Q. Further to the response to PUB-NLH-014 which describes risks and costs associated with delay of the Customer Service System project by 2, 3, and 5 years, please explain in detail if the risks and costs are the same for a delay of 2 years as they are for a delay of 5 years. In the response, please explain how qualitatively and quantitatively the risks and costs change by each year of a delay up to five years.

A. **A. Introduction**

Newfoundland Power's Customer Service System ("CSS") is critical to providing the Company's customers with equitable access to an adequate supply of power.[1] CSS is the primary system used when establishing electrical service for new customers. It is also the primary system used in applying the *Rates, Rules and Regulations* governing Newfoundland Power's service delivery.[2]

Comparable to physical infrastructure, such as poles and wires, information systems like CSS require routine maintenance, periodic upgrades and eventual replacement. Failure to adequately maintain, upgrade or replace information systems can result in poor system performance or system failure. The specific measures to manage system performance and availability are determined based on the risks facing each system and the criticality of a system in serving customers.[3]

Replacement of CSS is inevitable.[4] Newfoundland Power has determined that replacing CSS by 2023 is consistent with the provision of least-cost, reliable service to customers.[5] The Company's determination was made based on the risks facing CSS, available risk mitigation measures and associated costs. These considerations are consistent with the criteria recommended by EY in determining the most appropriate time to commence replacement.[6]

In Newfoundland Power's view, CSS must be replaced prior to exposing the system to a high degree of operational risk. This reflects the criticality of CSS, as exposing the system to a high degree of risk would pose a significant risk to the provision of service to customers.

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1 This is commonly referred to as the "obligation to serve." See Section 3(b)(ii) of the *Electrical Power Control Act, 1994*.

2 The *Rates, Rules and Regulations* governing Newfoundland Power's service delivery are periodically approved by the Board through general rate applications.

3 See, for example, response to Request for Information PUB-NP-012, in which Newfoundland Power describes its approach to managing system upgrades for critical business applications.

4 Market data clearly indicates that current industry practice is to replace legacy software, such as CSS, with modern, commercially available solutions. An assessment of alternatives for Newfoundland Power has confirmed that implementing a modern solution is the only option to ensure continuity in the Company's customer service delivery. See the *2021 Capital Budget Application, Volume 1, Customer Service Continuity Plan, Attachment A*, Section 4 Assessment of modernization alternatives and Appendix A Market Analysis.

5 See Section 3(b)(iii) of the *Electrical Power Control Act, 1994*.

6 See response to Request for Information PUB-NP-024.

Delaying system replacement by 2, 3 or 5 years would expose CSS to a high degree of risk. While risks would be considered high throughout that period, risk levels are expected to increase in severity annually.

Similar logic applies to the cost of delaying the replacement project. While a delay of 2, 3 or 5 years would result in additional costs to customers, costs are expected to increase the longer the project is delayed.

Delaying the replacement project by 2, 3 or 5 years would therefore be inconsistent with the provision of least-cost, reliable service to customers.

These issues are further addressed below.

B. Risks

Bi. 2018 Risk Assessment

Implementing a modern customer information system is a complex, multi-year effort. These projects are not typically undertaken in response to system failure. Rather, they include detailed assessment and planning, and multiple years to design, implement and stabilize a replacement system. Given the significant lead times associated with implementing a modern system, a reasonable indication of current and future risks is a critical input when considering an appropriate replacement timeframe.

As part of its routine technology planning, Newfoundland Power contracted Ernst and Young LLP ("EY") to undertake a risk assessment of CSS in 2018. EY is an industry-leading expert in utility customer information systems. EY conducted its assessment based on a standard methodology that evaluated:

(i) **Vendor risks**, which consider the probability and impact of software and hardware vendors no longer investing in or supporting their products;
(ii) **Support capacity risks**, which consider the probability and impact of having diminished skills and expertise to maintain a system;
(iii) **Business-enabling risks**, which consider the probability and impact of a system no longer meeting customer, business or regulatory requirements; and
(iv) **Reliability and security risks**, which consider the probability and impact of potential performance issues, including cybersecurity vulnerabilities.

EY assigned each risk dimension a rating from low to high based on a probability and impact matrix.[7] EY determined that CSS was facing moderate to moderate-high risks across 3 categories in 2018: (i) vendor risks; (ii) support capacity risks; and (iii) business-enabling risks. EY observed these risks are not static and will increase over time.[8]

[7] See Figure 1.1 of response to Request for Information PUB-NP-021.
[8] See EY, *CSS Technical Risk Assessment*, June 2018, page 20.

Bii. Continuous Risk Monitoring

Summary

Newfoundland Power has continued to monitor the risks assessed by EY in 2018. The Company's risk monitoring has indicated changes across 3 dimensions: (i) vendor risks; (ii) support capacity risks; and (iii) business-enabling risks.

Table 1 summarizes Newfoundland Power's monitoring of these risks, including the current status of each risk dimension and how those risks are forecast to change if the project is delayed by 2, 3 or 5 years (i.e. until 2025 to 2028).

