably meet the increase in electric vehicle related load.[26]

Electrification occurring concurrently with other utility challenges, such as aging infrastructure and climate change effects, necessitates an approach that, at a minimum, maintains current levels of service reliability.

Concluding

Newfoundland Power's distribution system reliability is currently adequate. The Company is focused on maintaining that level of reliability through maintaining the condition of its assets.

There are a number of challenges, both current and emerging, on the IIS that pose a risk to the Company being able to maintain its current level of reliability for its customers.

---

22 See, for example, The Provincial Government's December 13, 2021 new release, *Provincial Government Establishes Net-Zero Advisory Council.*

23 This is particularly true for vulnerable customers, such as senior citizens, as well as Newfoundland Power's critical customers. Critical customers are those with roles that are essential for the health, safety and welfare of the communities the Company serves. These would include, but not be limited to, hospitals, fire and police stations, seniors' homes, and water pumping stations.

24 On June 29, 2023 the Government of Newfoundland and Labrador announced incentives for customers to remove their oil heating systems in favour of electric heating systems. See Government of Newfoundland and Labrador news release *Provincial and Federal Governments Launch New Oil to Electric Incentive Program*, June 29, 2023.

25 As an example, Dunsky Energy Consulting ("Dunsky") provided an EV forecast in 2022 as part of Hydro's Reliability and Resource Adequacy Study. When considering all scenarios modelled by Dunsky, the number of light-duty EVs registered in the province is expected to range from 5,000 to 10,000 by 2025, increasing to 100,000 to 200,000 EVs by 2040.

26 See, for example, the Government of Canada's publication, *What we heard: NRCan's request for information on grid readiness for electric vehicles*.

For these reasons, it is Newfoundland Power's view that maintaining the condition of the electrical system though annual capital expenditures that are fully justified, such as those outlined in the *2024 Capital Budget Application*, is necessary to maintain adequate system reliability over the long-term.