Table 1
Newfoundland Power Risk Monitoring

Dimension	Change Since 2018	Current Forecast (2025-2028)
Vendor Risks	Risks have increased due to obsolescence of technology base[9]	• High risk due to diminishing pool of spare parts and reduced vendor support • Risk levels to increase in severity annually throughout the period
Support Capacity Risks	Risks have increased due to loss of personnel[10]	• High risk due to forecast employee retirements and barriers to recruitment/retention • Risk levels to increase in severity annually throughout the period
Business-Enabling Risks	Functional limitations (e.g. One-Time Customer Bill Credit) have validated risks[11]	• High risk due to functional limitations of CSS, diminished support capacity, and potential changes in service delivery • Risk level consistent throughout the period

In the Company's assessment, vendor risks and support capacity risks have increased and will continue to increase in severity annually should replacement of CSS be delayed by 2, 3 or 5 years. Business-enabling risks, while critical to Newfoundland Power's operations, are forecast to be reasonably consistent throughout the period.

Qualitative and quantitative information on each of these risks is provided below.

[9] See responses to Requests for Information CA-NP-070 (page 3, lines 1 to 6) and PUB-NP-014 (page 2, line 32 to page 4, line 15).

[10] See responses to Requests for Information CA-NP-070 (page 3, lines 15 to 21) and PUB-NP-013 (Attachment A, slide 14).

[11] See responses to Requests for Information CA-NP-070 (page 5, lines 14 to 30) and PUB-NP-014 (page 6, line 4 to page 7, line 3).

Vendor Risks

Vendor risks for CSS have started to materialize quickly. This is not unreasonable given the age of CSS and its underlying technologies.[12]

In 2018, the Customer/1 base of CSS was obsolete and other components were on the verge of obsolescence.[13] In 2020, the Hewlett Packard Enterprises ("HPE") Integrity servers underpinning CSS became obsolete.[14] At the time of delivering the technical conference on this project in November 2020, the Oracle database was the only core component of CSS that was not facing obsolescence.[15] However, Newfoundland Power was notified in January 2021 that this database is being retired.[16] As a result, *all core hardware and software components of CSS are now obsolete*.

The risk of operating obsolete hardware and software is significant and increases in severity annually. Integrity servers are no longer being manufactured. A reliable supply of replacement servers is no longer available. Future vendor support will be contingent upon the availability of spare parts, which will diminish annually. Similarly, the Oracle database will no longer receive cybersecurity or other patches to address potential vulnerabilities. The database will therefore become more vulnerable to failure as cybersecurity threats and technologies evolve over time. Failure of these components would lead to overall system failure.

Newfoundland Power's observed changes in vendor risks are consistent with the findings of EY in response to Request for Information PUB-NP-022.

Support Capacity Risks

Support capacity risks are forecast to become an increasing concern for CSS. CSS is supported by a small team with highly specialized skills. This team is responsible for troubleshooting issues that arise during day-to-day operations and overseeing all system upgrades and enhancements.[17]

In 2018, the support capacity for CSS was adequate, with a total of 12 employees. Based solely on retirement eligibility, the number of employees supporting CSS is forecast to

[12] CSS was technically migrated to a new architecture in 1998. This architecture includes the HPE Integrity servers, Oracle database, OpenVMS operating system and PowerHouse and Axiant programming languages. This is the same architecture upon which CSS operates today.

[13] For information on Customer/1, see response to Request for Information PUB-NP-018.

[14] The HPE Integrity servers are highly integrated with the OpenVMS operating system and PowerHouse and Axiant programming languages that underpin CSS. Obsolescence of the Integrity servers therefore forces obsolescence upon the current versions of these technology components. For information, see response to Request for Information PUB-NP-019.

[15] See response to Request for Information PUB-NP-013, Attachment A, slide 13.

[16] Previously published information indicated the Oracle database software used for CSS, which runs the OpenVMS operating system, would continue to receive enhancements and full support. Oracle's plans to further invest in this software ended abruptly in 2021, when they announced that the existing software version would be their last.

[17] For information on the support of CSS, see response to Request for Information CA-NP-074.

decrease annually from 2023 to 2027.[18] Annual reductions in capacity lead to annual increases in support risks. Additional reductions in capacity may also result from the unexpected loss of resources.

Options to replace lost capacity are limited. The skills necessary to support CSS are no longer offered as part of post-secondary programs and are no longer commonplace in the labour market. Recruiting and retaining employees to work on obsolete technologies is challenging, as future career prospects are severely limited in comparison to modern technologies.[19]

A decline in support capacity is concerning from multiple perspectives. First, an inadequately supported system faces increased risk of prolonged failure. Second, the technology base of CSS is now obsolete and vendor support will terminate for these technologies, increasing internal support requirements at a time when capacity is diminishing. Third, according to EY and other industry-leading experts, reduced support capacity would increase the risks of successfully executing a replacement project.[20]

Newfoundland Power's observed changes in support capacity risks are consistent with the findings of EY in response to Request for Information PUB-NP-022.

Business-Enabling Risks

Business-enabling risks are forecast to increase over the 2025 to 2028 timeframe, but are more challenging to predict with specificity.

The electricity sector in Newfoundland and Labrador is undergoing a period of significant transformation. The Muskrat Falls Project is changing how electricity is supplied to the majority of customers in the province. New initiatives, such as electrification of the province's transportation sector, are being pursued to mitigate customer rates.[21] The province's fundamental legislative framework has also been recommended for Provincial Government review.[22]

Newfoundland Power has been required to enhance CSS to provide new functionality once every 2.5 years.[23] Given the ongoing changes in the province's electricity sector, it is reasonable to expect additional enhancements will be required by 2028. CSS can no

[18] Based on retirement eligibility, support capacity is forecast to be 9 employees in 2024, 8 employees in 2025, 7 employees in 2026 and 6 employees in 2027. See response to Request for Information PUB-NP-014, page 5, Figure 1.

[19] Support of CSS requires highly specialized skills in computer programming and application design, including the PowerHouse and Axiant programming languages. These programming languages are no longer offered as part of post-secondary programs. Newfoundland Power's vendor of these programming languages no longer employs training personnel to offer that support. See response to Request for Information CA-NP-074.

[20] See responses to Requests for Information PUB-NP-014 (page 8, footnote 25) and PUB-NP-022, page 6.

[21] See Newfoundland Power's *2021 Electrification, Conservation and Demand Management Application*, filed December 16, 2021.

[22] See Commission of Inquiry Respecting the Muskrat Falls Project, *Muskrat Falls: A Misguided Project*, Volume 4, page 48.

[23] See response to Request for Information PUB-NP-014, page 6.

longer be cost-effectively upgraded to deliver new functionality. As a result, this poses a risk that Newfoundland Power would not be in a position to keep pace with changing customer or regulatory requirements.

C. Costs

In response to Request for Information PUB-NP-014, Newfoundland Power identified 3 principal costs associated with delaying the CSS replacement project:

(i) **System upgrade costs** – Should replacement of CSS be delayed by 1 year or more, Newfoundland Power would be required to complete a system upgrade. This upgrade would involve implementing the last line of Integrity servers, which are already obsolete. The cost of this upgrade is estimated at approximately $1.6 million. The detailed rationale for this upgrade is provided in response to Request for Information PUB-NP-019. This upgrade would not extend the service life of CSS as it would not mitigate the vendor, support or business-enabling risks described above.

(ii) **Assessment and planning costs** – Should replacement of CSS be delayed by 2, 3 or 5 years, Newfoundland Power would be required to update its *Customer Service Continuity Plan*. If the project were delayed by 2 years, minor updates would be required, primarily to ensure a sound cost estimate. If the project were delayed by 5 years, more substantive updates would be required to account for any changes in resources, business processes or data requirements, among other areas. EY estimates that additional assessment and planning costs could range as high as 50% of the original cost, or approximately $600,000, should the project be delayed by 5 years.

(iii) **System failure costs** – System failure costs would depend on the type and duration of the failure experienced. According to EY, system failure costs generally include recovery efforts, equipment costs and additional customer service costs. In Newfoundland Power's view, operating CSS during any period of high risk would result in a reasonable expectation of incurring system failure costs.

EY has identified additional costs should the replacement of CSS be delayed by 2, 3 or 5 years. These include: (i) costs related to additional enhancements during the interim period, whether planned or unplanned; (ii) inefficiencies during project execution due to diminished support capacity; and (iii) unknown costs should the replacement project be event-driven. For more information, see response to Request for Information PUB-NP-023.

D. Conclusion

Replacement of CSS with a modern system is the only viable option to mitigate the vendor, support capacity and business-enabling risks described above.[24] The timeframe for replacing CSS has been carefully considered through long-term risk management and diligent planning.

Replacing CSS by 2023 will avoid exposing a critical business application to unacceptably high levels of risk. Vendor risks and support capacity risks are increasing in severity annually. Business-enabling risks, given their potential impact on meeting customer and regulatory requirements, also pose a significant concern to the Company's provision of service.

Replacing CSS by 2023 will avoid additional investments in obsolete technology and additional assessment and planning costs. These costs would be unavoidable if system replacement was delayed beyond 2023. Costs would be expected to increase the longer the project is delayed.

Replacing CSS by 2023 will help manage project execution risks. Implementing a modern customer information system is a complex project. Adequate resourcing is critical to project success. If system replacement is delayed beyond 2023, Newfoundland Power would have diminished support capacity. This, in turn, would increase project execution risks. As support capacity is forecast to diminish annually, project execution risks would increase in severity the longer the project is delayed.

Replacing CSS in 2023 is consistent with the continued provision of least-cost, reliable service to Newfoundland Power's customers. Delaying replacement of this system would not be beneficial to the Company's customers.

[24] For an assessment of alternatives, see the *2021 Capital Budget Application, Volume 1, Customer Service Continuity Plan, Attachment A,* Section 4 Assessment of modernization alternatives.